Arab American University

Faculty of Graduate Studies

Department of Health Sciences

Master Program in Intensive Care Nursing

The Association between Nurse-to-Patient Ratios and Mortality Rates and Nurse Satisfaction in Intensive Care Units in West Bank

Salam Jafar Hassan Shahatit

202216331

Supervision Committee: Dr. Imad Abu Khader

Dr. Sajed Ghawadra

Dr. Khalaf Awwad

This Thesis Was Submitted in Partial Fulfilment of the Requirements for the Master Degree in Intensive Care Nursing Program.

Palestine, Feb/2025

Arab American University

Faculty of Graduate Studies

Department of Health Sciences

Master Program in Intensive Care Nursing

Thesis Approval

The Association between Nurse-to-Patient Ratios and Mortality Rates and Nurse Satisfaction in Intensive Care Units in West Bank

Salam Jafar Hassan Shahatit

202216331

This thesis was defended successfully on 13/2/2025 and approved by:

Thesis Committee Members:

Name	Title	Signature
1. Dr. Imad Rasheed Abu Khader	Main Supervisor	
2. Dr. Sajed Faisal Ghawadra	Member of Supervision Committee	
3. Dr. Khalaf Awwad	Member of Supervision Committee	

Palestine, Feb/2025

Declaration

I declare that, except where explicit reference is made to the contribution of others, this thesis is substantially my own work and has not been submitted for any other degree at the Arab American University or any other institution.

Student Name: Salam Jafar Shahatit

Student ID: 202216331

Signature: 

Date of Submitting the Final Version of Thesis: 13/5/2025

Dedication

To my dear parents, whose endless love, strength, and prayers have always guided me, who gave me limitless love and support and were my source of strength and refuge at every stage of my studies. To my mother, who taught me that dreams have no limits, and to my father, who instilled in me determination and resolve. And to the rest of my cherished family, at this moment, I can only say to you: Thank you from the bottom of my heart, for your constant support was and still is the reason for all my achievements.

To the pure soul of my aunt, the beloved of my heart, who left us but whose love and memory remain in my heart, and who was and still the first supporter in reaching this achievement, I always ask God to have mercy on her and make her abode in heaven.

Salam Jafar Hassan Shahatit

Acknowledgments

In the Name of God, the Most Gracious, the Most Merciful.

Praise God, who has guided me and provided me with His help and mercy to complete this work. I ask Him to remain with me in all my future steps.

First, I would like to thank God Almighty, who has blessed me with success and made this achievement possible through His grace and care.

I want to express my heartfelt thanks and deep appreciation to Dr. Imad Abu Khader, who was my role model and guide, and whose good guidance was the reason for completing this work. A lot of thanks for his great interest, patience, guidance, and sincere dedication, which had a great impact on shaping this research.

I would especially like to thank my dear friends, who were true partners in this academic journey. your companionship, every word of encouragement, and every moment of sharing played a great role in overcoming difficulties.

Lastly, I extend my gratitude to everyone who motivated and supported me, whether by a kind word or deed. Thanks to you, I have reached this stage.

The Association between Nurse-to-Patient Ratios and Mortality Rates and Nurse Satisfaction in Intensive Care Units in West Bank.

Salam Jafar Hassan Shahatit

Supervision Committee: Dr. Imad Abu Khader

Dr. Sajed Ghawadra

Dr. Khalaf Awwad

Abstract

Background: The nurse-to-patient ratio is critical to the quality of care a patient will receive, outcomes, and job satisfaction for nurses. In ICUs, nursing under-staffing has been associated with mortality and a predictor of nurse dissatisfaction, posing a challenge to the healthcare systems in the West Bank.

Purpose: This study aimed to examine the relationship between the nurse-to-patient ratios and mortality rates and nurses' satisfaction in the ICUs of West Bank hospitals.

Methods: A mixed-method was used with a quantitative cross-sectional survey approach to assess nurse satisfaction with a survey involving 78 ICU nurses, and a prospective observational data collection approach to assess mortality through hospital records during October and November 2024. It gathered demographic and satisfaction questionnaires and mortality statistics. Statistical analysis was performed in SPSS.

Results: Higher nurse-to-patient ratios were associated with higher ICU patient mortality rates, the researchers found. Higher ratios also correlated with lower nurse satisfaction in dimensions such as workload, teamwork, and opportunities for professional growth.

Conclusion: The report notes the importance of ratios as a determinant of patient and nurse safety. It is significant to implement evidence-based staffing policy and workload adaptation strategies to improve patient outcomes and nurse job satisfaction in West Bank ICUs.

Key Words: Nurse-to-patient ratio, mortality rates, nurse satisfaction, West Bank, health care staff.

Table of Contents

List of Tables

List of Figures

List of Appendices

Chapter One: Introduction

1.1 Background

Critically ill patients are mostly admitted to an intensive care unit (ICU) for close observation, continuous monitoring, and rapid actions. Adequate patient-to-nurse ratio is important for patient safety and quality of care (Lee et al., 2017).

Patient prognosis and outcome have been found to be inextricably connected to adequate nurse staffing levels in ICUs as well as normal ward settings (McGahan, Kucharski, Coyer, & Winner, 2012). However, the criteria used to determine adequate staffing levels in hospitals vary across different areas of specialization globally (Sharma & Rani, 2020).

When the ratio of nurses to patients is high, it indicates that there are comparatively many patients under one nurse's care; if it is low, on the other hand, there are relatively few patients under one nurse's care. Several studies assessing the impact of nurse staffing on mortality have yielded inconsistent findings (Neuraz et al., 2015).

Some studies have found a statistically significant relationship between ICU patient outcomes and the nurse-to-patient ratio (Rassin & Silner, 2007; Twigg, Duffield, Thompson, & Rapley, 2010), but other studies did not (Neuraz et al., 2015; Qureshi, Purdy, Mohani, & Neumann, 2019).

A study evaluating the relationship between nursing shifts with and without a patient mortality discovered that mortality associated with, lower nurse-to-patient ratios, in addition to high life-saving procedures(Lee et al., 2017).

Patient safety may be compromised in circumstances when there is a limited number of nurses staffing due to the need for critical care beds, lack of resources, and financial issues. Studies concluded that having the right number of nursing staff contributes to both clinical and financial gains in patient care. These gains include improving patient satisfaction, decreasing medication errors, reducing falls, Bed sores, and healthcare acquired infections, in addition to reducing the mortality rate, hospitalization period and re-admission, care costs, reducing nursing fatigue, and burnout among nursing staff with variations (Duffield et al., 2011; McGahan et al., 2012; Sharma & Rani, 2020).

The question of how many nurses are adequate for a specific kind of hospital ward is challenging to answer. However, in a given unit, the ideal nurse-to-patient ratio is

determined by several factors, including patients' conditions and needs, the number of patient admissions and discharges per day, nursing staff experience and knowledge, unit structure, and the availability of resources such as technology and support staff (Duffield et al., 2011; McGahan et al., 2012; Sharma & Rani, 2020).

In order to address the patient-to-nurse ratio (the number of patients assigned to one nurse during a shift) in critical care units and provide safe patient care focused on quality and desired patient outcomes, professional organizations such as the Australian College of Critical Care Nurses (ACCCN), the British Association of Critical Care Nurses (BACCN), and the American Association of Critical Care Nurses (AACN) have established minimum standards for nurse staffing levels. (McGahan et al., 2012; Sharma & Rani, 2020).

There was no significant correlation identified between in-hospital mortality and having a nurse-patient ratio of less than 1:2 during the day, evening, or night shift. However, there was a correlation in increasing resource consumption and the likelihood of complications following surgery (Cho, Hwang, & Kim, 2008).

For many reasons, the patient to nurses' ratio in an ICU differs from the general wards and other hospital services. The ACCCN has mandated a 1:1 nurse-to-patient ratio due to the high workload, the need for continuous monitoring, and the use of life-support machines such as cardiac monitors and mechanical ventilators. As a result, the nurse-to-patient ratio in intensive care units is significantly higher in Australia (Chamberlain, Pollock, Fulbrook, & Group, 2018). When a nurse needs assistance with duties that take more than one nurse to do, float nurses or assistant nurses must be used (Neuraz et al., 2015).

Different methods are used to calculate the nurse-patient ratio, there is no single method is appropriate in every situation. For many years, the census defined staffing levels; that is, the number of patients determined the number of nurses required to care for them. This really was strict enough to attend to the patients' medical requirements in case of unplanned situations. The other strategy, known as workload analysis, timed assignment, or activity technique, include nursing care activities types and frequencies(Sharma & Rani, 2020).

The World Health Organization (WHO) in 2020 created a framework known as "The workload indicator of staffing need", which is a common term for the bottom-up approach that uses to assess the need of nursing staff, by calculation of the number of nurses per cadre is determined by taking into account the hospital's available workload.

(World Health Organization. 2020). The number of caregivers responsible for a patient's care is believed to impact patient mortality; however, there is limited data to support this claim. In general, staffing levels should always reflect the workload that critical care teams are dealing with in order to ensure constant patient outcomes. The workload is often assessed using patient turnover in addition to personnel numbers, patient severity, and the number of life-saving treatments done (Qureshi et al., 2019).

1.2 Problem Statement

In health care sectors, nurse-to-patient ratio is a crucial component in determining the quality of patient care, especially in intensive care units (ICUs). Appropriate staffing levels improve patient outcomes and nurse job satisfaction, while insufficient staffing may adversely affect patient outcomes and mortality rates. Although many previous studies highlighted the importance of staffing level, there is still a knowledge gap about its impact on patient safety and nurse satisfaction in Arab countries and the West Bank in particular.

The impact of nurse staffing levels on patient outcomes has been demonstrated by several studies. For example, in Hong Kong a study conducted by (Lee et al., 2017) showed that in intensive care units (ICUs), a lower nurse-to-patient ratio significantly increased the chance of patient survival, while a higher ratio increased the risk of mortality. Likewise, another study conducted in many university hospitals found that high patient-to-nurse ratios (the number of patients assigned to one nurse during a shift) were related to higher mortality rates in ICU (Neuraz et al., 2015). These results emphasize the importance of maintaining appropriate nurse staffing levels to ensure the best care for patients and their outcomes.

Moreover, other studies have discovered a direct relationship between nurse-to-patient ratios and nurse job satisfaction (Qureshi et al., 2019) found that an increase in the nurse-to-patient ratio led to a decrease in quality of care and a worsening nursing workload. Similarly, another systematic review study conducted by (Driscoll et al., 2018) highlighted the favorable effects of higher nurse-to-patient on nurse satisfaction.

While many of the hospitals had no documentary records regarding the nurse-to-patient ratio, there was limited evidence at hospitals regarding the ratio and patient outcomes and even less about its impact on nurse satisfaction in the West Bank's healthcare system. Unique challenges have shaped healthcare in the region, including limited funding, staffing shortages, and variable policies on nurse-patient ratios. Hospital

administrators and policymakers need region-specific data to conduct proper staffing strategies. Despite the sizeable body of work that chronicles the challenges of the nursing workforce, much of the current literature falls short of providing insights needed to craft well-informed strategies to improve nurse retention, lower burnout, and enhance the quality-of-care patients receive.

This study intends to bridge this gap by providing empirical data on an under-researched area with the assumption that there exists an inverse relationship between nurse–patient ratios, mortality rates in ICUs, and nurses' satisfaction in governmental hospitals in the West Bank. The implications of this research will affect the policies in healthcare facilities and guidelines on staffing across nursing, leading to improved patient safety and nurse well-being throughout the region.

1.3 Significance of the Study

This study explores the relationship between the nurse-to-patient ratio and the mortality rates and nurse satisfaction in ICU departments in West Bank hospitals. It aims to improve patient care by knowing the optimal ratio of nurses to patients which reduces the mortality rates in intensive care departments. The results of the study can then be used to develop better recruitment policies that ensure improved quality of care and reduce mortality rates in ICUs.

This study also explores how the nurse-to-patient ratio affects the nurses themselves. By understanding this relationship, research can help improve nurses' morale and protect them from job burnout and exhaustion. This, in turn, ultimately creates a better work environment for nurses in intensive care departments in the West Bank.

This study contributes to global knowledge about nursing staffing and its impact on nurses' psychology, productivity, patient outcomes, and mortality rates.

1.4 Purpose of the study

This study aimed to investigate the correlation between the nurse-to-patient ratio and its effect on mortality rates and nurse job satisfaction in the ICUs of Palestinian hospitals.

1.4.1 Specific Objectives

1. To assess the level of satisfaction of ICU nurses with their hospitals in West Bank.

2. To assess the level of satisfaction with the nurse-to-patient ratio in ICU patients in West Bank hospitals.
3. To determine the level of job satisfaction of nurses working in ICU in West Bank hospitals.
4. To identify the difference between the satisfaction with nurse-patient ratio and job satisfaction based on demographic characteristics.
5. To investigate the relationship between the satisfaction with nurse-patient ratio and job satisfaction.
6. To identify the differences in nurse-patient ratio and mortality rates.

1.4.2 Research Questions

1. What is the level of satisfaction of ICU nurses with their hospitals in West Bank?
2. What is the level of satisfaction with the nurse-to-patient ratio in ICU patients in West Bank hospitals?
3. What is level of job satisfaction of nurses working in ICU in West Bank hospitals?
4. Is there a significant difference between the satisfaction with nurse-patient ratio and job satisfaction based on demographic characteristics?
5. Is there a significant relationship between the satisfaction with nurse-patient ratio and job satisfaction?
6. Is there a significant difference between nurse-patient ratio and mortality rates?

1.4.3 Research Hypotheses

1. There is no significant difference between the satisfaction with nurse-patient ratio and job satisfaction based on demographic characteristics.
2. There is no significant relationship between the satisfaction with nurse-patient ratio and job satisfaction.
3. There is no significant differences between nurse-patient ratio and mortality rates.

1.5. Variables

- Dependent variables are mortality rates and nurses' satisfaction.
- Independent variables are the nurse-to-patient ratio in addition to participant characteristics.

1.6. Conceptual Definitions

Mortality rates: the number of deaths resulting from the health incident being investigated and can be expressed as an absolute number or a rate. (Hernandez & Kim, 2024)

Nurse-to-patient ratio: related to the number of patients a registered nurse cares for through a shift. (NurseJournal, 2023)

Job satisfaction: Job satisfaction is a person's overall evaluation of their job — the extent to which a particular person favorable or unfavorable it. An individual's thoughts (cognitions), feelings (affect), and behaviors related to their job. (Meier & Spector, 2015)

1.7. Conceptual Framework

This study's conceptual framework revolves around the interrelationship between nurse-to-patient ratios, patient mortality rates, and nurse satisfaction in ICU departments. It is illustrated in the diagram below.

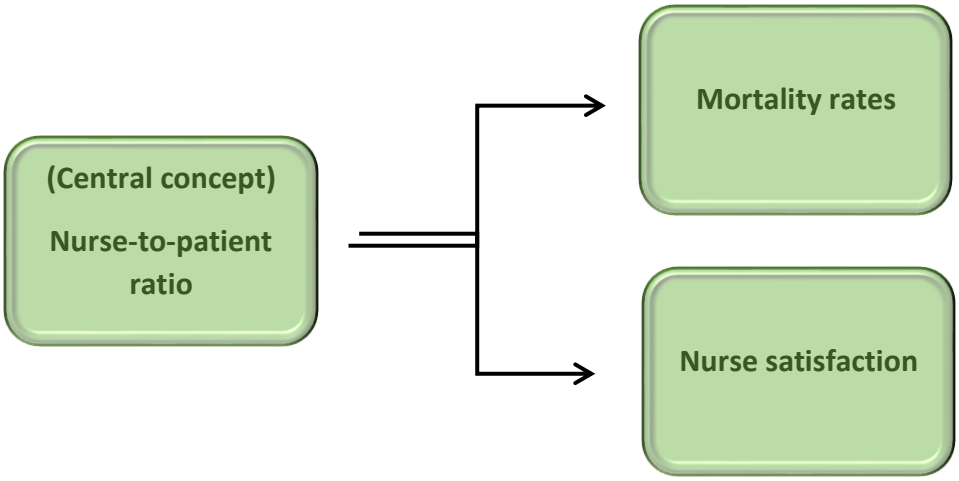

Figure 1.1. The Conceptual Frameworks

1.8. Summary

This thesis looks at the relationship between nurse staffing and both patient mortality as well as nurse satisfaction in ICUs. Specifically, this study focuses on West Bank ICUs, there is a lack of research in the West Bank and we hope to bridge this gap for better patient care as well as nurses' welfare. The study provides insights into the influence of staffing levels on patient mortality and nurse satisfaction. If more robust evidence of the types and quantities of harm to patients, it might lead to improve healthcare practice standards for patient safety or quality improvements. This policy brief will focus on nurse-to-patient ratios and their impact on the mortality rates of patients, and nurses' job satisfaction by providing evidence-based staffing recommendations.

Chapter Two: Literature Review

2.1 Introduction

In this literature review, the published research articles on the topic of "Nurse-to-Patient Ratios, Mortality Rates, and Nurse Satisfaction in West Bank ICUs" were reviewed. The search was done by using electronic libraries Google Scholar, Cumulative Index to Nursing Allied Health Literature (CINAHL), PubMed, and Semantic Scholar, for the following terms (nurse-to-patient ratio, mortality rates, nurse job satisfaction, Intensive Care Unit (ICU)) including previous researches that available in full text in English language and published no longer than ten years ago. 50 articles were found and after applying inclusion criteria it ended up with 15 articles. This literature review is divided into two parts that are nurse-to-patient ratio and its effect on mortality rates and the nurse-to-patient ratio and its effect on nurses' satisfaction.

2.2 Nurse-to-Patient Ratio and Its Effect on Mortality Rates

In a French study conducted in four university hospitals with eight intensive care units, the researchers aimed to evaluate the impact of nurse-to-patient ratio, and physician-to-patient ratio and workload on the mortality rate in the intensive care unit. The study included a reference population of 5,718 admitted patients. The results of this study found that when the patient-to-nurse ratio was higher than 2.5 (Two and a half patients for one nurse), the risk of death increased by 3.5. Similarly, when the patient-to-physician ratio surpassed 14 (14 patients for one physician), the risk of death increased by 2.0. This study concluded that there was a higher likelihood of death when the nurse-to-patient ratio was lower, the patient turnover was higher, and the number of life-sustaining procedures increased (Neuraz et al., 2015).

A Chinese retrospective analysis was conducted on prospectively collected data from a cohort of 845 adult patients admitted to two Intensive Care Units. The study examined the relationship between nursing shifts and patient outcomes. The findings revealed that a lower nurse-to-patient ratio, higher patient turnover, and increased number of life-sustaining procedures were associated with a higher likelihood of patient death. The analysis demonstrated that a maximum workload-to-nurse ratio below 40 had a 95% probability of improving survival to hospital discharge, while a ratio exceeding 52 had a more than 95% chance of increasing the likelihood of death. Patients exposed to a high workload-to-nurse ratio (52 or higher) for at least one day during their ICU stay had lower

risk-adjusted odds of surviving to hospital discharge compared to patients who were never exposed to such high ratios (odds ratio). In conclusion, exposing critically ill patients to high workload/staffing ratios significantly reduces their chances of survival (Lee et al., 2017).

A prospective panel study conducted in Queensland hospitals (Australia) compared the effects of a staffing ratio policy on staffing levels and patient outcomes. The study included 27 intervention hospitals subject to the policy and 28 comparison hospitals without the policy. Data was collected before and 2 years after policy implementation. Standardized patient data linked with death records were used to assess patient characteristics and outcomes such as 30-day mortality, 7-day readmissions, and length of stay for medical-surgical patients. Additionally, survey data from 17,010 medical-surgical nurses in the study hospitals were collected before and after policy implementation. The study analyzed 231,902 patients at baseline and 257,253 patients in the post-implementation period. After policy implementation, mortality rates in comparison hospitals did not significantly increase compared to baseline. However, intervention hospitals showed significantly lower mortality rates compared to baseline. In terms of readmissions, there was an increase in comparison hospitals from baseline to post-implementation, but no significant change was observed in intervention hospitals (McHugh et al., 2021). Overall, the findings suggest that the staffing ratio policy was associated with lower mortality rates in intervention hospitals compared to baseline, while readmissions increased in comparison hospitals but remained relatively stable in intervention hospitals.

Another systematic review study and meta-analysis of 35 cross-sectional studies examining nurse staffing levels and patient outcomes in acute specialist units found that higher staffing levels were associated with improved patient outcomes, including reduced mortality, medication errors, ulcers, restraint use, infections, pneumonia, increased aspirin use, and higher rates of percutaneous coronary intervention, while a meta-analysis of six studies focusing on intensive care and cardiac/cardiothoracic units showed that higher nurse staffing levels decreased the risk of in-hospital mortality by 14%, although there was high heterogeneity among the studies (Driscoll et al., 2018).

(Qureshi et al., 2019) carried out a study to evaluate a novel nurse-focused discrete event simulation modeling approach to predict nurse workload and care quality. They employed discrete event simulation to develop a "Simulated Care Delivery Unit" model that could forecast the effects of different nurse-patient ratios. The model incorporated

various inputs, including patient care data from GRASP systems, the floor plan of the in-patient unit, and operational logic. The model generated outputs such as nurse workload measurements (e.g., task-in-queue, cumulative distance walked) and care quality indicators (e.g., task-in-queue time, missed care). The findings of the study indicated that an increase in the nurse-patient ratio (NPR) resulted in a decline in care quality, with a 120% increase in missed care and a 20% increase in task-in-queue time. Furthermore, nursing workload demonstrated a significant increase, with a 120% rise in task-in-queue and a 110% increase in cumulative walking distance.

An Observational cross-sectional study conducted in Illinois state in 2021 using data from using data from 2020 on nurse staffing levels, Medicare patient data claims (2018), and from a nurse survey (December 2019 - February 2020) to assess the differences in nurse staffing ratios in Illinois hospitals, and assess if increased workloads for nurses are related to patient mortality, length of stay, and hospital cost outcomes. The findings showed that when the nurse-to-patient ratio exceeds the proposed 4:1 ratio in safe staffing legislation, the patient mortality rates increase by 16% for every additional patient, and hospital longer stays increase by 5% for every additional patient, and when implementing the proposed 4:1 ratio could have prevented over 1,595 deaths and saved hospitals over 117 million dollars yearly (Lasater et al., 2021).

A review study conducted in 2021 aimed to infer the impact of nursing workload on patient outcomes and safety in the ICU departments. The study found a strong relationship between nurse workload and patient outcomes on more than one hand, On the one hand, the high nursing workload had an impact on increased mortality rates and nosocomial infections like pneumonia, and on the other hand, the more workload the more nurse burnout and dissatisfaction, and this in turn negatively affects the quality of care of ICU patients and longer hospital stays (Almenyan, Albuduh, & Al-Abbas, 2021).

2.3 Nurse-to-Patient Ratio and Its Effect on Nurses' Satisfaction

A systematic review study aimed to examine how the nurse-to-patient ratio affects the mental and emotional well-being of nurses, as well as their overall productivity. The findings indicated that factors such as mismanagement of resources, lack of follow-through, extended shifts, and excessive personal requirements contributed to nurse dissatisfaction and burnout. Unlike states with legally mandated ratios, the state in question did not have consistent monitoring of nurse staffing levels. While a suggested norm of two patients per nurse existed, this ratio often deviated due to patients requiring

varying levels of attention and cost-cutting practices that resulted in overcrowded and understaffed floors. Overall, the study highlighted the importance of maintaining appropriate nurse-to-patient ratios to prevent nurse burnout and ensure quality care (Gutsan, Patton, Willis, & Alberto Coustasse, 2018).

A cross-sectional study used a self-administered questionnaire to investigate the correlation between nurse staffing levels, workload, and burnout. The questionnaire that measures ADPNR (average daily patient-nurse ratio), intention to leave the job, nurse burnout, patient-related burnout, job dissatisfaction, and other demographics was distributed among full-time registered nurses working in medical or surgical wards of tertiary and secondary hospitals in Taiwan. The study found that there is an effect on the three mediators in this study related to standardize ADPNR, the higher intention to quit the job was correlated with higher levels of burnout and job dissatisfaction, and the indirect effects of ADPNR, which were mediated by burnout and dissatisfaction, were greater than the direct impacts on the intention to leave a job (Chen et al., 2019). In general, the study shows that having a safe staffing ratio is crucial to avoid staff turnover, burnout, and dissatisfaction among nurses.

In May 2017, a secondary analysis conducted of an online-based cross-sectional survey of registered nurses from across the UK was developed and administered by the Royal College of Nursing, the purpose of the study was to investigate factors that contribute to nurses' demoralization and dissatisfaction after their most recent shift. The study showed that staffing issues like understaffing or high nurse-to-patient ratio lead to risk for patients and nurses and that in turn leads to increased job dissatisfaction and demoralization (Senek et al., 2020).

Similarly, in 2019 a systematic review study was completed that evaluated the correlation between nurse-to-patient ratio and nurse outcome in which 30 articles published from 2002 to 2018 were reviewed. The study revealed that nurse outcome was significantly related to nurse-to-patient ratio. A low nurse-to-patient ratio is higher in nurses’ job satisfaction, lower burnout risk and intent to leave the profession, lower number of needle stick injuries, and a perception of quality care services and patient safety (Wynendaele, Willems, & Trybou, 2019).

Chapter Three: Methodology

3.1 Introduction

The crucial topic of the role of nurse staffing in the intensive care unit (ICU) was discussed in previous sections which found that the nurse-to-patient ratios possibly affect satisfaction among nurses or even the mortality rate of patients. In this chapter, the inherent methodology to examine these correlations will be clarified.

This study applied mixed methods via quantitative descriptive cross-sectional and prospective research design. A quantitative cross-sectional method used to evaluate the correlation between the nurse-to-patient ratio and ICU nurses' satisfaction. The prospective part was concerned with examining how the nurse-to-patient ratio is related to the mortality rate in ICU departments at West Bank.

This chapter include the following research design, study setting, data collection, data analysis, ethical considerations, and limitations.

3.2 Research Design

The study utilized a combination of two methods of study design, which are a quantitative cross-sectional method & prospective data collection method, to provide a comprehensive assessment of the nurse-to-patient ratio effect on the nurses' satisfaction with work and patient mortality in ICU departments.

3.2.1 Quantitative Cross-Sectional Survey Method

This section used a quantitative cross-sectional method to evaluate the correlation between the nurse-to-patient ratio and ICU nurses' satisfaction with their jobs in the West Bank. This design allows to collect the data from nursing staff at a specific point in time to explore the satisfaction of nurses and their association with staffing levels.

3.2.2 Prospective Observational Data Collection Method

Through this design, the relationship between the nurse-to-patient ratio and mortality rates in ICU departments was explored by obtaining data from hospital records for one month (from October 2024 to November 2024) and then analyzing if there is a relationship with staffing levels in ICU departments.

3.3 Study Setting and Participants:

3.3.1 Setting

This study's sample includes nurses who work in adult ICU departments. It was taken from the hospitals of the North, Central, and South regions of the West Bank, which included one governmental hospital from every region with an adult ICU department.

The hospitals were:

1. Hebron Governmental Hospital from the South region.
2. Palestinian Medical Complex – Ramallah Hospital from the central region.
3. Rafedia Surgical Hospital from the North region.

Hebron Governmental Hospital, the ICU department of this hospital has a full capacity of 15 beds which was full almost time, and the total number of nurses who work in is 36 nurses. Data collected from this hospital from the period of 6/Oct./24 to 12/Nov./24.

Palestinian Medical Complex, the adult medical ICU of this hospital is divided into two sections that are Old ICU and the New ICU, and the capacity is 10 beds and 21 nurses in every section, which means the total capacity of the whole ward is 20 beds and there are 42 nurses working in the ward. We start to collect the data on 29/Sep./24 to 2/Nov./24.

Rafeidia Surgical Hospital, the hospital has a full capacity of 13 beds and the total number of nurses is 24 who work in the ICU ward. The data started to collect from 5/Oct./24 to 4/Nov./24.

3.3.2 Population

The study population includes the nurses who work in ICU departments at governmental hospitals in the West Bank. And their number is 243 nurses.

3.3.3 Sample

The investigation targeted 80 nurses employed at ICU departments in West Bank hospitals chosen for the study.

The sample size was determined using Cochran's formula for finite populations. Given a 95% confidence level, a 10% margin of error, and an assumed population proportion of 50%, the initial sample size was calculated as follows:

$$n_0 = \frac{Z^2 \times p \times (1-p)}{e^2}$$

Then, according to the total population size (243), the sample size was adjusted using Cochran's correction formula:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

Z: The critical value for a 95% confidence level (equal to 1.96).

p: The estimated population proportion with the studied characteristic (assumed to be 50%).

e: The allowable margin of error (10%).

N: The total population size (243 ICU nurses).

3.3.4 Inclusion and Exclusion Criteria

Inclusion and exclusion criteria strictly adhered to when selecting patient data for analysis.

3.3.4.1 Inclusion Criteria for Patients

- Patients admitted to the ICU in the specified West Bank hospitals.
- Patients who have stayed in the ICU for more than 8 hours.
- Patients who have complete medical records available for review.
- Patients who have not been admitted to intensive care while in a state of clinical death.

3.3.4.2 Exclusion Criteria for Patients

- Patients who have stayed in the ICU for less than 8 hours.
- Patients with incomplete or unavailable medical records.
- Patients who have been admitted to intensive care while in a state of clinical death.

These criteria ensure that the study focuses on patients who have spent a sufficient amount of time in the ICU and have relevant medical records for analysis.

3.3.4.3 Inclusion Criteria of Nurses

- Nurses working in the ICU departments of hospitals located in the West Bank.
- Nurses who have direct patient care responsibilities in the ICU.
- Nurses who are willing to participate in the study and provide consent for data collection and analysis.
- Nurses of all genders and age groups.

3.3.4.4 Exclusion Criteria of Nurses

- Nurses who do not work in the ICU departments.
- Nurses who have previously participated in a similar study on nurse-to-patient ratio and nurse satisfaction.
- Nurses who are on long-term leave or unavailable for participation during the study period.
- Nurses who are unable or unwilling to provide informed consent for participation.
- Nurses in administrative roles such as nurse managers, or nurse supervisors who do not have direct patient care responsibilities in the ICU.

3.4 Study Tool and Data Collection Procedures:

Data collection was started for both designs from October 2024 to December 2024. Initially, information was gathered for the quantitative portion to investigate the relationship between nurse satisfaction and the ICU department's nurse-to-patient ratio. By giving nurses in intensive care units at three West Bank government hospitals (Hebron Governmental Hospital, Palestinian Medical Complex, and Rafedia Surgical Hospital) a reliable questionnaire (attached in the appendix section). The questionnaire was taken from a previous study conducted in 2023 about nurses' satisfaction and its effect on job performance (Hamed, 2023) which is divided into 3 sections. Only the first two sections were used which are:

1. **Section one:** included the demographic data of participants.
2. **Section two:** the satisfaction factors part consisted of 37 questions which were rated on a five-point Likert scale.

The questionnaire was distributed to the participants as an online survey in the three hospitals ICUs for the duration mentioned before and the confidentiality was preserved. Permission was obtained from the author of the study to use the questionnaire. All participants also were informed about the purpose of our study and consent was provided before answering the questionnaire.

Second, for the quantitative prospective data collection part data were collected to examine the relationship between the nurse-to-patient ratio and mortality rates from the ICU departments themselves in the hospitals participating in the study. Initially, the hospitals' administrations were contacted to obtain approval to collect information from the intensive care departments. Then, in collaboration with department heads and colleagues working in these departments, data was collected day-by-day and shift-by-shift over a period of one month from each hospital. The data included the number of nurses on duty per shift, the number of patients in the department during each shift, and the number of deaths -if any- per shift.

3.5 Data Analysis

Statistical analysis was performed using SPSS version 21. The data analysis aimed to assess the correlation between the nurse-to-patient ratio and its effect on mortality rates and nurse job satisfaction in the ICUs of Palestinian hospitals. Descriptive statistics were used to summarize demographic and clinical data, including frequencies, percentages, means, and standard deviations. Cronbach's alpha was used to assess reliability. Inferential statistics like Spearman correlation and Pearson correlation were used to assess differences in nurse-patient ratio, job satisfaction, and mortality rates in terms of participants' demographic characteristics. All statistical tests were two-sided and the significance level $p < 0.05$ is considered statistically significant.

3.6 Pilot Study

To verify the validity and reliability of the study tools, a pilot study was carried out. The pilot study covered 10% (n=8) of the entire population.

3.6.1 Validity and Reliability of Instruments

The content validity was qualitatively assessed using three expert reviews. Concept validity is the process of determining if an instrument assesses the theoretical

concept it is intended to measure accurately. Criterion validity includes assessing how well the instrument correlates with a relevant criterion measure. In order to investigate the relationship between the criterion measure and the instrument scores, correlation analysis was carried out (Table 3.1).

The internal consistency of the items meant to measure the same construct was examined using Cronbach's Alpha. As shown in (Table 3.2), both instruments was reliable evidenced by Cronbach's Alpha were more than 0.7 in both pilot and main study.

Table 3.1. Criterion Validity of Instruments

Items	Pearson Correlation	Satisfaction with NPR	Job Satisfaction
I am satisfied with the nurse-to-patient ratio in my shift.	R	.952**	
	P	.000	
I am satisfied with the nurse per shift ratio according to the number of tasks to be performed. (Suitable nurses number per shift to workload)	R	.954**	
	P	.000	
I am satisfied with the moments of having conversations and sharing medical information with my co-workers.	R		.343**
	P		.002
I am satisfied with the spirit of collaboration between me and my coworkers.	R		.380**
	P		.001
I am satisfied with the workload at my workplace.	R		.655**
	P		.000
I am satisfied with my co-workers' effort to provide better care.	R		.566**
	P		.000
I am satisfied with my superiors' effort to improve my working conditions.	R		.589**
	P		.000
I am satisfied with my participation in decision-making at my workplace.	R		.508**
	P		.000
I am satisfied with the career advancement opportunities.	R		.614**
	P		.000
I am satisfied with the level of trust that I have with my co-workers.	R		.527**
	P		.000
I am satisfied with how my superiors allow me to participate in training courses/projects.	R		.625**
	P		.000
I am satisfied with the physical conditions of the space where I provide care.	R		.700**
	P		.000
I am satisfied with the routines at my unit.	R		.785**
	P		.000
I am satisfied with the fact that my work is rewarded and/or valued by my superiors.	R		.723**
	P		.000
I am satisfied with the fact that my work is rewarded and/or valued by the patients.	R		.673**
	P		.000
I am satisfied with how patients and their families value my work.	R		.566**
	P		.000
I am satisfied with the nursing assigned to me in my department.	R		.695**
	P		.000
I am satisfied with the other health specialists' skills.	R		.638**
	P		.000
I am satisfied with the training opportunities provided at my workplace.	R		.641**
	P		.000
I am satisfied with the level of colleagues' competence in the same field	R		.690**
	P		.000
I am satisfied with the possibility to implement new knowledge at my workplace.	R		.654**
	P		.000
I am satisfied with the equipment/ materials at my unit.	R		.650**
	P		.000
I am satisfied with the followed system my workplace.	R		.750**
	P		.000
I am satisfied with my autonomy to provide adequate care to patients according to my skills.	R		.635**
	P		.000
I am satisfied with how protocols are well organized and elaborated in my unit.	R		.655**

	P	.000
I am satisfied with the quality of the care I provide taking into account the context where I work	R	.482**
	P	.000
I am satisfied with the waiting time to be promoted at my workplace.	R	.673**
	P	.000
I am satisfied with the tasks performed in my unit.	R	.672**
	P	.000
I am satisfied with my superiors' respect for my work.	R	.682**
	P	.000
I am satisfied with the number of protocols on the unit's functioning.	R	.780**
	P	.000
I am satisfied with my salary, taking into account the tasks I perform.	R	.736**
	P	.000
I am satisfied with my salary taking into account my skills/knowledge.	R	.684**
	P	.000
I am satisfied with the moments of dialogue and sharing of information with my superiors.	R	.699**
	P	.000
I am satisfied with the patients' perception of my activities.	R	.696**
	P	.000
I am satisfied with my superiors' encouragement to participate in training.	R	.671**
	P	.000
I am satisfied with the patients' respect for my work.	R	.643**
	P	.000
I am satisfied with the other health professionals' respect for the care I provide	R	.748**
	P	.000

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 3.2. Reliability Statistics of Instruments

Instrument	N of Items	Pilot study Cronbach's Alpha	Main study Cronbach's Alpha
Satisfaction with Nurse-Patient Ratio	2	0.972	0.899
Job Satisfaction	35	0.856	0.958

3.7 Ethical Considerations

First of all, the study was reviewed and approved by the Arab American University Institutional Review Board – Ramallah IRB letter code: R-2024/A/56/N. Also, we obtained permission from the Palestinian MOH and the hospitals' administrators where the study was conducted, in addition, the confidentiality of the participants was maintained by keeping the participants anonymous in this study. The approval was obtained from nurses who participated in the study, and the purpose of the research was explained in the cover letter of the questionnaire, they were informed that their participation in answering the questionnaire was completely voluntary and that they had the complete freedom to refrain from answering or withdraw from participation at any time without any consequences or impact on their rights. The confidentiality of the nurses' information was ensured and their identity was not revealed.

3.8 Summary

In this chapter, the methods and procedures used for this study were explained. The specific variables examined were the relationship between the nurse-to-patient ratio and mortality rates and nurses' satisfaction in ICU departments. A mixed-method design was used in this research, descriptive cross-sectional study design was used with an anticipated sample size of approximately 80 participants to examine nurses' satisfaction, and an observation of the mortality and nurse-to-patient ratios in ICUs through one month in participated hospitals. Data was analyzed with descriptive statistics at the level of significance ($\alpha = 0.05$), 95 % confidence level ($Z = 1.96$), and margin of error ±10%.

Chapter Four: Results

4.1 Introduction

This chapter presents the findings of the study through comprehensive statistical analysis and interpretation of participant responses. The results provide details about descriptive statistics of participant characteristics, mean scores of satisfaction with nurse patients' ratio, and total satisfaction. Also, it highlights the correlations between both variables. Results shows also the differences between satisfaction and participants' characteristics. The last part of results also provides the relationship between the nurse-patient ratio and mortality rate of patients in ICU in West Bank hospitals.

4.2 Tests for Data Normal Distribution

Table (4.1) and Figure (4.1) show that all p-values for the Shapiro-Wilk and Kolmogorov-Smirnov tests were below the significance level ($p < 0.05$). This implies that the data for each research variable deviates from a normal distribution. This result can imply that non-parametric tests should be taken into account for further data processing.

Table 4.1. Tests of Normality for Data Distribution

Variables	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Satisfaction with Nurses Patients Ratio	0.192	78	0.000	0.885	78	0.000
Total Satisfaction	0.104	78	0.038	0.956	78	0.009

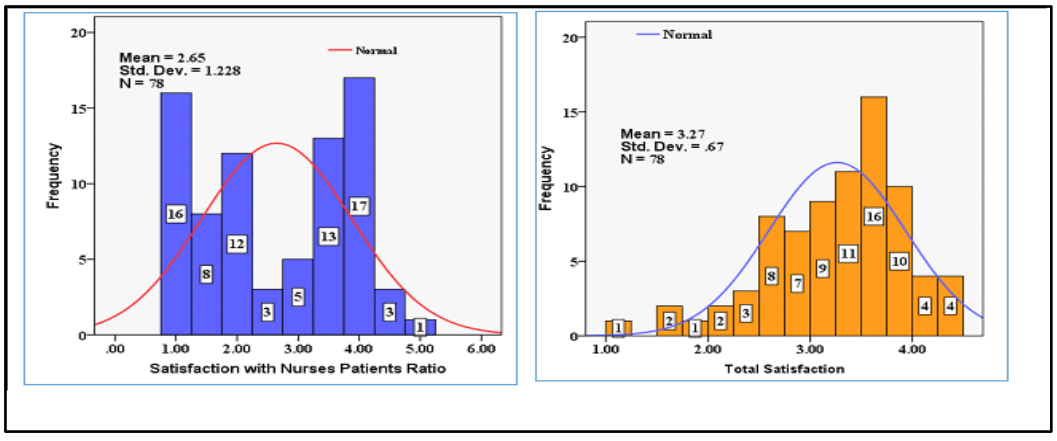

Figure 4.1. Tests of Normality for Data Distribution

4.3 Descriptive Statistics

Table (4.2) and Figure (4.2) show how the participants were distributed according to their characteristics. Most of the participants (42.3%) were in the 26–30 age range. Just 9.0% of the sample was in the smallest age group, which was 31 to 35 years old. Of the sample, 23.1% of participants were over 35, while 25.6% were between the ages of 20 and 25. Men made up 46.2% of the participants, while women made up slightly more than half (53.8%). The majority of participants (30.8%) had worked for three to five years. Those with one to two years and six to ten years of experience made up the second-largest groupings, each accounting for 23.1%. 21.8% had more than ten years of experience, while a small percentage (1.3%) had less than a year. Most of them (73.1%) had a bachelor's degree, master's degree (14.1%), a high diploma (2.6%), and an intermediate diploma (10.3%). The majority of participants (80.8%) were registered nurses, head nurses (6.4%), while practical nurses were 12.8%. Three West Bank hospitals were employed by the participants: Rafeidia Hospital (23.1%), Alia Hospital (35.9%), and Palestinian Medical Complex (PMC) (41.0%).

Table 4.2. Demographic Characteristics of Participants (n=78)

Variables		F	%
Age	20 - 25 Years	20	25.6
	26 - 30 Years	33	42.3
	31 - 35 Years	7	9.0
	>35	18	23.1
Gender	Male	36	46.2
	Female	42	53.8
Working Years	<1 Years	1	1.3
	1 - 2 Years	18	23.1
	3 - 5 Years	24	30.8
	6 - 10 Years	18	23.1
	>10 Years	17	21.8
Education Level	Intermediate Diploma	8	10.3
	Bachelor's	57	73.1
	High Diploma	2	2.6
	Master	11	14.1
Job Category	Practical Nurse	10	12.8
	Registered Nurse	63	80.8
	Head Nurse	5	6.4
Hospital	PMC	32	41.0
	Alia	28	35.9
	Rafeidia	18	23.1

Data were based on Frequencies (F) and Percentages (%)

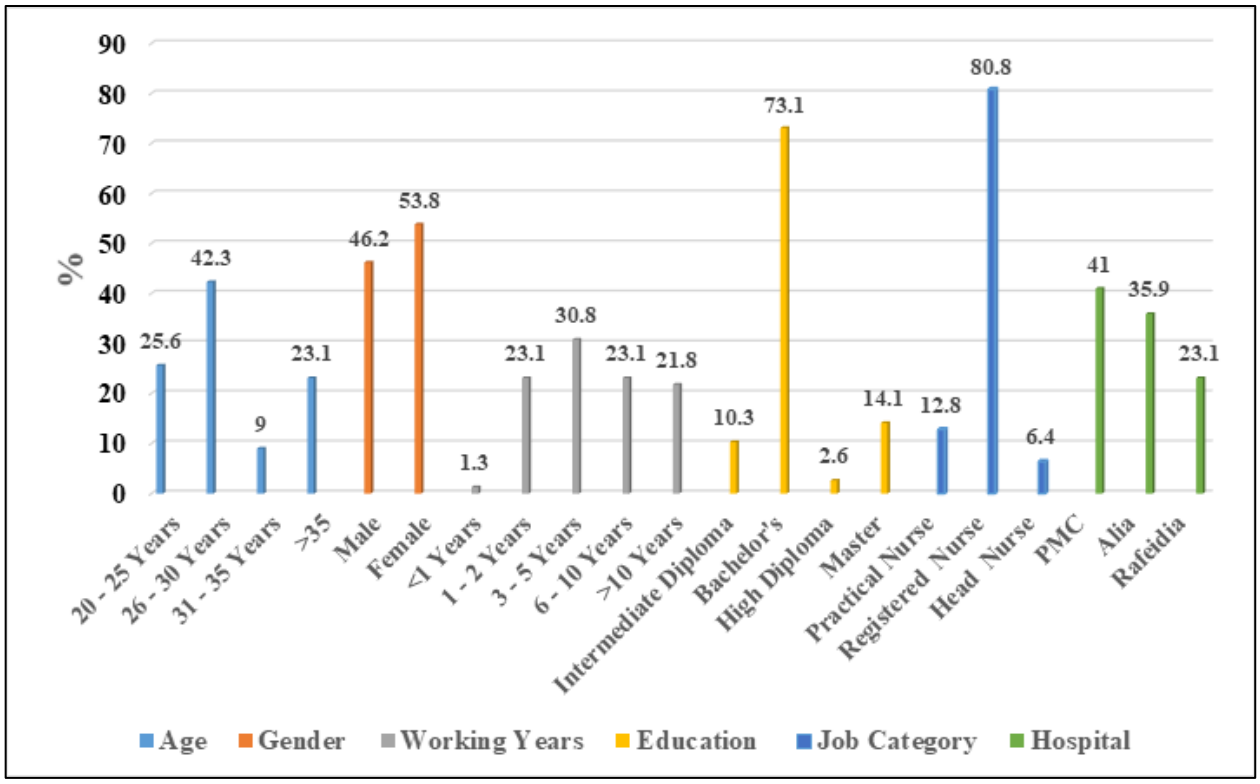

Figure 4.2. Demographic Characteristics of Participants (n=78)

4.4 Levels of Satisfaction with Hospitals, Nurse-Patient Ratios Satisfaction and Job Satisfaction

Table (4.3) attempts to answer the research questions (#1, #2 and 3) that claimed:

4 What is the level of satisfaction of ICU nurses with their hospitals in West Bank?

5 What is the level of satisfaction with the nurse-to-patient ratio in ICU patients in West Bank hospitals?

6 What is the level of job satisfaction of nurses working in ICU in West Bank hospitals?

4.4.1 Satisfaction with Hospital

19.2% of nurses expressed low satisfaction with their hospitals, while the largest group (47.4%) expressed moderate satisfaction and 33.3% of them expressed high satisfaction. The mean scores of their satisfaction was in a moderate level (5.17± 2.32).

4.4.2 Satisfaction with Nurse-Patient Ratios

The majority of participants (46.2%) expressed dissatisfaction with nurse-patient ratios. In contrast, 26.9% of respondents claimed they were moderately satisfied, and

26.9% said they were highly satisfied. The mean scores of their satisfaction was in a moderate level (2.65 ± 1.23).

4.4.3 Job Satisfaction

Merely 10.3% of respondents expressed low in their job satisfaction. The majority expressed a moderate level of overall satisfaction (57.7%). Job satisfaction was high for 32.1% of respondents. The mean scores of their job satisfaction was in a moderate level (3.27 ± 0.670).

Table 4.3. Levels of Satisfaction with Hospitals, Nurse-Patient Ratios Satisfaction and Job Satisfaction (n=78)

Variables	COP	Value	F	%	M	SD	Value
Satisfaction with Hospital	0 - 3.33	Low	15	19.2	5.17	2.32	Moderate
	3.34 - 6.67	Moderate	37	47.4			
	6.68 - 10	High	26	33.3			
Satisfaction with Nurses Patients Ratio	1 - 2.33	Low	36	46.2	2.65	1.23	Moderate
	2.34 - 3.67	Moderate	21	26.9			
	3.68 - 5	High	21	26.9			
Job Satisfaction	1 - 2.33	Low	8	10.3	3.27	0.670	Moderate
	2.34 - 3.67	Moderate	45	57.7			
	3.68 - 5	High	25	32.1			
Data were based on Frequencies (F) and Percentages (%) COP: Cutoff Points of Variables; M: Mean; SD: Standard Deviation							

Satisfaction scores were classified according to the Likert scale into three equal categories:

- Scale (0-10) for satisfaction with the hospital: low satisfaction (0-3.33), moderate (3.34-6.67), high (6.68-10).
- Scale (1-5) for satisfaction with the nursing ratio and job satisfaction: low satisfaction (1-2.33), moderate (2.34-3.67), high (3.68-5).

It is a common statistical criterion in analyzing Likert scale data to determine levels of attitudes and opinions.

4.5 Satisfaction with the Nurse-Patient Ratio and Job Satisfaction Based on Demographic Characteristics

Table (4.4) attempts to answer the research question (#4) and hypothesis (#1) that claimed:

Research Question # 4: Is there a significant difference between the satisfaction with nurse-patient ratio and job satisfaction based on demographic characteristics?

Research Hypothesis # 1: There is no significant difference between the satisfaction with nurse-patient ratio and job satisfaction based on demographic characteristics.

The mean (M) and standard deviation (SD) values for job satisfaction and nurse-patient ratio satisfaction, split down by different demographic factors, are displayed in Table (4.4). To evaluate the significance of differences, the p-values were computed using the Kruskal-Wallis and Mann-Whitney U tests.

4.5.1 Satisfaction with the Nurse-Patient Ratio

Males and females expressed comparable levels of satisfaction with the nurse-patient ratio (M=2.486, M=2.786), and there was no statistically significant difference (Z=−1.037, P=0.300). Age-group mean satisfaction scores with the nurse-patient ratio did not differ significantly (P=0.632). There were no significant variations in the degree of satisfaction with the nurse-patient ratio between years of work experience (P=0.495). Hospitals did not significantly differ in their satisfaction with the nurse-patient ratio (P=0.851).

The greatest satisfaction was reported by intermediate diploma holders (M=3.750), with a significant difference (χ2=8.922, P= 0.030). The greatest level of satisfaction was reported by practical nurses (M=3.600), with a significant difference seen (χ2=8.149, P=0.017). The highest satisfaction was reported by practical nurses (M=3.600), and there was a significant difference (χ2=8.149, P=0.017).

4.5.2 Job Satisfaction

Every p-value was more than 0.05, highlighting the fact that there were no significant differences in any of the individuals' demographic characteristics.

Table 4.4. Satisfaction with the Nurse-Patient Ratio and Job Satisfaction based on Demographic Characteristics

Variables		**Nurse Patient Ratio**		**Job Satisfaction**	
		M	**SD**	**M**	**SD**
Gender	Male	2.486	1.222	3.244	0.687
	Female	2.786	1.230	3.283	0.663
	Z	-1.037		-0.175	
	P	0.300		0.861	
Age	20 - 25 Years	2.600	1.420	3.031	0.850

	26 - 30 Years	2.682	1.191	3.329	0.594
	31 - 35 Years	2.857	1.144	3.335	0.578
	>35	2.556	1.187	3.381	0.597
	χ^2	0.428		1.721	
	P	0.632		0.934	
Working Years	<1 Years	1.000	0.000	2.514	0.000
	1 - 2 Years	2.861	1.513	3.384	0.634
	3 - 5 Years	2.438	1.219	3.131	0.746
	6 - 10 Years	2.667	1.000	3.213	0.639
	>10 Years	2.794	1.147	3.429	0.627
	χ^2	3.391		3.623	
	P	0.495		0.459	
Education Level	Intermediate Diploma	3.750	1.165	3.604	0.792
	Bachelor's	2.491	1.190	3.230	0.680
	High Diploma	2.000	1.414	2.929	1.071
	Master	2.773	1.148	3.262	0.448
	χ^2	8.922		2.936	
	P	0.030		0.402	
Job Category	Practical Nurse	3.600	1.174	3.403	1.041
	Registered Nurse	2.532	1.204	3.236	0.617
	Head Nurse	2.200	0.837	3.360	0.474
	χ^2	8.149		1.924	
	P	0.017		0.382	
Hospital	PMC	2.578	1.374	3.286	0.583
	Alia	2.625	1.136	3.134	0.826
	Rafeidia	2.801	1.140	3.430	0.518
	χ^2	0.322		1.095	
	P	0.851		0.578	
P values were based on Mann-Whitney U and Kruskal Wallis Tests					

4.6 Relationship between Satisfaction with the Nurse-Patient Ratio and Job Satisfaction

Tables (4.5 & 4.6) attempt to answer the research question (#5) and hypothesis (#2) that claimed:

Research Question # 5: Is there a significant relationship between the satisfaction with nurse-patient ratio and job satisfaction?

Research Null Hypothesis # 2: There is no significant relationship between the satisfaction with nurse-patient ratio and job satisfaction.

There is a strong and statistically significant relationship between the moderate satisfaction with the nurse-patient ratio (2.65 ± 1.23) and the moderate job satisfaction (3.27 ± 0.670). The value of Eta (0.695) represents a large effect size, showing a strong relationship between satisfaction with the nurse-patient ratio and job satisfaction. Eta Squared (0.483) indicates that nearly half of the variability in job satisfaction can be attributed to differences in satisfaction with the nurse-patient ratio. This highlights the importance of nurse staffing in shaping job satisfaction. To identify the strength of this relationship, Spearman correlation test was performed. There was a strong positive correlation (0.682) between both variables which emphasized that as satisfaction with the nurse-patient ratio improves, job satisfaction tends to increase, and vice versa. This relationship was statistically significant ($p<0.05$) (Table 4.5; Table 4.6).

Table 4.5. Effect of Satisfaction with the Nurse-Patient Ratio on Job Satisfaction

Variables	M	SD	F	P	Eta	Eta Squared
Satisfaction with Nurses Patients Ratio	2.65	1.23	8.057	0.000	0.695	0.483
Job Satisfaction	3.27	0.670				

Table 4.6. The Correlation between Satisfaction with the Nurse-Patient Ratio and Job Satisfaction

		Job Satisfaction
Satisfaction with Nurses Patients Ratio	Correlation Coefficient	0.682
	P-value	0.000
	N	78

P value based on Spearman's rho Correlation test

4.7 Nurse Patient Ratio and Mortality Rates

In this section, the results attempt to answer the research question (#6) and hypothesis (#3) that claimed:

Research Question # 6: Is there a significant difference between nurse-patient ratio and mortality rates?

Research Null Hypothesis #3: There is no significant difference between nurse-patient ratio and mortality rates.

4.7.1 Nurse Patient Ratio and Mortality in PMC

As shown in (Table 4.7; and Figure 4.1), data on nurse-patient ratios and mortality in the PMC during 31 days (September 29, 2024, to October 29, 2024), were divided into three shifts (A, B, and C). The number of nurses, patients, and deaths during every shift were the important elements. Different shifts had different nurse-to-patient ratios. With fewer patients per nurse than shifts B and C, shift A often had the highest ratio. In general, the mortality rate was low, with many days having no recorded deaths. Certain shifts (such as those with lower nurse-patient ratios) had greater mortality rates. The mean of the mortality rate was greater in shift C (M = 1.962, SD = 3.327).

Table 4.7. Nurse Patient Ratio and Mortality in PMC

Day	**# of Nurses**			**# of** Patients			# of Deaths	% of Deaths	PNR			% of Deaths		
	A	B	C	A	B	C			A	B	C	A	B	C
1	8	6	6	19	17	19	0	0	42.10	35.29	31.58	0	0	0
2	8	6	6	19	18	19	1	5.26	42.10	33.33	31.58	0	0	5.26
3	8	6	6	18	15	17	0	0	44.44	40	35.29	0	0	0
4	8	6	6	16	17	16	2	12.50	50	35.29	37.50	6.25	0	6.25
5	8	6	6	17	17	18	0	0	47.06	35.29	33.33	0	0	0
6	8	6	6	15	14	14	0	0	53.33	42.86	42.86	0	0	0
7	8	6	6	15	15	14	0	0	53.33	40	42.86	0	0	0
8	8	6	6	12	13	15	0	0	66.67	46.15	40	0	0	0
9	8	6	6	15	17	15	2	13.34	53.33	35.29	40	6.67	0	6.67
10	8	6	6	15	15	15	0	0	53.33	40	40	0	0	0
11	8	6	6	15	16	16	0	0	53.33	37.50	37.50	0	0	0
12	8	6	6	15	15	18	1	6.67	53.33	40	33.33	0	0	6.67
13	8	6	6	18	16	16	1	6.25	44.44	37.50	37.50	0	6.25	0
14	8	6	6	16	16	17	0	0	50	37.50	35.29	0	0	0
15	8	6	6	17	17	20	0	0	47.06	35.29	30	0	0	0
16	8	6	6	18	17	19	1	5.56	44.44	35.29	31.58	0	0	5.56
17	8	6	6	19	19	16	3	16.77	42.10	31.58	31.58	5.26	5.26	6.25
18	8	6	6	16	16	18	0	0	50	37.50	33.33	0	0	0
19	8	6	6	18	19	20	0	0	44.44	31.58	30	0	0	0
20	8	6	6	20	16	15	1	6.67	40	37.50	40	0	0	6.67
21	8	6	6	15	17	18	0	0	53.33	35.29	33.33	0	0	0
22	8	6	6	18	17	17	0	0	44.44	35.29	35.29	0	0	0
23	8	6	6	18	20	20	0	0	40	30	30	0	0	0
24	8	6	6	20	18	17	1	5	40	33.33	35.29	0	0	5
25	8	6	6	18	18	18	0	0	44.44	33.33	33.33	0	0	0
26	8	6	6	19	17	18	1	5.88	42.10	35.29	33.33	0	5.88	0
27	8	6	6	18	16	17	0	0	44.44	37.50	35.29	0	0	0
28	8	6	6	17	18	18	0	0	47.06	33.33	33.33	0	0	0

29	8	6	6	18	18	17	0	0	44.44	33.33	35.29	0	0	0
30	8	6	6	19	20	19	0	0	42.10	30	31.58	0	0	0
31	8	6	6	16	16	17	4	24.63	50	37.50	37.50	5.88	6.25	12.50
Mean								**3.501**	**47.33**	**36.10**	**35.12**	**0.776**	**0.763**	**1.962**

4.7.2 Nurse Patient Ratio and Mortality in Alia Hospital

As shown in (Table 4.8; Figure 4.1), data on nurse-patient ratios and mortality in alia hospital during 31 days (October 6, 2024 to November 10, 2024), divided into three shifts (A, B, and C). The number of nurses, patients and deaths during every shift were the important elements. Different shifts had different nurse-to-patient ratios. With fewer patients per nurse than shifts B and C, shift A often had the highest ratio. In general, the mortality rate was low, with many days having no recorded deaths. Certain shifts (such as those with lower nurse-patient ratios) had greater mortality rates. The mean of the mortality rate was greater in shift C (M = 1.506, SD = 3.316).

Table 4.8. Nurse Patient Ratio and Mortality in Alia Hospital

Day	# of Nurses			Total of patients	# of Deaths	% of Deaths/Day	PNR			% of deaths/Shift		
	A	B	C				A	B	C	A	B	C
1	5	5	5	12	0	0	41.67	41.67	41.67	0	0	0
2	5	5	5	15	1	6.67	33.33	33.33	33.33	0	6.67	0
3	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
4	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
5	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
6	5	5	5	15	2	13.33	33.33	33.33	33.33	0	6.67	6.67
7	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
8	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
9	4	5	5	15	0	0	26.67	33.33	33.33	0	0	0
10	5	5	5	15	2	13.33	33.33	33.33	33.33	0	0	13.33
11	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
12	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
13	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
14	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
15	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
16	5	5	5	15	3	20	33.33	33.33	33.33	6.67	6.67	6.67
17	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
18	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
19	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
20	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
21	5	5	5	15	2	13.33	33.33	33.33	33.33	0	13.33	0
22	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
23	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
24	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
25	5	5	5	15	2	13.33	33.33	33.33	33.33	6.67	0	6.67
26	5	5	5	15	1	6.67	33.33	33.33	33.33	0	0	6.67
27	5	5	5	15	1	6.67	33.33	33.33	33.33	6.67	0	0
28	5	5	5	15	1	6.67	33.33	33.33	33.33	0	6.67	0
29	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
30	5	5	5	15	1	6.67	33.33	33.33	33.33	0	0	6.67
31	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0

32	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
33	5	5	5	15	0	0	33.33	33.33	33.33	0	0	0
					Mean	**3.441**	**33.38**	**33.60**	**33.60**	**0.646**	**1.291**	**1.506**

4.7.3 Nurse Patient Ratio and Mortality in Rafeidia Hospital

As shown in (Table 4.9; Figure 4.1), data on nurse-patient ratios and mortality in Rafeidia hospital during 31 days (October 5, 2024 to November 4, 2024), divided into three shifts (A, B, and C). The number of nurses, patients and deaths during every shift were the important elements. Different shifts had different nurse-to-patient ratios. With fewer patients per nurse than shifts B and C, shift A often had the highest ratio. In general, the mortality rate was low, with many days having no recorded deaths. Certain shifts (such as those with lower nurse-patient ratios) had greater mortality rates. The mean of the mortality rate was greater in shift C (M = 1.804, SD = 3.871).

Table 4.9. Nurse Patient Ratio and Mortality in Rafeidia Hospital

Day	# of Nurses			Total of patients	# of Deaths	% of Deaths/Day	PNR			% of deaths/Shift		
	A	B	C				A	B	C	A	B	C
1	6	4	4	10	0	0	60	40	40	0	0	0
2	6	4	4	10	0	0	60	40	40	0	0	0
3	6	4	4	7	0	0	85.71	57.14	57.14	0	0	0
4	6	4	4	9	0	0	66.67	44.44	44.44	0	0	0
5	6	4	4	12	0	0	50	33.33	33.33	0	0	0
6	6	4	4	13	0	0	46.15	30.77	30.77	0	0	0
7	6	4	4	10	0	0	60	40	40	0	0	0
8	6	4	4	12	1	8.33	50	33.33	33.33	8.33	0	0
9	6	4	4	12	0	0	50	33.33	33.33	0	0	0
10	6	4	4	12	1	8.33	50	33.33	33.33	8.33	0	0
11	6	4	4	12	1	8.33	50	33.33	33.33	0	8.33	0
12	6	4	4	12	1	8.33	50	33.33	33.33	0	0	8.33
13	6	4	4	13	0	0	46.15	30.77	30.77	0	0	0
14	6	4	4	7	1	14.26	85.71	57.14	57.14	0	0	14.26
15	6	4	4	11	0	0	54.55	36.36	36.36	0	0	0
16	6	4	4	11	0	0	54.55	36.36	36.36	0	0	0
17	6	4	4	10	0	0	60	40	40	0	0	0
18	6	4	4	13	0	0	46.15	30.77	30.77	0	0	0
19	6	4	4	12	1	8.33	50	33.33	33.33	0	8.33	0
20	6	4	4	12	1	8.33	50	33.33	33.33	0	0	8.33
21	6	4	4	10	0	0	60	40	40	0	0	0
22	6	4	4	12	0	0	50	33.33	33.33	0	0	0
23	6	4	4	13	0	0	46.15	30.77	30.77	0	0	0
24	6	4	4	12	0	0	50	33.33	33.33	0	0	0
25	6	4	4	12	1	8.33	50	33.33	33.33	0	0	8.33
26	6	4	4	12	0	0	50	33.33	33.33	0	0	0
27	6	4	4	12	1	8.33	50	33.33	33.33	0	0	8.33
28	6	4	4	12	1	8.33	50	33.33	33.33	0	0	8.33
29	6	4	4	10	0	0	60	40	40	0	0	0
30	6	4	4	12	0	0	50	33.33	33.33	0	0	0
31	6	4	4	11	1	9.09	54.55	36.36	36.36	9.09	0	0

Mean	**3.172**	**54.72**	**36.48**	**36.48**	**0.831**	**0.537**	**1.804**

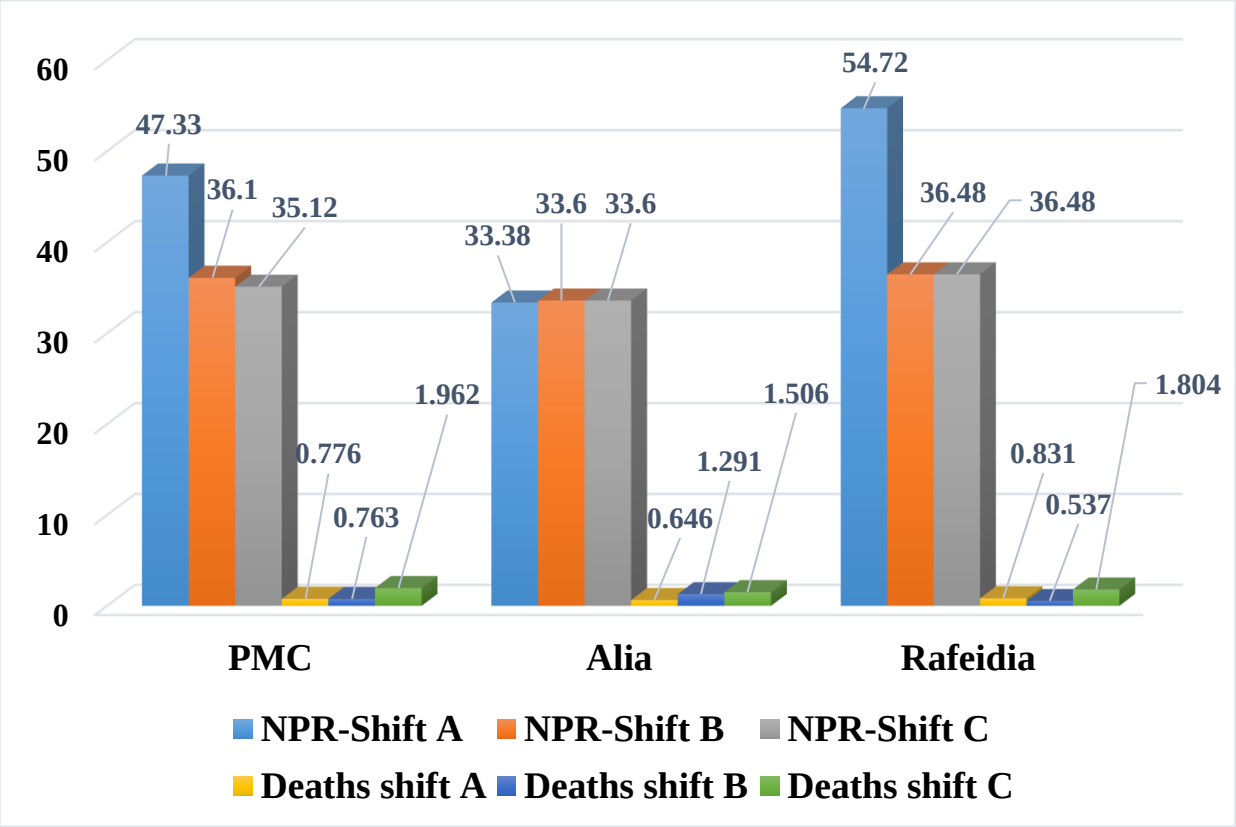

Figure 4.1. Nurse Patient Ratio and Mortality across the Three Hospitals

4.7.4 Nurse Patient Ratio and Mortality across the Three Hospitals

The mean scores of the nurses-to-patient ratio for each shift in PMC varied significantly (F = 71.283, P = 0.000). There were also significant differences in the average rate of deaths every shift (F = 2.276, P=0.019). The death rate was higher in shift C which was the least nurse-patient ratio. The mean scores of the nurses-to-patient ratio for each shift in Alia hospital did not vary significantly (F = 0.173, P = 0.842). There were also no significant differences in the average rate of deaths every shift (F = 0.741, P = 0.479). The mean scores of the nurses-to-patient ratio for each shift in Rafeidia hospital varied significantly (F = 57.310, P = 0.000). While there was no significant differences in the average rate of deaths every shift (F = 1.573, P = 0.213). Shift C had the lowest nurse-patient ratio.

The mean scores of the nurses-to-patient ratio for each shift across all hospitals varied significantly (F = 56.103, P = 0.000). There were also significant differences in

the average rate of deaths every shift (F = 3.667, P = 0.027). More details are shown in (Table 4.10; Figure 4.2).

Table 4.10. Nurse Patient Ratio and Mortality across the Three Hospitals

Hospital		Nurse Patient Ratio/Shift			Deaths /Shift		
		A	B	C	A	B	C
PMC	**M**	47.33	36.10	35.12	0.776	0.763	1.962
	SD	5.830	3.563	3.659	2.059	2.019	3.327
	F		71.283			2.276	
	P		**0.000**			**0.019**	
Alia	**M**	33.38	33.60	33.60	0.646	1.291	1.506
	SD	1.948	1.498	1.498	2.005	3.183	3.316
	F						
	P						
Rafeidia	**M**	54.72	36.48	36.48	0.831	0.537	1.804
	SD	9.762	6.508	6.508	2.582	2.080	3.871
	F						
	P						
Total	**M**	45.14	35.39	35.07	0.751	0.864	1.757
	SD	11.07	4.509	4.506	2.207	2.479	3.481
	F		56.103			3.667	
	P		**0.000**			**0.027**	

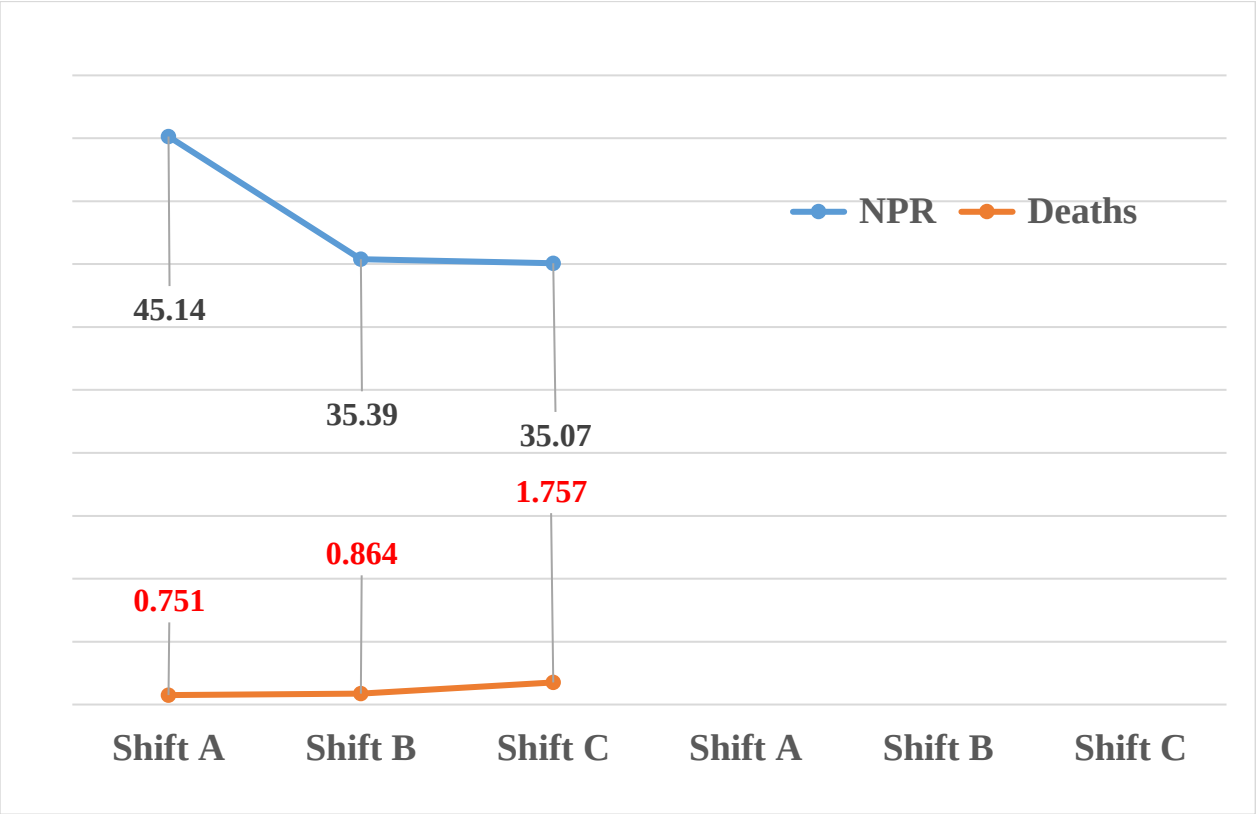

Figure 4.2. Nurse Patient Ratio and Mortality across the Three Hospitals

Chapter Five: Discussion

5.1 Introduction

This study sought to investigate the relationship between nurse-to-patient ratio and mortality rates as well as nurse satisfaction at the ICUs in the governmental hospitals in the West Bank. It also aimed to broaden the understanding of how high and low staffing ratios affect the quality of care in these units, incorporating the practical and psychological effects on the workforce.

This has been shown worldwide the importance of nurse staffing in patient safety and nurse satisfaction. Studies by Lee et al. (2017) and Neuraz et al. It was found that "the right ratios of staff reduces mortality rates" (2015) Likewise, Qureshi et al. (2019) and Driscoll et al. (2018) found that optimal nurse-to-patient ratios improve nurse satisfaction and job performance. Yet, there is a significant lack of evidence in Arab countries, especially the West Bank, representing a key knowledge gap.

Within this framework, the current research aimed to make evidence-based recommendations to optimize the staffing ratios in the ICU, with the ultimate goal of promoting patient safety and nurse well-being. This contribution has both local relevance and wider significance to understanding how nurse staffing impacts healthcare delivery due to the lack of research in this domain.

5.2 Nurse- Patient Ratio and Job Satisfaction

The nurse-to-patient ratio in intensive care units among three hospitals in the west bank—PMC, Alia, and Rafeidia—was compiled in this study. Three shifts—A (47.33), B (36.10), and C (35.12)—were assigned a PMC ratio. They were A (33.38), B (33.60), and C (33.60) in Alia Hospital. They were A (54.72), B (36.48), and C (36.48) at Rafeidia Hospital.

This study highlighted the crucial role of nurse staffing in shaping job satisfaction. ICU nurses rated the current nurse-to-patient ratio in their facilities as moderately adequate, and their overall job satisfaction was at a similar moderate level. The two variables showed a positive relationship, highlighting the idea that job satisfaction tends to rise in tandem with improvements in the nurse-patient ratio and vice versa. Results indicate that nearly half of the variability in job satisfaction can be attributed to differences in satisfaction with the nurse-patient ratio. Gender, age, work experience, and hospital affiliation did not show a statistically significant impact on job satisfaction or

satisfaction with the nurse-patient ratio ($p > 0.05$). Conversely, compared to all other educational levels and occupational types, intermediate diploma holders and practical nurses expressed much greater satisfaction with nurse-patient ratios.

The study concluded that an effective nurse-patient ratio would improve job satisfaction, a conclusion widely supported by a study that highlighted the importance of maintaining appropriate nurse-to-patient ratios to prevent nurse burnout and ensure quality care (Gutsan, Patton, Willis, & Alberto Coustasse, 2018). While in a study in Taiwan revealed that a higher patient's ratio to nurses was linked to higher levels of burnout, job dissatisfaction, and a greater tendency to quit, according to the findings (Chen et al., 2019). Wynendaele et al. (2019) found that increased ratios (number of patients more than nurses) lead to nurse dissatisfaction, burnout, and intentions to turnover. These studies are consistent with this study's results; poor satisfaction was particularly evident in the case of nurses delivering larger patient loads.

Senek et al. (2020) also emphasized that understaffing and excessive ratios are critical reasons for lack of job satisfaction and discouragement among nurses; a result which matched well with this study. This suggests that there is still work to be done to improve nurse satisfaction regarding their workload-related stress.

Although the overall findings align with earlier studies, the present study uniquely documents consistently higher satisfaction levels for diploma holders than their counterparts in other studies which is not frequently observed. This may also suggest that factors related to expectation or role may be region-specific given that ICU in the context of the West Bank is by necessity less diverse than elsewhere and therefore warrants further exploration.

The nature of the West Bank ICU environment poses challenges that may mediate the impact of nurse-to-patient ratios on both mortality rates and satisfaction. Limited resources, understaffing, and unique healthcare policies may magnify the effect of high ratios more so than in settings implementing international recommendations within well-resourced healthcare systems from high-income countries. Such challenges as a lack of opportunities for professional development or insufficient administrative support may, for example, contribute to the high levels of dissatisfaction reported in this study.

The perception of higher satisfaction among diploma nurses could also be accounted for by cultural and organizational factors at play as the expectations of the job for this nurse temping is likely to differ from that which is held within her cohort of higher qualifications. This is in contrast to observations from studies like Wynendaele et al.

(2019), for example, all categories of nurses working in high-ratio environments had similarly high levels of dissatisfaction.

5.3 Nurse-to-Patient Ratios and Mortality Rates

Another purpose of this study was to examine if the nurse-to-patient ratios affect mortality rates in three West Bank major hospitals: Rafedia Surgical Hospital, Alia Governmental Hospital, and Palestine Medical Complex (PMC). Research Question #6 and Null Hypothesis #3—that there are no variations in mortality among nurse-to-patient ratios—are attempted to be addressed in this study. The results of the observation in the 3 hospitals were as follows:

In the Palestinian Medical Complex, death numbers were low overall, with most days having zero deaths. Across shifts, nurse-to-patient ratios varied, with Shift A tending to have lower nurse-to-patient ratios than Shifts B and C, which tended to produce higher mortality rates that were highest in Shift C (M = 1.962, SD = 3.327).

As for Rafeidia Surgical Hospital, the results were similar to the previous hospital, overall mortality rates were low, however, higher ratios of patients per nurse were associated with higher mortality, especially in Shift C (M = 1.804, SD = 3.871). The nurse-patient ratio varied between shifts as the morning shift had the lowest nurse-patient ratio compared with the evening and night shifts. Mortality was higher in shifts where a nurse-patient ratio was higher.

But at Alia Governmental Hospital, death rates varied despite nurse-to-patient ratios being largely constant over shifts. However, Shift C also has the greatest mean rate of deaths (M = 1.506, SD = 3.316), suggesting that nursing resources may have been under stress during this shift. Deaths were relatively low and occurred during shifts with the highest nurse-patient ratio.

Those findings tend to align in demonstrating that nurse-to-patient ratios and death rates are connected — the higher the ratios, the greater the mortality. In all three hospitals, death rates were higher in shifts with larger patient loads and fewer nurses (such as Shift C). These findings highlight the relevance of having an optimal nurse-to-patient ratio in order to reduce patient mortality and improve outcomes in the ICU.

Similar patterns were seen in all three hospitals, showing that shifts with greater nurse-to-patient ratios had higher death rates than shifts with lower ratios. This was especially true for Shift C (e.g. PMC: M= 1.962, SD = 3.327). This supports the

assumption that patients who have more patients are more likely to suffer from care decompensation and ultimately death.

Mostly, mortality rates were not high. However, there was usually more stress on nursing resources during shifts with more patients, especially at night (Shift C). This tendency to increase stress on nursing resources during shift C was evident in all three hospitals with mortality, including Alia Governmental Hospital where the nurse-to-patient ratio did not vary significantly with the shift. These findings confirm the importance of sufficient staffing to patient safety. Increased nurse-to-patient ratios, especially during night shifts can reduce the quality of care through delays and errors, with subsequent negative implications for patient outcomes, underlining the importance of adequate staffing levels in the ICUs.

Numerous significant correlations between nurse-to-patient ratios, mortality, and nurse satisfaction are highlighted in the reviewed literature. Numerous studies agree that having more nurses on the ward results in lower patient mortality and greater nurse satisfaction. Furthermore, lifesaving interventions, workload, and turnover have a negative impact on having enough ICU staff. These outcomes serve as a fingerprint for comparing this study's findings to those published in the literature. These findings agree with those from other studies that found a higher nurse-patient ratio is associated with increased as well as decreased mortality. For instance, Neuraz et al. ratio greater than 2.5 and its implication on mortality risk (2015). Similarly, Lee et al. (2017) found and concluded that lower survival is associated with exposure to high workload (defined as the nurse workload > 52). The findings from this global study are also aligned with this study which found a positive relationship between nurse-to-patient ratios and mortality rates.

Driscoll et al.’s systematic review corroborates Phillips et al.'s (2018) findings, which advocate that improved staffing levels lead to better patient outcomes, including mortality. McHugh et al. (2021) also showed that policy implementation of staffing ratios was associated with decreased mortality rates in intervention hospitals; these results align with this study's findings. However, although most studies concluded that high ratios were harmful, different thresholds and specific ratios of interest were reported, possibly reflecting differences in healthcare systems and resource allocation to ICUs.

Yet, Qureshi et al., using a simulation-based model, showed that the impact of workload on the quality of care is less about mortality per se (2019) than one may have

anticipated. This highlights a methodological difference that imposes a degree of limitation in making comparisons.

5.4 Conclusion

This study has shed great light on and highlighted the correlation between nurse-to-patient ratios, nurse satisfaction, and mortality rates in the ICU setting in the governmental hospitals in the West Bank. It provides the theory behind how healthcare staffing ratios can either lead to more positive outcomes for healthcare professionals with negative implications for patient care (if too low) and an understanding of what healthcare staffing ratios can look like in a resource-limited environment.

Results demonstrate that satisfaction with nurse-to-patient ratios is critical to overall job satisfaction, and among ICU nurses there is a strong positive correlation between satisfaction with staffing levels and job satisfaction. And this underscores why an optimal nurse-to-patient ratio is essential not just to nursing well-being and satisfaction, but the quality of care patients receive. The findings of this study broaden the evidence that higher nurse provision ratios correlate strongly with increased risk of patient death, particularly in departments where nursing staff were above the recommended threshold. This also highlights just how important adequate staffing is to ensuring patient safety.

These findings mirror research around the globe that has repeatedly demonstrated that better staffing ratios lead to better outcomes for patients and greater satisfaction for nurses. The healthcare systems in these countries differ, but those conclusions also add to a growing body of evidence about how staffing levels improve healthcare delivery. But it also includes some specific findings -- such as that less qualified nurses were more satisfied than more qualified ones -- that suggest local cultural and organizational factors may be influencing nurse satisfaction in ways not sufficiently captured in other studies.

Though the study faced some limitations, including difficulties obtaining administrative approval and limitations on periods of data collection, it also works as a foundation for future studies. Broader studies with larger sample sizes, a variety of healthcare environments, and longitudinal design could improve the generalizability of findings, and provide additional information on the longer-term implications of nurse-patient ratios on both mortality outcomes and nurse satisfaction overall.

Overall, this study emphasizes that appropriate nurse staffing can help avoid negative patient outcomes and improve the satisfaction and well-being of nurses. And as

the West Bank is a low-resource setting, it calls for continued work on developing appropriate staffing ratios to further health care and make the work environment better for nurses.

5.5 Implications of Similarities and Differences in Palestinian Governmental Hospitals

The findings of this study and data from the existing literature on the topic support the notion that nurse-to-patient ratios should be a core part of care in an intensive care unit (ICU). This global coherency in the findings reinforces the relevance of the staffing strategies that reduced mortality and improved nurse satisfaction internationally. However, the variety of thresholds, location-specific results, and methodological issues demonstrate the significance of local-level interventions.

Improving nurse-to-patient ratios could have major implications (including decreased mortality and increased job satisfaction) in resource-poor regions such as the West Bank. Regional issues, like fair resource allocation and targeted professional development, could enhance your output and healthcare outcomes further.

5.6 Limitations

This study encountered several challenges and limitations during the data collection phase in hospitals, the most significant of which are as follows:

The problem of pursuing administrative agreements from the hospitals: the data collection needed formal agreements from the hospital administration, which took some time to complete.

Self-reported data: Data were collected based on questionnaires given by nurses themselves about their job satisfaction and nurse-to-patient ratio, which may lead to bias in responses, as some participants may choose to give socially acceptable answers rather than expressing their true opinions.

Time constraints: The data collection period was not that extensive, limiting the ability to cover more time and more hospitals.

The difficulties described here were however accompanied by extra processes of dealing with stakeholders who participated to ensure that the aims of the study were made clear so that the relevant information required to address the research aims were shared.

5.7 Suggestions for future work

This research reviews nurse-to-patient relationships and the possible effects on nurse satisfaction and mortality rates, however, there still needs to be further study done on this topic. There are some recommendations following:

Longitudinal study: A longitudinal study may provide a more complete picture of the impacts of changing nurse-to-patient ratios on nurse satisfaction and death rates over time. This would help to establish whether cross-sectional studies detect lagged effects or the continuation of short-term fluctuations over longer periods of time.

Expanded Sample Size and Geographic Scope: This study generalized on a sample of 78 ICU nurses in 3 governmental hospitals in the West Bank. Future studies, to increase the generalizability of the results, could have a larger sample size from hospitals from the private and governmental sectors throughout Palestine or other locations.

Comparative Analysis with Other Healthcare Settings: Analyzing the ICU setups for their nurse-to-patient ratio in countries or regions with more advanced healthcare systems could have identified features that could have potentially improved nurse satisfaction and patient outcomes.

Other Variables: Future research may be on different contributing factors related to nurse satisfaction and patient outcomes including– nursing skills, support systems, and work-life balance. Combining this work with the interplay of nurse-to-patient ratios would add to our collective understanding of the issues and opportunities in the ICU setting.

References

Almenyan, A. A., Albuduh, A., & Al-Abbas, F. (2021). Effect of Nursing Workload in Intensive Care Units. *Cureus, 13*(1), e12674. doi:10.7759/cureus.12674

Chamberlain, D., Pollock, W., Fulbrook, P., & Group, A. W. S. D. (2018). ACCCN Workforce Standards for Intensive Care Nursing: Systematic and evidence review, development, and appraisal. *Aust Crit Care, 31*(5), 292-302. doi:10.1016/j.aucc.2017.08.007

Chen, Y. C., Guo, Y. L., Chin, W. S., Cheng, N. Y., Ho, J. J., & Shiao, J. S. (2019). Patient-Nurse Ratio is Related to Nurses' Intention to Leave Their Job through Mediating Factors of Burnout and Job Dissatisfaction. *Int J Environ Res Public Health, 16*(23). doi:10.3390/ijerph16234801

Cho, S. H., Hwang, J. H., & Kim, J. (2008). Nurse staffing and patient mortality in intensive care units. *Nurs Res, 57*(5), 322-330. doi:10.1097/01.NNR.0000313498.17777.71

Driscoll, A., Grant, M. J., Carroll, D., Dalton, S., Deaton, C., Jones, I., . . . Astin, F. (2018). The effect of nurse-to-patient ratios on nurse-sensitive patient outcomes in acute specialist units: a systematic review and meta-analysis. *Eur J Cardiovasc Nurs, 17*(1), 6-22. doi:10.1177/1474515117721561

Duffield, C., Diers, D., O'Brien-Pallas, L., Aisbett, C., Roche, M., King, M., & Aisbett, K. (2011). Nursing staffing, nursing workload, the work environment and patient outcomes. *Appl Nurs Res, 24*(4), 244-255. doi:10.1016/j.apnr.2009.12.004

Gutsan, E., Patton, J. P., Willis, W. K., & Alberto Coustasse, D. P. M. M. M. (2018). *Burnout syndrome and nurse-to-patient ratio in the workplace*.

Hamed, M. H. M. (2023). *Nurses' satisfaction and its effect on job performance: Comparative study between Joint Commission International accredited and non-accredited Palestinian hospitals* (Master's thesis). Al-Quds University, School of Public Health.

Hernandez, J. B. R., & Kim, P. Y. (2024). Epidemiology Morbidity And Mortality. In *StatPearls*. Treasure Island (FL) ineligible companies. Disclosure: Peggy Kim declares no relevant financial relationships with ineligible companies.

Lasater, K. B., Aiken, L. H., Sloane, D., French, R., Martin, B., Alexander, M., & McHugh, M. D. (2021). Patient outcomes and cost savings associated with hospital safe nurse staffing legislation: an observational study. *BMJ Open, 11*(12), e052899. doi:10.1136/bmjopen-2021-052899

Lee, A., Cheung, Y. S. L., Joynt, G. M., Leung, C. C. H., Wong, W. T., & Gomersall, C. D. (2017). Are high nurse workload/staffing ratios associated with decreased survival in critically ill patients? A cohort study. *Ann Intensive Care, 7*(1), 46. doi:10.1186/s13613-017-0269-2

McGahan, M., Kucharski, G., Coyer, F., & Winner, A. B. N. R. P. s. b. E. (2012). Nurse staffing levels and the incidence of mortality and morbidity in the adult intensive care unit: a literature review. *Aust Crit Care, 25*(2), 64-77. doi:10.1016/j.aucc.2012.03.003

McHugh, M. D., Aiken, L. H., Sloane, D. M., Windsor, C., Douglas, C., & Yates, P. (2021). Effects of nurse-to-patient ratio legislation on nurse staffing and patient mortality, readmissions, and length of stay: a prospective study in a panel of hospitals. *Lancet, 397*(10288), 1905-1913. doi:10.1016/S0140-6736(21)00768-6

Neuraz, A., Guerin, C., Payet, C., Polazzi, S., Aubrun, F., Dailler, F., . . . Duclos, A. (2015). Patient Mortality Is Associated With Staff Resources and Workload in the ICU: A Multicenter Observational Study. *Crit Care Med, 43*(8), 1587-1594. doi:10.1097/CCM.0000000000001015

NurseJournal. (2023). Nurse-to-Patient Staffing Ratio Laws and Regulations by State. Retrieved from https://nursejournal.org/articles/nurse-to-patient-staffing-ratio-laws-by-state/

Qureshi, S. M., Purdy, N., Mohani, A., & Neumann, W. P. (2019). Predicting the effect of nurse-patient ratio on nurse workload and care quality using discrete event simulation. *J Nurs Manag, 27*(5), 971-980. doi:10.1111/jonm.12757

Rassin, M., & Silner, D. (2007). Trends in nursing staff allocation: the nurse-to-patient ratio and skill mix issues in Israel. *Int Nurs Rev, 54*(1), 63-69. doi:10.1111/j.1466-7657.2007.00529.x

Senek, M., Robertson, S., Ryan, T., King, R., Wood, E., Taylor, B., & Tod, A. (2020). Determinants of nurse job dissatisfaction - findings from a cross-sectional survey analysis in the UK. *BMC Nurs, 19*, 88. doi:10.1186/s12912-020-00481-3

Sharma, S. K., & Rani, R. (2020). Nurse-to-patient ratio and nurse staffing norms for hospitals in India: A critical analysis of national benchmarks. *J Family Med Prim Care, 9*(6), 2631-2637. doi:10.4103/jfmpc.jfmpc_248_20

Twigg, D., Duffield, C., Thompson, P. L., & Rapley, P. (2010). The impact of nurses on patient morbidity and mortality - the need for a policy change in response to the nursing shortage. *Aust Health Rev, 34*(3), 312-316. doi:10.1071/AH08668

Wynendaele, H., Willems, R., & Trybou, J. (2019). Systematic review: Association between the patient-nurse ratio and nurse outcomes in acute care hospitals. *J Nurs Manag, 27*(5), 896-917. doi:10.1111/jonm.12764

Workload Indicators of Staffing Need (WISN) [Internet]. World Health Organization. 2020 [cited 2024 april 18]. Available from: https://www.who.int/hrh/resources/wisn_user_manual/en/.

Appendices

Appendix 1. IRB Approval

Arab American University
Institutional Review Board - Ramallah

الجامعة العربية الأمريكية
مجلس اخلاقيات البحث العلمي – رام الله

IRB Approval Letter

Study Title: "Nurse-to-Patient Ratios, Mortality Rates, and Nurse Satisfaction in West Bank ICUs".

Submitted by: Salam Jafar Hassan Shahatit

Date received: 26nd March 2024

Date reviewed: 6th May 2024

Date approved: 6th May 2024

Your Study titled **"Nurse-to-Patient Ratios, Mortality Rates, and Nurse Satisfaction in West Bank ICUs"** with the code number **"R-2024/A/56/N"** was reviewed by the Arab American University Institutional Review Board - Ramallah and it was approved on the 6th of May 2024.

Sajed Ghawadra, PhD
IRB-R Chairman
Arab American University of Palestine

الجامعة العربية الأمريكية - فلسطين
مجلس اخلاقيات البحث العلمي - رام الله
IRB-R
ARAB AMERICAN UNIVERSITY-PALESTINE
INSTITUTIONAL REVIEW BOARD - RAMALLAH

General Conditions:

1. Valid for 6 months from the date of approval.
2. It is important to inform the IRB-R with any modification of the approved study protocol.
3. The Bord appreciates a copy of the research when accomplished.

رام الله – فلسطين

Tel: 02-294-1999 **E-Email:** IRB-R@aaup.edu **Website:** www.aaup.edu

Appendix 2. The Questionnaire

الجامعة العربية الأمريكية
ARAB AMERICAN UNIVERSITY

أعزائي الممرضون/ الممرضات،

هذا الاستبيان الذي بين أيديكم، هو استبيان قامت بتوزيعه الطالبة سلام شحاتيت طالبة ماجستير في كلية الدراسات العليا في الجامعة العربية الامريكية – تخصص تمريض العناية المكثفة، وسيتم استخدام البيانات التي تم جمعها في البحث الأكاديمي؛ وتهدف هذه الدراسة المقارنة بين نسبة الممرضين الى المرضى ورضا التمريض في وحدات العناية المركزة.

من المقدر أن يستغرق منك إتمام هذا الاستبيان ما بين 10 – 15 دقيقة، والمشاركين في هذا الاستبيان مجهولين الهوية، أي أنه لا يشترط منك كتابة اسمك، وعليه فإن البيانات المجمعة سيتم تقديمها على شكل احصاءات لتحقيق اهداف البحث.

إن مشاركتك في هذا الاستبيان هي مشاركة طوعية، ولديك كامل الحق في عدم الإجابة عليه ويرجى العلم بأن إجابتك على جميع الأسئلة تشير إلى موافقتك.

وأتقدم أيضا بجزيل الشكر والتقدير لمشاركتك في هذا الاستبيان حيث أن مساهمتك ستضيف قيمة إلى نتائج الدراسة.

إذا كان لديك أي أسئلة بخصوص الدراسة أو الاستبيان، فال تتردد في الاتصال بالباحث أو المراسلة

معلومات الاتصال بالباحث:

رقم الهاتف: 0597855459

البريد الالكتروني: s.shahatit@student.aaup.edu

أشكرك لتعاونك ووقتك

(القسم الأول:) البيانات الديموغرافية يرُجى ملئ ما يلى: -

1. العمر: -

1. أقل من 20 سنة
2. من 20 الى 25 سنة
3. من 26 الى 30 سنة
4. من 31 الى 35 سنة
5. أكثر من 35 سنة

2. الجنس: -

[ ] ذكر [ ] أنثى

3. منذ متى وأنت تعمل في هذا المستشفى؟

1. أقل من 1 سنة
2. من 1 الى 2 سنوات
3. من 3 الى 5 سنوات
4. من 6 الى 10 سنوات
5. أكثر من 10 سنوات

4. ما هي أعلى درجة علمية حصلت عليها؟

1. درجة الدبلوم المتوسط
2. بكالوريوس في علوم التمريض
3. دبلوم عالي
4. درجة الماجستير

5. ما هي فئتك الوظيفية؟

1. ممرض مؤهل (دراسة سنتين)
2. ممرض قانوني دراسة (3 الى 4 سنوات)
3. رئيس قسم تمريضي

6. المستشفى التي تعمل بها:

1. مجمع فلسطين الطبي
2. مستشفى عالية الحكومي
3. مستشفى رفيديا الجراحي

7. من 0 حتى 10 كم تقيم مستوى رضاك عن المستشفى؟

غير راضٍ على الاطلاق						راضٍ تماماً				
0	1	2	3	4	5	6	7	8	9	10

8. من 0 الى 10 كم تقيم مستوى أدائك الوظيفي في المستشفى؟

ضعيف /أقل من المتوقع						مميز/ اعلى من المتوقع				
0	1	2	3	4	5	6	7	8	9	10

(القسم الثانى) استبيانات لتقييم الرضا: -

يرجى تحديد مدى موافقتك او عدم موافقتك على أن العبارة تصف مستوى رضاك، ويرجى استخدام الرمز لتحديد الإجابة التي تناسبك (لا أوافق بشدة، لا أوافق، حيادي، أوافق، أوافق بشدة.)

الرقم	البنود	لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة
.1	أنا راضٍ عن إجراء الحوارات ومشاركة المعلومات الطبية مع زملائي في العمل.					
.2	أنا راضٍ عن روح التعاون بيني وبين زملائي في العمل.					
.3	انا راضٍ عن عبء العمل في مكان عملي.					
.4	أنا راضٍ عن جهود زملائي في العمل لتوفير رعاية أفضل.					
.5	أنا راضٍ عن جهد رؤسائي لتحسين ظروف عملي.					
.6	أنا راضٍ عن مشاركتي في اتخاذ القرارات في مكان عملي.					
.7	أنا راضٍ عن نسبة الممرضين لكل مريض أثناء مناوبتي.					
.8	أنا راضٍ عن فرص التقدم الوظيفي.					
.9	أنا راضٍ عن مستوى الثقة التي لدي مع زملائي في العمل.					
.10	أنا راضٍ عن الفرص التي يوفرها لي رؤسائي في العمل للمشاركة في الدورات التدريبية/ المشاريع.					
.11	أنا راضٍ عن نسبة الممرضين لكل مناوبة وفقاً للمهمات المُراد اداؤها. (عدد الممرضين مناسب لكل وردية نسبتاً لأعباء العمل).					
.12	أنا راضٍ عن الظروف المادية للمكان الذي أقدم فيه الرعاية.					
.13	أنا راضٍ عن الأعمال الروتينية في قسمي.					
.14	أنا راضٍ عن حقيقة أن رؤسائي يكافئون و/أو يقدرون عملي.					
.15	أنا راضٍ عن حقيقة أن المرضى يكافئون و/أو يقدرون عملي.					
.16	أنا راضٍ عن حقيقة أن المرضى وعائلاتهم يقدرون عملي.					

.17	أنا راضٍ عن مهمات التمريضية الموكلة إليّ في قسمي.					
.18	أنا راضٍ عن مهارات أخصائيو الصحة الآخرين.					
.19	أنا راضٍ عن فرص التدريب المتوفرة في مكان عملي.					
.20	أنا راضٍ عن كفاءة زملائي الذين يشَغلون نفس وظيفتي.					
.21	أنا راضٍ عن إمكانية تطبيق المعرفة الجديدة في مكان عملي.					
.22	أنا راضٍ عن المعدات/ الأدوات المتوفرة في قسمي.					
.23	أنا راضٍ عن التنظيم في مكان عملي.					
.24	أنا راضٍ عن استقلاليتي في تقديم الرعاية الطبية المناسبة وفقاً لمهاراتي.					
.25	أنا راضٍ عن مدى تفصيل وتنظيم البروتوكولات المتبعة في قسمي.					
.26	أنا راضٍ عن جودة الرعاية التي أقدمها مع مراعاة السياق الذي اعمل فيه بالحسبان.					
.27	أنا راضٍ عن الوقت الذي يجب انتظاره حتى تتم ترقيتي في مكان عملي.					
.28	أنا راضٍ عن المهمات التي يتم تأديتها في قسمي.					
.29	أنا راضٍ عن احترام رؤسائي لعملي.					
.30	أنا راضٍ عن عدد البروتوكولات الخاصة بالقسم.					
.31	أنا راضٍ عن راتبي مقارنة بالمهمات التي أؤديها.					
.32	أنا راضٍ عن راتبي مقارنة بمهاراتي/معرفتي.					
.33	أنا راضٍ عن إجراء الحوار ومشاركة المعلومات مع رؤسائي في العمل.					
.34	أنا راضٍ عن نظرة المرضى لعملي.					
.35	أنا راضٍ عن تشجيع رؤسائي للمشاركة في التدريب.					
.36	أنا راضٍ عن احترام المرضى لعملي.					
.37	أنا راضٍ عن احترام أخصائيو الصحة الاخرين للرعاية التي أقدمها.					

***Part One (Demographics Data). Please fill in the following**

1. Age: -

[ ] Less than 20 Years [ ] From 20 to 25 Years [ ] From 26 to 30 Years

[ ] From 31 to 35 Years [ ] More than 35 Years

2. Gender: -

[ ] Male [ ] Female.

3. How long have you been working in this hospital?

[ ] Less than 1 Year [ ] From 1 to 2 Years [ ] From 3 to 5 Years

[ ] From 6 to 10 Years [ ] More than 10 Years

4. What is your highest educational degree?

[ ] Diploma Degree [ ] Bachelor of Nursing Science

[ ] Higher Diploma [ ] Master's degree

5. What is your occupational category?

[ ] Licensed Practical Nurse [ ] Registered Nurse [ ] Head Nurse

6. Woke place:

[ ] Hebron Governmental Hospital (Alia) [ ] Palestinian Medical Complex

[ ] Rafedia Surgical Hospital

7. From 0 to 10, how do you rate your satisfaction level in your organization?

Not at all satisfied	Completely satisfied

0	1	2	3	4	5	6	7	8	9	10

8. From 0 to 10, how do you rate your Performance level in your organization?

Poor Below expectations						Exceptional Always exceeds expectations				
0	1	2	3	4	5	6	7	8	9	10

***Part Two (Satisfactions Questionnaire)**

Please indicate the extent to which you agree or disagree that the statement characterizes your satisfaction, and use the Likert. symbol for the appropriate response (Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree).

No.	**Items**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1.	I am satisfied with the moments of having conversations and sharing medical information with my co-workers.					
	I am satisfied with the spirit of collaboration between me and my co-workers.					
3.	I am satisfied with the workload at my workplace.					
4.	I am satisfied with my co-workers' effort to provide better care.					
5.	I am satisfied with my superiors' effort to improve my working conditions.					
6.	I am satisfied with my participation in decision-making at my workplace.					

7.	I am satisfied with the nurse-to-patient ratio in my shift.					
8.	I am satisfied with the career advancement opportunities.					
9.	I am satisfied with the level of trust that I have with my co-workers.					
10.	I am satisfied with how my superiors allow me to participate in training courses/projects.					
11.	I am satisfied with the nurse per shift ratio according to the number of tasks to be performed. (suitable nurses number per shift to workload)					
12.	I am satisfied with the physical conditions of the space where I provide care.					
13.	I am satisfied with the routines at my unit.					
14.	I am satisfied with the fact that my work is rewarded and/or valued by my superiors.					
15.	I am satisfied with the fact that my work is rewarded and/or valued by the patients.					
16.	I am satisfied with how patients and their families value my work.					
17.	I am satisfied with the nursing assigned to me in my department.					
18.	I am satisfied with the other health specialists' skills.					
19.	I am satisfied with the training opportunities provided at my workplace.					

20.	I am satisfied with the level of colleagues' competence in the same field.					
21.	I am satisfied with the possibility to implement new knowledge at my workplace.					
22.	I am satisfied with the equipment/ materials at my unit.					
23.	I am satisfied with the followed system my workplace.					
24.	I am satisfied with my autonomy to provide adequate care to patients according to my skills.					
25.	I am satisfied with how protocols are well organized and elaborated in my unit.					
26.	I am satisfied with the quality of the care I provide taking into account the context where I work.					
27.	I am satisfied with the waiting time to be promoted at my workplace.					
28.	I am satisfied with the tasks performed in my unit.					
29.	I am satisfied with my superiors' respect for my work.					
30.	I am satisfied with the number of protocols on the unit's functioning.					
31.	I am satisfied with my salary, taking into account the tasks I perform.					
32.	I am satisfied with my salary taking into account my skills/knowledge.					

33.	I am satisfied with the moments of dialogue and sharing of information with my superiors.					
34.	I am satisfied with the patients' perception of my activities.					
35.	I am satisfied with my superiors' encouragement to participate in training.					
36.	I am satisfied with the patients' respect for my work.					
37.	I am satisfied with the other health professionals' respect for the care I provide.					

العلاقة بين نسبة عدد الممرضين الى المرضى ومعدل الوفيات ورضا الممرضين في وحدات العناية المكثفة في الضفة الغربية

سلام جعفر حسن شحاتيت

لجنة الاشراف: د. عماد أبو خضر

د. ساجد غوادرة

د. خلف عواد

ملخص

الخلفية: تعتبر نسبة الممرضات إلى المرضى أمر بالغ الأهمية لجودة الرعاية التي سيتلقاها المريض، والنتائج، والرضا الوظيفي للممرضات. في وحدات العناية المركزة، ارتبط نقص عدد العاملين في التمريض بالوفيات ومؤشر على عدم رضا الممرضات، مما يشكل تحديًا لأنظمة الرعاية الصحية في الغرب.

الهدف: هدفت هذه الدراسة إلى دراسة العلاقة بين نسبة الممرضات إلى المرضى ومعدلات الوفيات ورضا الممرضات في وحدات العناية المركزة في مستشفيات الضفة الغربية.

المنهجية: تم استخدام طريقة مختلطة مع نهج كمي مقطعي لتقييم رضا الممرضات عن دراسة استقصائية شملت 78 ممرضة من ممرضات وحدة العناية المركزة، ونهج جمع البيانات الرصدية المستقبلية لتقييم الوفيات من خلال سجلات المستشفى خلال شهري أكتوبر ونوفمبر 2024. وقد جمعت استبيانات ديموغرافية واستبيانات رضا. وإحصاءات الوفيات. تم إجراء التحليل الإحصائي في برنامج SPSS.

النتائج: وجد الباحثون أن ارتفاع نسبة الممرضات إلى المرضى ارتبط بارتفاع معدلات وفيات المرضى في وحدة العناية المركزة. وترتبط النسب الأعلى أيضًا بانخفاض رضا الممرضات في أبعاد مثل عبء العمل والعمل الجماعي وفرص النمو المهني.

الاستنتاج: يشير التقرير إلى أهمية النسب كمحدد لسلامة المريض والممرضة. ومن المهم تنفيذ سياسة التوظيف القائمة على الأدلة واستراتيجيات التكيف مع عبء العمل لتحسين نتائج المرضى والرضا الوظيفي للممرضين في وحدات العناية المركزة في الضفة الغربية.

الكلمات المفتاحية: نسبة الممرضات إلى المرضى، معدلات الوفيات، رضا الممرضات، الضفة الغربية، طاقم الرعاية الصحية.