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Nurses' Knowledge and Perceived Practices Regarding the Green Hospital at Badr University Hospital

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Abstract

Background: Green hospitals have evolved to emphasize sustainability by adopting eco-friendly practices such as waste reduction, energy efficiency, and the use of non-toxic materials. As front-line healthcare professionals, nurses play a critical role in implementing these green initiatives. **Aim:** To assess nursing personnel's knowledge and perceived practices regarding green hospitals at Badr University Hospital. **Methods:** A descriptive research design was conducted on 350 nursing personnel at Badr University Hospital in Egypt. Data were collected using a knowledge questionnaire and a perceived practices checklist related to green hospitals. Statistical software was used to analyze the data and determine correlations between variables. **Findings:** The majority of nursing personnel had an unsatisfactory level of knowledge about green hospitals, with an average knowledge level of 12.6%. However, nearly half of nursing personnel demonstrated a good level of perceived practices related to green hospitals, with an average perceived practices level of 48%. Finally, A statistically significant positive correlation was found between overall knowledge about green hospitals and total perceived practices among nursing personnel. **Conclusion:** While nursing personnel exhibited limited knowledge about green hospitals, their perceived practices were relatively better. However, A statistically significant relationships were observed between knowledge levels and factors such as job title and age. **Recommendations:** Healthcare organizations should develop and implement green policies, integrate environmental sustainability goals into their vision, mission, and values, and incorporate environmental sustainability topics into nursing education curricula. Further studies should be conducted on larger groups of nursing personnel in private hospitals and compared with those in governmental hospitals.

Key words: Eco-friendly, Energy efficiency, Green hospitals, Non-toxic materials, Sustainability.

I. Introduction:

Sustainability in healthcare has emerged as a critical priority, driven by the sector's substantial environmental footprint and the need to balance ecological, economic, and social equity goals ***(Sherman et al., 2023).*** In nursing, sustainability emphasizes environmental responsibility by integrating sustainable practices into both nursing education and clinical settings ***(Álvarez-Nieto et al., 2024).***

The green hospital has no universal definition; however, it can be defined as a facility that is designed and built to use as many natural resources as possible in an efficient and environmentally friendly manner. Green hospitals are medical facilities that provide high-quality healthcare by implementing sustainable design principles. Its features include a thoughtfully chosen location, effective energy and water utilization, suitable exhaust management, and the use of environmentally friendly materials. Furthermore, it encourages initiatives to increase operational effectiveness

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by lessening environmental effects and raising patient and healthcare team satisfaction with hospital administration and operations ***(Asamoto et al., 2024).***

Green hospital is a hospital that improves public health by continuing to reduce its environmental impact on sustainability ***(Tarkar, 2022).*** The green hospital concept is carried out to minimize the hospital's contribution to global warming, reduce the impact of environmental damage, and improve air quality with natural ventilation. Apart from that, the importance of open space around the hospital, proper water management, healing gardens, comfortable accessibility for hospital users, and good management of medical and non-medical waste ***(Ismaeil & Sobaih, 2022).***

In order to reduce dependency on fossil fuels, green hospitals use energy-efficient lighting, heating, ventilation, and air conditioning systems; integrate renewable energy sources, such as solar panels, wind turbines, and geothermal systems; conserve water by installing water-saving fixtures, rainwater harvesting systems, and wastewater recycling; use sustainable building materials, such as non-toxic, recyclable, and locally sourced materials in construction and renovation projects; reduce waste by encouraging recycling, composting, and the safe disposal of hazardous and medical waste; and improve indoor environmental quality ***(Doulabi, 2024).***

II. Significance of the study:

The Egyptian government launched the National Climate Change Strategy. Also, as a host of COP27, Egypt is also coordinating global action on climate adaptation, mitigation, and finance. In addition, Egypt's Vision 2030 gives importance to confronting the effects of climate change through creating a sustainable and thriving environment that contributes positively to the preservation and restoration of Egypt natural resources and Eco-system ***(Gomaa, 2024).***

Healthcare sectors contributes 4.4% of global greenhouse gas emissions, with estates accounting for 15% of NHS emissions in the UK. Environmental health issues like pollution contribute to conditions like heart disease, asthma, and cancer. Transitioning to a net-zero economy can improve health ***(Sebire et al., 2025).***

On the regional level, the Eastern Mediterranean countries, including Egypt, have around 22% of the deaths attributed to environmental caused diseases. ***(ElMitainy & El-Haggar, 2019).*** Egypt is highly vulnerable to water scarcity, droughts, and other adverse impacts of climate change. To support the move to a greener, climate-resilient economy ***(Abu-Zeid, Abu-Zeid, & Halim, 2025).***

III. Aim of the study:

This study aimed to assess nursing personnel' knowledge and perceived practices regarding the green hospital through the following objectives:

1- Assess nursing personnel's knowledge about the green hospital at the selected hospital.
2- Determine perceived green hospital practices by nursing personnel at the selected hospital.

Research Question:

The research question of this study was formulated as the following :

1- What are nursing personnel's knowledge levels about green hospitals?
2- What are the perceived green hospital practices reported by nursing personnel?

IV. Subject and Methods:

Research Design:

A descriptive research design was utilized to conduct this study.

Research Setting:

The study was conducted at Badr University Hospital, which is affiliated to Helwan University, Cairo Governorate, Egypt.

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Research Subjects:

The study subject encompassed all nursing personnel (N=350) at the aforementioned hospital who participated in the study during the data collection. It composed of two groups: 1st group: It included all categories of nurse managers (N=30): nurse director, assistant nurse director, nurse supervisors and head nurses. And 2nd group included all staff nurses in different departments (N=320).

Tools of data collection:

First tool: Nursing personnel's knowledge about the green hospital questionnaire which is consist of two parts:

It is a self- administered questionnaire. This tool was designed by **Ismail et al. (2024)** and adopted by the researcher. It was consisted of two parts:

Part 1: Personal data for nursing personnel:

This part was used to assess personal data for nursing personnel included: age, gender, job title, department, level of education in nursing and years of experience in the current hospital.

Part 2: Nursing personnel's knowledge about the green hospital questionnaire.

The questionnaire covered six dimensions of green hospital. It was composed of 61 questions as follows: green hospital (12 questions), green management (11 questions), green team (12 questions), green human resources management (9 questions), green performance management (8 questions), and green waste management (9 questions) .

Scoring system: Responses of nursing personnel were scored were scored as one for correct answers and zero for incorrect answers. So, the total score equals 61 points. The cut point was 65%, which equals 40 points.

- **Satisfactory level**: ≥ 65% (≥ 40 points) .
- **Unsatisfactory level**: < 65 % (< 40 points).

Second tool: Nursing personnel's perceived practices about green hospital checklist.

It is a self- administered checklist. This tool was designed by **Ismail et al. (2024)** and adopted by the researcher. It consisted of 112 questions grouped under 18 dimensions about the green hospital as follows: water efficiency (9 questions), management (6 questions), feeding system (7 questions), hospital's green space (3 questions), laboratory (7 questions), pharmacy (6 questions), infection control (4 questions), energy efficiency (8 questions), waste management (9 questions), hospital physical location (4 questions), innovation in the design of hospital spaces (10 questions), assessment of green hospital management system (5 questions), indoor air ventilation for hospitals (6 questions), environmentally preferable purchasing (3 questions), paper (3 questions), transportation (7 questions), voice (4 questions), and green human resources management (11 questions).

2-Scoring system: The participants' responses were measured on a three-point Likert scale, where˝2˝indicates present,˝1˝indicates not applicable, and˝0˝indicates absent. A total score of 224 points was submitted, and the cutoff point was made at 60%, which 136 points based on a 3-point Likert scale.

- **Good practice level**: > 75 % (>168 points).
- **Moderate practice level**: 61% – 75% (137–168 points).
- **Poor practice level**: ≤ 60 % (≤ 136 points).

Validity:

The tools used in this study are valid for content and face validity by **Ismail et al. (2024)**. They tested the validity by a jury of three experts, professors at the Nursing Administration department from different universities Menoufia University and Cairo University.

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Reliability:

Reliability for the utilized tools was tested by Cronbach's alpha coefficient test. Cronbach alpha test for nursing personnel's knowledge about green hospital was (0. 82), and nursing personnel's perceived practices about green hospital was (0.87).

Ethical considerations:

Official permission for the proposed study was obtained from the Scientific Research Ethics Committee at the Faculty of Nursing, Helwan University (Ethical Committee No. 40, dated 18 March 2024). Additional permission was granted by the Faculty of Medicine at Helwan University (dated 30 May 2024). Participation in the study was voluntary. All subjects were fully informed about the study's objectives and their role prior to written consent.

II- Operational design.

This study was completed and passed through different phases as follow: Preparatory phase, Pilot study, and Field work.

A-Preparatory phase.

Included reviewing of past, current, national, and international related literature and theoretical knowledge of various aspects of the study using books, articles, the internet, and magazines to develop and review tools for data collection. The researcher worked as a nurse resident at Badr University Hospital, which is affiliated to Helwan University, for two years. Therefore, the researcher is familiar with the hospital and all nursing personnel.

B -Pilot study:

A pilot study was carried out on 32 staff nurses and 3 nurse managers to test the clarity and applicability of the data collection tools. The nurses who participated in the pilot study were included in the study because no modifications were made to the study tools.

C-Field work:

The actual field work started at the beginning of July 2024 to the end of October 2024, with two days/week morning, afternoon, and night shifts. The researcher collected data by himself by meeting all categories of nursing personnel and explaining the aim of the study and method for filling out the questionnaire and checklist. The researcher was present all the time during fulfilling forms to answer any questions. The time needed by nurses to complete the study tools ranged between (30-45) minutes. The researcher checked the completeness of each filled sheet after the nurses completed it to ensure the absence of any missing data .

III- Administrative Item:

An official permission to conduct the study was obtained from the Faculty of Nursing at Helwan University, the Dean of the Faculty of Medicine at Helwan University Hospital, and the Chief Executive Manager of Badr University Hospital.

IV-Statistical design:

Data collected from the studied sample was revised, coded and entered using. P C. Computerized data entry and statistical analysis were fulfilled using the statistical package for social sciences (SPSS) version (27). Data were presented using descriptive statistics in the form of frequencies, percentage. The Comparison between groups with qualitative data was done by using Chi-square test; Pearson's correlation coefficient (r) test was used to assess the degree of association between two sets of variables. The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following :

For all tests, a two-tailed p-value ≤ 0.05 was considered statistically significant, P-value ≤ 0.01 was considered highly statistically significant. While p-value> 0.05 was considered not significant.

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IX. Results:

Table (1): Descriptive statistics of personal data of nurse managers (N=30).

Personal data	Nurse managers (N=30)	
	No	%
Level of education in nursing		
Technical nursing institute	1	3.3
Bachelor's Degree	28	93.3
Master Degree	1	3.3
Years of experience in current hospital		
0-2 years	8	26.7
>2-5 years	9	30.0
>5-10	13	43.3
Department		
1-Critical care units	13	43.3
2-Inpatient departments	12	40.0
3-Outpatient clinics	2	6.7
4-Others	3	10.0

Table (1): Describes that, the majority (93.3%) of nurse managers held a bachelor's degree in nursing, while only 3.3% of them had a technical institute and a master's degree in nursing. Additionally, fewer than half (43.3%) of nurse managers had between 6-10 years of experience at their current hospital, while more than a quarter (26.7%) had only 0-2 years of experience. Furthermore, fewer than half (43.3%) worked in critical care units, while only 6.7% worked in outpatient clinics.

Table (2): Descriptive statistics of personal data of staff nurses (N=320).

Personal data	Staff nurses (N=320)	
	No	%
Level of education in nursing		
Technical nursing institute	199	62.2
Bachelor's Degree	121	37.8
Years of experience in current hospital		
0-2 years	69	21.6
>2-5 years	170	53.1
>5-10	81	25.3
Department		
1- Critical care units	165	51.6
2- Inpatient departments	112	35.0

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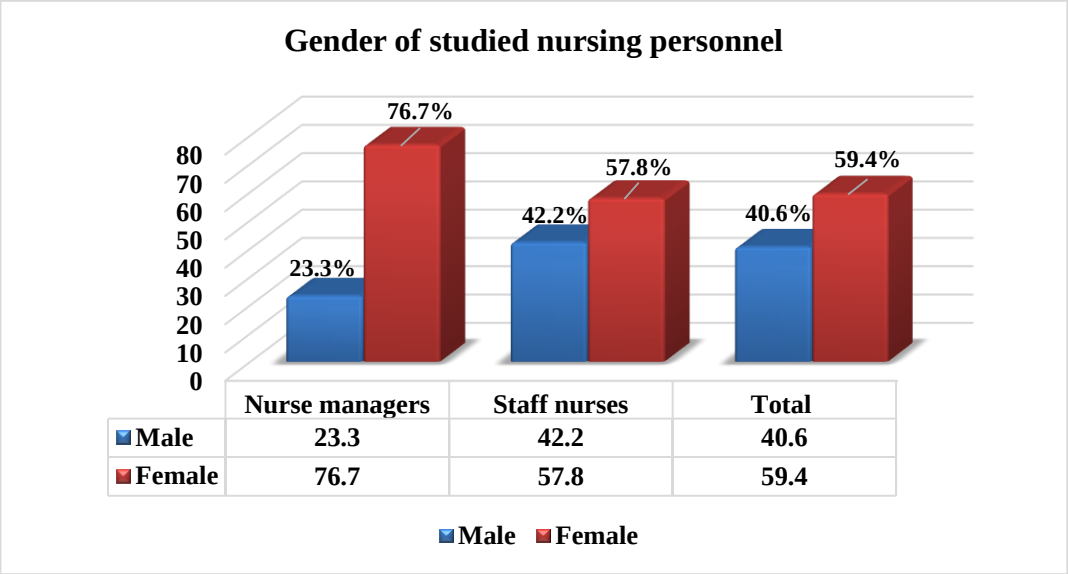
3- Outpatient clinics	20	6.3
4- Other	23	7.2

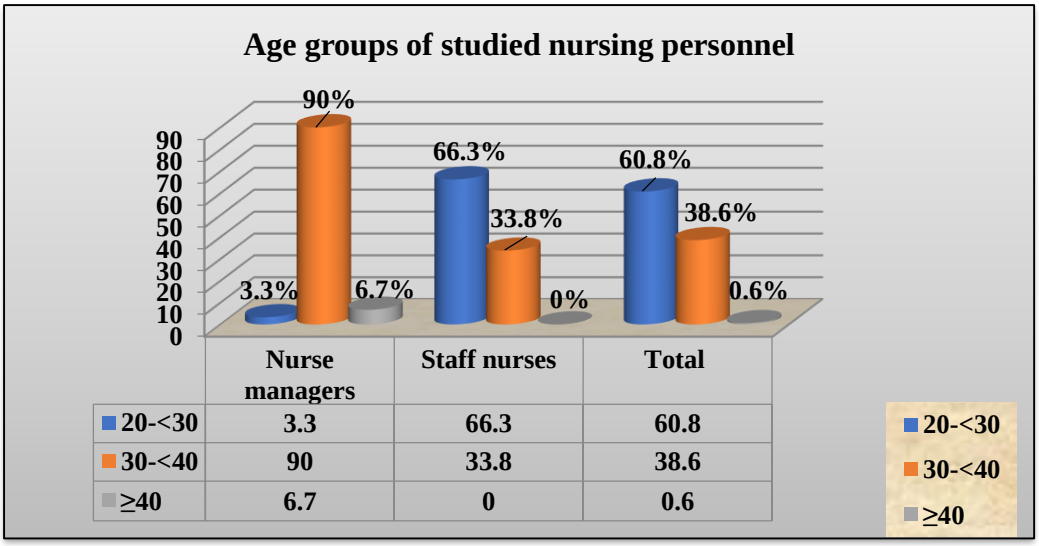
Table (2): Shows that, fewer than two-thirds (62.2%) of staff nurses held a technical institute degree and more than a third (37.8%) had a bachelor's degree. Additionally, more than half (53.1%) of the nurses had 3-5 years of experience in their current hospital, and fewer than a quarter (21.6%) had 2-5 years of experience. Moreover, more than half (51.6%) worked in critical care units, whereas only 6.3% worked in outpatient clinics.



	Nurse managers	Staff nurses	Total
Male	23.3	42.2	40.6
Female	76.7	57.8	59.4

Figure (1): Descriptive statistics of studied nursing personnel regarding their gender (N=350).

Fig (1): Illustrates that, more than three-quarters (76.7%) of nurse managers were female, while fewer than a quarter (23.3%) were male. Additionally, fewer than two-thirds (57.8%) of staff nurses were female, while more than two-fifths (42.2%) were male. Overall, fewer than two-thirds (59.4%) of all nursing personnel were female, while more than two-fifths (40.6%) were male.



	Nurse managers	Staff nurses	Total
20-<30	3.3	66.3	60.8
30-<40	90	33.8	38.6
≥40	6.7	0	0.6

Figure (2): Descriptive statistics of studied nursing personnel regarding their age groups (N=350).

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Fig (2): Illustrates that, the majority (90%) of nurse managers were aged from 30 to less than 40 years old, whereas only 3.3% were aged from 20 to less than 30 years old. Additionally, two-thirds (66.3%) of staff nurses were aged from 20 to less than 30 years old, whereas nearly a third (33.8%) were aged from 30 to less than 40 years old. In addition, fewer than two-thirds (60.8%) of all nursing personnel were aged from 20 to less than 30 years old, and only 0.6% were older than 40 years old.

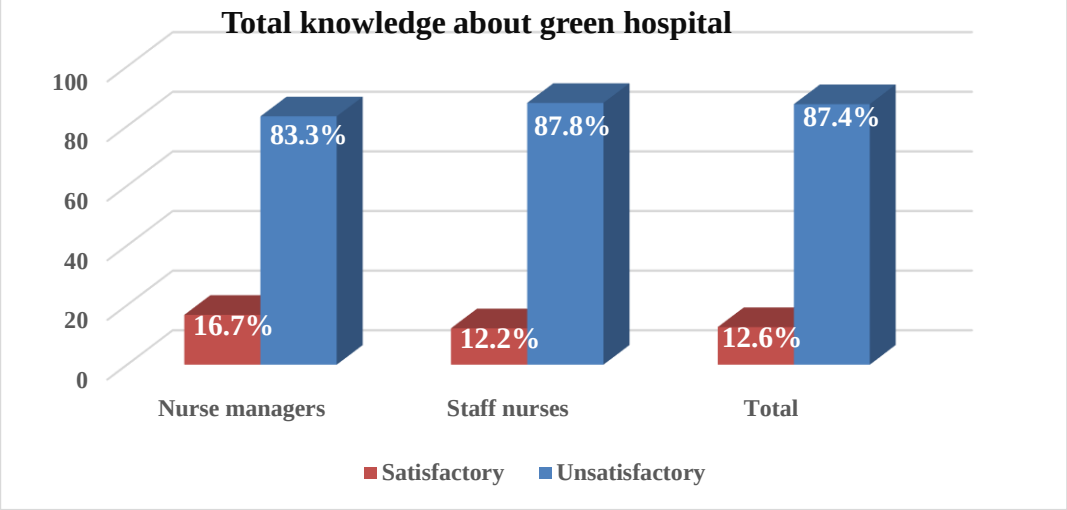

Figure (3): The total knowledge of the studied nurses about green hospitals (N=350).

Fig (3): Shows that, only **16.7%** of nurse managers had a satisfactory level of total levels of knowledge about the green hospital, while the majority **(87.4%)** of them had an unsatisfactory level. In addition, only **12.2%** of the staff nurses had a satisfactory level of total level of knowledge about the green hospital, while the majority **(87.8%)** of them had an unsatisfactory level. Overall, only **12.6%** of all nursing personnel had a satisfactory level of total levels of knowledge about the green hospital, whereas the majority **(87.4%)** of them had an unsatisfactory level.

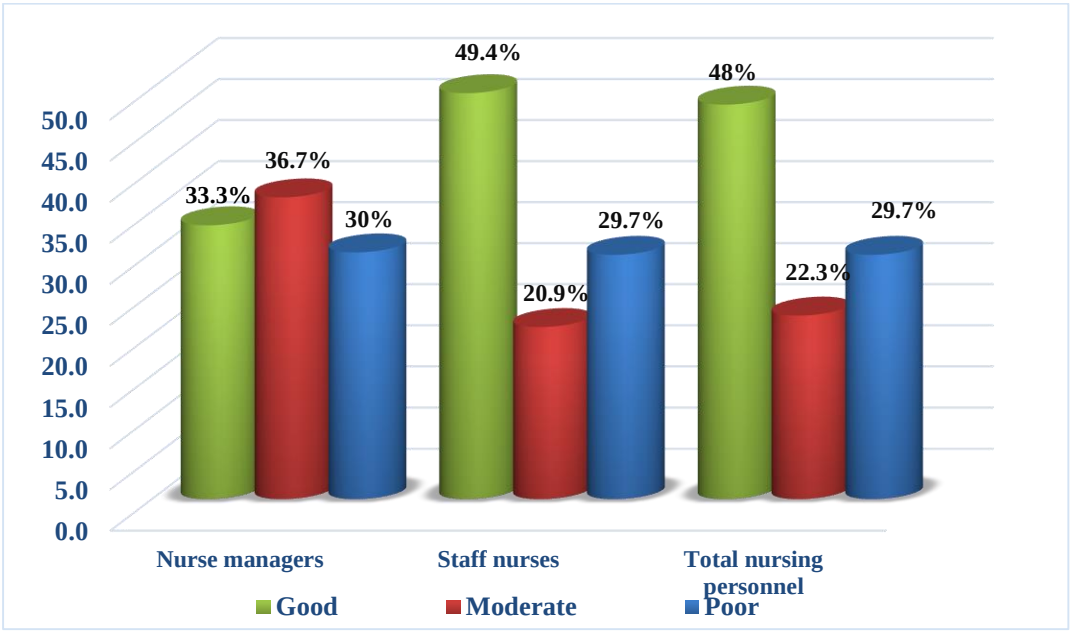

Figure (4): The total levels of perceived practices of the studied nursing personnel about green hospital (N=350).

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Fig (4): Illustrates that, one-third **(33.3%)** of nurse managers had a good level about total levels of perceived practices about the green hospital and fewer than one-third **(30%)** of them had a poor level. while, nearly half **(49.4%)** of staff nurses had a good level about total levels of perceived practices about the green hospital and fewer than one-third **(29.7%)** of them had a poor level. In addition, fewer than half **(48%)** of all nursing personnel had a good level about total levels of perceived practices about the green hospital and fewer than one-third **(29.7%)** of them had a poor level.

Table (3): Relationship between total levels of knowledge and total levels of perceived practices among the studied nursing personnel (N=350).

Items		Total levels of knowledge				X^2	P-value
		Satisfactory		Unsatisfactory			
		N	%	N	%		
Total levels of perceived practices	Poor	24	6.9	80	22.9	15.156	0.041* (S)
	Moderate	5	1.4	73	20.9		
	Good	15	4.3	153	43.7		

*** P-value ≤ 0.05 Significant**

Table (3): Clarifies that, there was a significant statistical relationship between total levels of knowledge about the green hospital and total levels of perceived practices about the green hospital domains among the studied nursing personnel at **P-value=0.041 and X^2 =15.156.**

X. Discussion:

Green hospitals play a pivotal role in mitigating the healthcare sector's environmental impact while enhancing patient care and operational efficiency. Given that healthcare contributes to approximately 4.4% of global carbon emissions, transitioning to sustainable practices such as energy-efficient infrastructure, renewable energy adoption, and waste reduction is critical to reducing this footprint. Beyond environmental benefits, green hospitals improve patient outcomes ***(Smith et al., 2023; Orsini et al., 2024; Al Amosh & Khatib, 2025).***

The aim of this study was to assess nursing personnel's knowledge and perceived practices regarding green hospitals at Badr University Hospital through the following objectives: to assess nursing personnel's knowledge about green hospitals, and to determine perceived green hospital practices among nursing personnel at the selected hospital. Furthermore, the research questions this study were formulated as follows: What are nursing personnel's knowledge levels about green hospitals? and what are the perceived green hospital practices reported by nursing personnel?

The current study results found that, the majority of nurse managers had an unsatisfactory level of total knowledge about green hospitals. These findings were in line with the study by ***Taie (2023),*** who conducted a study in Egypt, entitled "Emergence of Greening Hospitals is a future challenge for nurse managers: Designing and validating protocol" who reported that, the majority of managers had unsatisfactory knowledge about green hospitals before awareness sessions.

Furthermore, the findings of the current study were incongruent with those of a previous study by ***Pakpour et al., (2021),*** who conducted a study in Iran, entitled ' Using an Integrated Social Cognition Model to Explain Green Purchasing Behavior ' The authors argued that, the managers' and employees' involvement in continuous improvement initiatives had a positive impact. Therefore, by implementing green concepts, practices, and systems, continuous improvement activities can be developed efficiently and effectively through green healthcare education, preparation, and supervision.

From the researcher's point of view, these findings suggest that nurse managers may struggle to integrate eco-friendly policies into hospital operations, ultimately hindering the adoption of sustainable healthcare practices.

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This challenge may be attributed to a lack of encouragement for employees to participate in green activities and a weak regulatory framework within the organization's administration.

The current study results highlighted that; the majority of staff nurses had an unsatisfactory level of overall knowledge about green hospitals. These findings were congruent with study by ***Mohammed et al., (2024),*** who clarified that, more than three-quarters of the nursing staff had a low level of perception regarding the overall of green hospitals. In addition, the study findings were in sync with the study by ***Elksas et al., (2024),*** who conducted a study in Egypt, entitled "Effectiveness of Implementing Green Management Program on Nursing Staff Knowledge, Attitudes and Green Management Practices towards Occupational Safety" who reported that, the majority of nursing staff had an unsatisfactory level of knowledge about green management.

The current study results disagreed with a previous study conducted by ***Dion et al., (2022) and Benzidia et al., (2023),*** who conducted a study in United Kingdom**,** entitled "Hospitals Management Transformative Initiatives; towards Energy Efficiency and Environmental Sustainability in Healthcare Facilities" who stated that, the nursing staff had a high level of perception regarding overall green hospital dimensions. From the researcher's point of view, these results may stem from a lack of awareness and prioritization of green healthcare initiatives, limited environmental education, minimal exposure to sustainable practices, and unclear policies or incentives may contribute to nurses' insufficient knowledge.

The current study results found that, more than third of nurse managers had a good level of perceived practices regarding green hospitals. The study findings were compatible with the study by ***Algabar et al., (2023),*** who conducted a study in Egypt, entitled "Role of Nurse Managers' Sustainable Management Behaviors in Building Sustainability Consciousness among Nurses" who indicated that, approximately half of nurse managers demonstrated sustainable management behaviors. Moreover, the study findings were consistent with the study by ***Abd-Elmonem et al., (2022),*** who conducted a study in Egypt, entitled "The Relation between Green Human Resource Management Strategies and Organizational Innovativeness among Head Nurses" who showed that, two-thirds of nurse managers had a high level of perception toward green human resource management to support the sustainable use of resources.

Likewise, the current study results were opposite to the study by ***Leppanen et al., (2022),*** who conducted a study in Finland, entitled "Nurses´ and Nurse Managers´ Perceptions of Sustainable Development in Perioperative Work: A Qualitative Study" who reported that, the majority of nurse managers had a poor level of sustainable development practices. From the researcher's point of view, these results suggest that even if over one-third of nurse managers have strong practices related to green hospitals, a sizable majority might still not be sufficiently aware of the issue. This implies a deficiency in healthcare leaders' perception of and commitment to environmental sustainability.

The current study results indicated that, nearly half of staff nurses had a good level of perceived practices regarding green hospitals. The study findings were supported by ***Mekawy (2023),*** who declared that, more than half of the staff nurses had a low perception of waste reduction and energy-saving dimensions in environmental sustainability practices. On the other hand, the current study results were opposite to the study by ***Kalogirou et al., (2021)***, who conducted a study in Canada, entitled "How the hospital context influences nurses' environmentally responsible practice: A focused ethnography" who clarified that, several participants stated they did not often think about environmentally responsible practice or climate change and had difficulties linking these concepts to their work. From the researcher's perspective, these results may be due to nurses' key role in sustainability but a lack of clear policies and awareness of their responsibility to reduce workplace environmental hazards.

The current study results revealed that, the majority of nurse managers had a good level of perceived practices regarding the administrative support domain. Moreover, the study findings were in agreement with the study by ***Algabar et al., (2023),*** who stated that, the majority of nurse managers had a high overall percentage score for sustainable management behaviors. Likewise, the study findings aligned with the study by ***Salmela et al., (2016),*** who conducted a study in Finland and the United States, entitled "Integrating the Light and Dark Sides of Student Engagement Using Person-Oriented and Situation-Specific Approaches" who demonstrated that, nurse managers

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played a significant role in creating an atmosphere of ethical sustainable culture with smooth transitions for practice in routine care.

The present study findings were opposite to those of ***Leppanen et al., (2022),*** who reported that, the majority of nurse managers exhibited sustainable management behaviors in economic efficiency, corporate functioning, and protection sensitivity. From the researcher's point of view, these results might be due to the nurse managers being in leadership roles may feel a greater responsibility to align with hospital sustainability initiatives, reinforcing their engagement in administrative support for green practices.

The current study results represented that; half of the nurse managers had a poor level of perceived practices regarding the environmentally preferable purchase domains. The present study findings were in harmony with ***Mwacharo (2015),*** who conducted a study in Kenya, entitled "Green Procurement in Kenyan Hospitals; Exploring the Awareness and Opportunities for Kenyan Hospitals to Implement Green Procurement" who noted that, the participants had a limited understanding of green procurement practices.

Moreover, the study findings were corroborated by ***Nsowah et al., (2024),*** who conducted a study in Ghana, entitled "Green Procurement Practices and Barriers in Hospitals in The Bono Region of Ghana" who showed that, the hospital personnel were aware of environmental management systems but did not employ a green supply chain or procurement practices. From the researcher's point of view, this result may be due to budget constraints and cost concerns may limit nurse managers' ability to prioritize eco-friendly products, as hospitals often focus on cost-effective solutions rather than sustainability.

The current study results found that, the majority of staff nurses had a good level of perceived practices regarding the administrative support domains in green hospitals. The present study findings were consistent with those of ***Tsai and Tan (2022),*** who conducted a study in Taiwan, entitled "Exploratory Examination of Environmental Protection Behaviors in a Hospital Setting Using the Theory of Planned Behavior and Ethical Leadership" who illustrated that, respondents held favorable views of ethical leadership, strong attitudes, positive subjective norms, and a high level of perceived behavioral control regarding environmental protection in the healthcare sector.

The present study findings disagreed with those of ***Kalogirou (2020),*** who conducted a study in Canada, entitled "The Impact of Context on Practice: How the Hospital Setting Influences Nurses' Abilities to Practice in Environmentally Responsible Ways" who stated that, participants did not often think about environmentally responsible practices or climate change and had difficulties linking these concepts to their work. From the researcher's point of view, this result suggests that administrative support plays a crucial role in shaping staff nurses' engagement with green hospital practices.

The results of the current study revealed that, more than a third of staff nurses had a poor level of perceived practices regarding indoor air ventilation in green hospitals. These findings were supported by ***Dhaief et al., (2024),*** who conducted a study in Iraq, titled 'Evaluation of Medical Staff Knowledge toward Bacterial Contamination at the Indoor Air of Hospitals in Najaf City, Iraq ' Their study found that, while participants were aware of the negative impacts of air pollution on local and national health, a knowledge gap remained that could affect the quality of ventilation practices in hospitals.

The present study findings were incongruent with those of ***Kumar and Chaudhary (2021),*** who conducted a study in India, entitled "Environmental Sustainability Practices in Hospitals of Bihar" who reported that, the highest level of implementation was found in resource conservation, hospital pollution management, patient room sustainability, and energy conservation, while the lowest level of implementation was found in environmental communication and water recycling. From the researcher's point of view, this results due to the hospital may not provide sufficient education on how ventilation impacts both patient health and environmental sustainability.

The current study results stated that, there was a significant statistical relationship between the total level of knowledge about green hospitals and the job title and age of the studied nursing personnel. The present study's findings are in line with those of ***Mekawy (2023),*** who reported that, there were significant statistical differences between respondents' age and all dimensions of sustainability. On the other hand, the present study findings were

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supported by ***Al Zaydan et al., (2021),*** who conducted a study in Saudi Arabia, entitled "The Impact of nurses' work environment on job satisfaction and job resignation: A literature review" who confirmed that, as head nurses got older, they interacted with the environment more sustainably.

From the researcher's point of view, these results may be attributed to staff nurses having a more limited understanding of the green hospital concept. Since green hospitals are a relatively new concept in the healthcare field, there may be a lack of awareness and very few formal trainings on this topic among healthcare workers is present.

The current study results revealed that, there was a significant statistical relationship between the total level of perceived practices regarding green hospital domains and the years of experience in the current hospital among the studied nursing personnel. The present study findings were in line with those of ***Wang et al., (2022),*** who conducted a study in Mongolia, entitled "Sustainability of Nursing Leadership, and Its Contributing Factors in a Developing Economy: A Study in Mongolia" who reported that, there were statistically significant relationships between overall nurses' sustainability, their age, and their years of experience.

The present study findings disagreed with those of ***Mekawy (2023),*** who reported that, there was no significant statistical correlation between participants' perception of climate change and sustainability and their gender, education, and years of experience. From the researcher's point of view, these results might be indicated that younger nurses with less experience are more flexible and adaptable to change than older nurses. As well as having more contact with social media and TV advertisements, all of which have recently tended to emphasize the importance of sustainability.

The current study results declared that, there was a significant statistical relationship between total levels of knowledge about green hospitals and total levels of perceived practices regarding green hospital domains among the studied nursing personnel. The present study findings were in line with those of ***Elksas et al., (2024),*** who reported that, there was a highly statistically significant positive correlation between the total knowledge and total attitude of nursing staff before and after implementing green management programs.

Likewise, the present study findings were incongruent with those of ***Faltas et al., (2022),*** who conducted a study in Egypt, entitled "Green practice guideline program regrading waste management on nurses' knowledge and practice in intensive care units" who revealed that, there was a statistically significant negative correlation between the studied nurses' knowledge and practices. From the researchers' point of view, this might be due to effective knowledge having a good impact on practices that increase and reflect on green hospitals and sustainability in healthcare.

At the end, the researcher discussed the results that achieve the objectives of the current study through assess nursing personnel' level of knowledge about green hospital and determine nursing personnel' perceived practices about green hospital. Also, answered the research questions.

XI. Conclusion:

Based on the study findings, it was concluded that: The majority of both nurse managers and staff nurses had an unsatisfactory level of knowledge about the green hospitals. However, more than one-third of nurse managers demonstrated a good level of perceived practices related to green hospitals, while nearly half of staff nurses exhibited a good level of perceived practices. Finally, there was a statistically significant positive correlation between overall knowledge about green hospitals and total perceived practices among nursing personnel.

XII. Recommendations:

Based on the study findings, the following recommendations were suggested:

Healthcare organization:

1. Develop green policies as for waste management, energy conservation, and sustainable procurement to promote eco-friendly hospital operations.
2. Integrate environmental sustainability goals into the organization's vision, mission and values.
3. Encourage the transition to electronic health records to reduce paper waste.

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4. Establish a team of sustainability within nursing units to promote best practices and mentor peers.

Educational institutes:

1. Integrate environmental sustainability topics into nursing education curriculum to increase nursing students' awareness about green management and environmental sustainability.
2. Implement regular training sessions to enhance nursing personnel's knowledge about green hospital principles, sustainability, and environmentally friendly practices.

Nurse managers:

1. Encourage nurses to follow eco-friendly behavior in their daily practices as reducing waste, conserving energy, and promoting recycling.
2. Reward nurses who actively contribute to green initiatives within healthcare settings.
3. Link green rewards and compensation with environmentally friendly behavior and performance.

Further studies:

1. Replicate the same study on a large group of nursing personnel in private hospitals and compare these hospitals with governmental hospitals.
2. Explore the impact of green hospitals initiatives on nurses' satisfaction and overall organizational performance in the healthcare settings.

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