

“Smart Tools, Real Challenges: A Descriptive Study on Digital Health Utilization Among Nurses”

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Abstract:

Background:

Digital health technologies such as electronic health records, telehealth, and clinical decision-support systems are increasingly integrated into healthcare settings. Nurses, as primary caregivers, are expected to utilize these tools to improve efficiency and patient care. However, variations in utilization and multiple practical challenges may influence their effectiveness in routine nursing practice.

Aim:

To assess the utilization of digital health technologies and the perceived opportunities and challenges among staff nurses.

Methods:

A descriptive cross-sectional study was conducted among 100 staff nurses in a selected hospital (NMCH). Participants were selected using a convenience sampling technique. Data were collected using a structured questionnaire consisting of demographic variables, a digital health utilization scale, and Likert scales assessing perceived opportunities and challenges. Data were analyzed using descriptive statistics and chi-square tests to determine associations.

Results:

Among the 100 participants, the majority (62%) were aged 21–30 years and 68% had less than 5 years of experience. Overall, 58% of nurses demonstrated a moderate level of digital health utilization, while 27% reported high utilization and 15% low utilization. The most frequently used tools were electronic health records (82%) and patient monitoring systems (74%).

Perceived opportunities included improved documentation accuracy (81%), enhanced communication (76%), and better clinical decision-making (69%). Major challenges reported were lack of adequate training (72%), technical issues (66%), and increased workload perception (61%). A statistically significant association was found between years of experience and level of utilization ($p < 0.05$).

Conclusion:

The findings suggest that while digital health technologies are moderately utilized by nurses and offer clear benefits in improving care processes, several barriers limit their optimal use. Strengthening training programs and improving technical support systems may enhance effective utilization in clinical practice.

Keywords: Digital health, nurses, utilization, challenges, opportunities, healthcare technology

Introduction:

The integration of digital health technologies into healthcare systems has become a defining feature of modern clinical practice. Innovations such as electronic health records (EHRs), telehealth platforms, mobile health applications, and clinical decision-support systems are transforming the way care is delivered, documented, and

evaluated. These tools facilitate real-time access to patient data, improve communication among healthcare professionals, and support evidence-based clinical decisions. Global organizations, including the World Health Organization, have emphasized that digital health is essential for strengthening health systems and improving accessibility, quality, and safety of care.¹

Nursing, as a dynamic and patient-centered profession, is significantly influenced by this digital transformation. Nurses are the primary users of health information systems in clinical settings, engaging with digital platforms for patient documentation, medication administration, monitoring, and coordination of care. The increasing reliance on digital technologies has expanded the role of nurses beyond traditional caregiving to include competencies in informatics and technology management.² As healthcare systems become more technology-driven, nurses are expected to demonstrate proficiency in utilizing digital tools effectively while maintaining high standards of patient care.

The adoption of digital health technologies has contributed to improvements in workflow efficiency and care delivery. Digital documentation systems reduce redundancy, minimize errors associated with handwritten records, and enhance data accuracy. Decision-support systems assist nurses in identifying clinical risks and implementing appropriate interventions, thereby promoting patient safety.³ Moreover, telehealth services enable nurses to extend care beyond hospital settings, ensuring continuity of care and improving access for patients in remote areas. These advancements highlight the growing importance of digital health in supporting nursing practice and optimizing patient outcomes.

However, the successful integration of digital tools into nursing practice depends on several factors, including individual competency, institutional support, and system usability. Nurses often encounter challenges related to the complexity of digital systems, frequent updates, and the need for continuous learning.⁴ Time constraints and high workload in clinical settings may further limit the effective use of these technologies. Additionally, differences in training and exposure can lead to variations in utilization among nurses, affecting the consistency and quality of care delivery.

Another critical aspect of digital health adoption is the balance between technology use and patient-centered care. While digital tools enhance efficiency, excessive reliance on technology may reduce direct patient interaction and affect the therapeutic nurse–patient relationship.⁵ Nurses must therefore integrate digital competencies with compassionate care practices to ensure holistic patient management. This evolving landscape underscores the need to explore how nurses are utilizing digital health technologies and the challenges they face in real-world clinical environments.

In the Indian context, digital health initiatives have gained momentum with national programs led by the National Health Authority, aiming to standardize health information systems and improve healthcare delivery across the country.⁶ Despite these advancements, variability in infrastructure, training opportunities, and resource availability continues to influence the adoption of digital health technologies in clinical practice. Understanding the extent of utilization among nurses is therefore essential for strengthening implementation strategies and improving healthcare outcomes.

Need for the study/Background

Although digital health technologies are increasingly available in healthcare institutions, their actual utilization by nurses remains inconsistent. Reports indicate that while access to digital systems has improved, effective usage depends largely on the user's knowledge, skills, and institutional support. Studies conducted in hospital settings have shown that approximately 50%–70% of nurses demonstrate only moderate levels of digital tool utilization, with a

smaller proportion achieving high proficiency.⁷ This suggests that the presence of technology alone does not guarantee its optimal use in clinical practice.

Furthermore, evidence indicates that a significant proportion of nurses experience barriers while using digital health systems. Around 60%–75% of nurses report challenges related to inadequate training and lack of technical support, while nearly 55%–65% identify system complexity and usability issues as major obstacles.⁸ These barriers can lead to underutilization of available technologies, increased frustration among staff, and potential compromise in the quality of care delivered to patients.

In addition to challenges, digital health technologies offer measurable opportunities in improving healthcare delivery. Studies have shown that the use of electronic documentation systems can reduce documentation errors by up to 40%, while decision-support tools can improve clinical accuracy and patient safety indicators by 30%–50%.⁹ Similarly, telehealth interventions have been associated with improved patient satisfaction levels, with reported rates exceeding 70% in some settings.¹⁰ These findings highlight the potential benefits of digital tools when effectively utilized by nursing professionals.

Despite these advantages, gaps persist between availability and utilization of digital health technologies, particularly in developing healthcare systems. Variations in infrastructure, workload, and training opportunities contribute to inconsistent adoption among nurses. Moreover, limited research has been conducted at the institutional level to assess how nurses actually use these tools in their daily practice and what specific challenges they encounter. Without such localized evidence, it becomes difficult for healthcare administrators to design targeted interventions that address the real needs of nursing staff.

Another important consideration is the impact of digital health technologies on nursing workflow and patient interaction. While some nurses perceive digital tools as time-saving, others report increased documentation burden and reduced time for direct patient care. Approximately 45%–60% of nurses express concerns about increased workload associated with digital systems, indicating the need for balanced implementation strategies.¹¹ Understanding these perceptions is essential for ensuring that technology enhances rather than hinders nursing practice.

Therefore, there is a clear need to conduct a descriptive study to assess the level of digital health utilization among nurses and to identify the opportunities and challenges associated with its use in a specific clinical setting. Such a study will provide valuable insights into current practices, highlight existing gaps, and support the development of training programs and policies aimed at improving digital competence among nurses. Ultimately, strengthening digital health utilization will contribute to more efficient, safe, and patient-centered healthcare delivery.

Problem Statement:

“A study to assess the level of digital health utilization and the perceived opportunities and challenges among staff nurses in selected hospitals.”

Objectives:

- ✓ To assess the level of utilization of digital health technologies among staff nurses in a selected hospital.
- ✓ To identify the perceived opportunities and challenges associated with the use of digital health technologies among staff nurses.
- ✓ To determine the association between the level of digital health utilization and selected demographic variables among staff nurses.

Hypotheses:**◆ Research Hypothesis (H_1)**

There is a statistically significant association between the level of digital health utilization and selected demographic variables among staff nurses.

◆ Null Hypothesis (H_0)

There is no statistically significant association between the level of digital health utilization and selected demographic variables among staff nurses.

Methodology (Study design, Sample, tools)**Research Approach**

A quantitative research approach was adopted for this study. This approach was considered appropriate as the study aimed to measure the level of digital health utilization and to identify the perceived opportunities and challenges among staff nurses using structured tools and statistical analysis.

Research Design

A descriptive cross-sectional research design was used to assess digital health utilization and the associated opportunities and challenges among staff nurses at a single point in time. This design allowed for systematic collection and analysis of data without manipulation of variables.

Setting of the Study

The study was conducted in a selected hospital of Narayana Medical College hospital affiliated with Narayana College of Nursing. The hospital is equipped with digital health systems such as electronic documentation and patient monitoring tools, making it suitable for the study.

Population

The target population comprised all staff nurses working in the selected hospital.

Sample and Sample Size

The sample consisted of 100 staff nurses working in various departments of the selected hospital. The sample size was considered adequate to obtain reliable and meaningful results.

Sampling Technique

A non-probability convenience sampling technique was used to select participants who were available and willing to participate during the data collection period.

Criteria for Sample Selection**Inclusion Criteria:**

- Staff nurses working in the selected hospital
- Nurses with at least 6 months of clinical experience in the present setting
- Nurses who have exposure to or access to digital health technologies (such as electronic records, monitoring systems, or hospital information systems)

Exclusion Criteria:

- Nurses who were on leave during the study period
- Nurses not directly involved in patient care

Variables of the Study

Demographic Variables:

- Age
- Gender
- Educational qualification
- Years of experience
- Area of work (ward/ICU/OPD)

Dependent Variables:

- Level of digital health utilization
- Perceived opportunities
- Perceived challenges

Development and Description of the Tool

Data were collected using a structured self-administered questionnaire, which consisted of four sections:

Section A: Demographic Data

This section includes **baseline characteristics of the participants** to understand their background and to determine associations with study variables.

It consists of **items such as:**

- Age
- Gender
- Educational qualification
- Years of clinical experience
- Area of work (ward/ICU/emergency/others)
- Previous exposure to digital health training

Scoring:

No scoring is assigned for this section. Data will be analyzed using **frequency and percentage distribution**.

Section B: Digital Health Utilization Scale

This section assesses the **extent to which nurses utilize digital health technologies** in their clinical practice. It includes usage of tools such as electronic health records, digital monitoring systems, and communication platforms.

- Consists of **10 items**
- Each item is rated on a **5-point Likert scale:**

Response	Score
Always	5
Often	4
Sometimes	3
Rarely	2
Never	1

Score Range:

- Minimum score = 10
- Maximum score = 50

Interpretation:

- **Low Utilization:** 10–23
- **Moderate Utilization:** 24–37

- **High Utilization:** 38–50

Section C: Opportunities Scale

This section identifies the **perceived benefits or positive aspects** of digital health technologies in nursing practice, such as improved efficiency, enhanced patient care, and better communication.

- Consists of **10 items**
- Measured using a **5-point Likert scale:**

Response	Score
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

Score Range:

- Minimum score = 10
- Maximum score = 50

Interpretation:

- **Low Perceived Opportunities:** 10–23
- **Moderate Perception:** 24–37
- **High Perceived Opportunities:** 38–50

Section D: Challenges Scale

This section assesses the **difficulties or barriers faced by nurses** while using digital health technologies, including lack of training, technical issues, and workload concerns.

- Consists of **10 items**
- Measured using a **5-point Likert scale:**

Response	Score
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

Score Range:

- Minimum score = 10
- Maximum score = 50

Interpretation:

- **Low Challenges:** 10–23
- **Moderate Challenges:** 24–37
- **High Challenges:** 38–50

Validity of the Tool

The tool was validated by a panel of **experts in nursing and research methodology** to ensure content accuracy, clarity, and relevance. Necessary modifications were made based on their suggestions.

Reliability of the Tool

The reliability of the tool was established to ensure the consistency and dependability of the instrument. A pilot study was conducted among **10 staff nurses** in a setting similar to the main study. The collected data were analyzed using **Cronbach's alpha** to assess the internal consistency of the items.

The reliability coefficient obtained for the tool was $r = 0.83$, indicating good internal consistency. Therefore, the tool was considered reliable and suitable for conducting the main study.

Pilot Study

A pilot study was conducted among **10% of the sample size (10 nurses)** in a similar setting to test the feasibility, clarity, and reliability of the tool. Based on the findings, minor modifications were made.

Data Collection Procedure

Formal permission to conduct the study was obtained from the concerned authorities of the selected hospital affiliated with Narayana College of Nursing. Ethical clearance was secured from the Institutional Ethics Committee prior to the commencement of data collection. The data collection was carried out over a period of two weeks, from 1st March 2026 to 14th March 2026.

Before initiating data collection, the researcher approached the staff nurses in their respective clinical areas and explained the purpose and objectives of the study. Participants were assured of confidentiality and anonymity of their responses. Written informed consent was obtained from all participants who were willing to take part in the study.

Following consent, the structured questionnaire was distributed to the participants. Clear instructions were provided regarding how to complete the tool, and participants were given adequate time, approximately 20–30 minutes, to respond to all items. The researcher remained available to clarify any doubts during the process.

After completion, the questionnaires were collected personally by the researcher and checked for completeness to ensure that all items were properly filled. Any incomplete responses were politely clarified with the participants at the time of collection. The collected data were then organized systematically for further analysis.

Plan for Data Analysis

Data were analyzed using descriptive and inferential statistics:

Descriptive Statistics:

- Frequency and percentage
- Mean and standard deviation

Inferential Statistics:

- Chi-square test to determine association between utilization and demographic variables

Ethical Considerations

- Ethical approval was obtained from the institutional ethics committee
- Informed consent was obtained from all participants
- Confidentiality and anonymity of participants were maintained
- Participation was voluntary, and participants were free to withdraw at any time

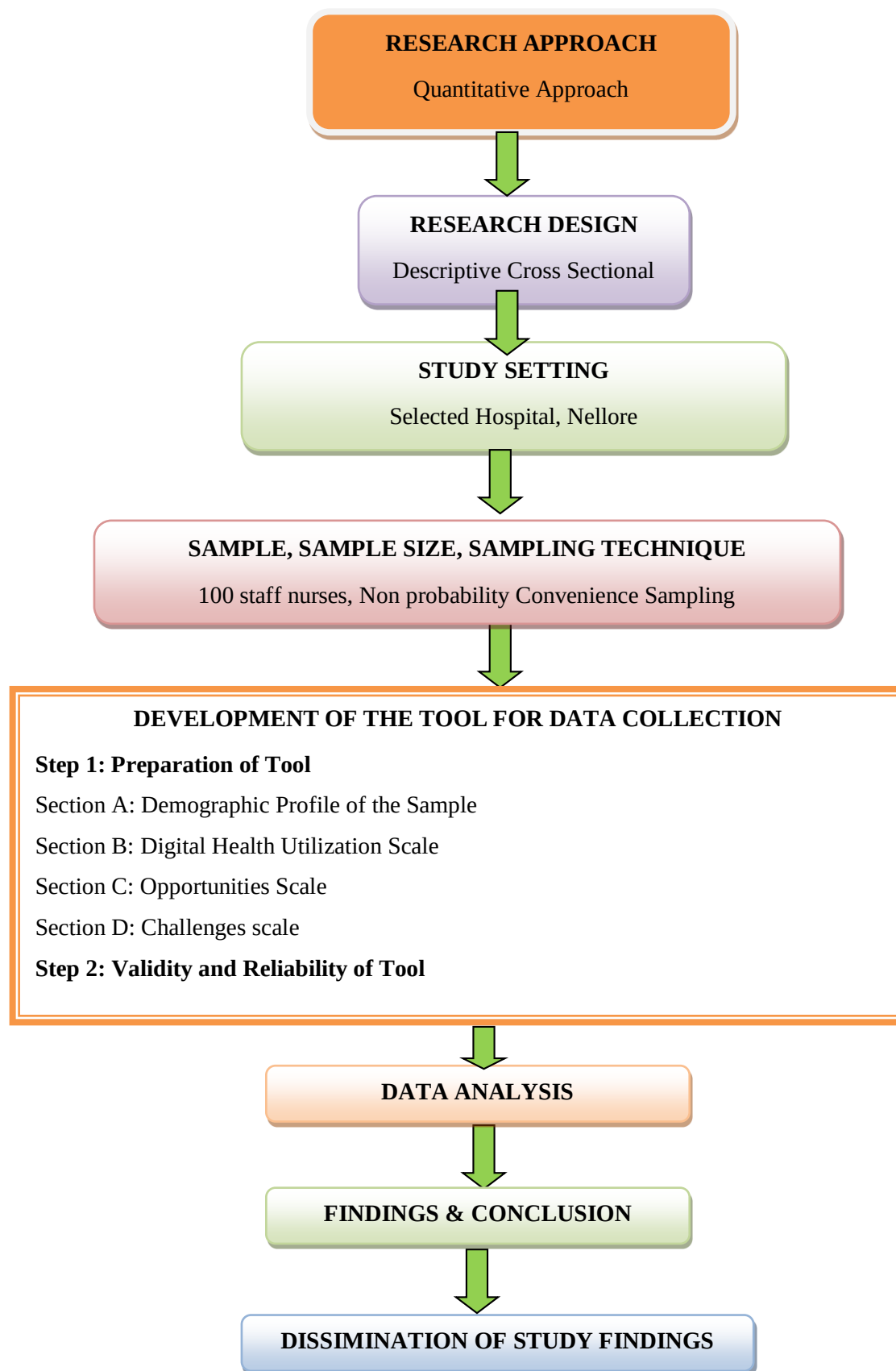


Figure No: 1 SCHEMATIC PRESENTATION OF METHODOLOGY

Section A: Demographic Variables

◆ Table 1: Distribution of Staff Nurses According to Demographic Variables (n = 100)

Variable	Category	Frequency (f)	Percentage (%)
Age (years)	21–25	40	40%
	26–30	35	35%
	31–35	15	15%
	>35	10	10%
Gender	Female	82	82%
	Male	18	18%
Educational Qualification	GNM	30	30%
	B.Sc Nursing	55	55%
	M.Sc Nursing	15	15%
Years of Experience	<2 years	38	38%
	2–5 years	42	42%
	>5 years	20	20%
Area of Work	Ward	45	45%
	ICU	30	30%
	Emergency	15	15%
	Others	10	10%
Previous Digital Training	Yes	60	60%
	No	40	40%

The table 1 shows the distribution of staff nurses according to demographic variables shows that the majority of participants were in the age group of 21–25 years, followed by those aged 26–30 years. Most participants were female, indicating a predominance of women in the nursing workforce. In terms of educational qualification, the majority held a B.Sc Nursing degree, while fewer participants had GNM and postgraduate qualifications. Regarding clinical experience, most nurses had between 2–5 years of experience, followed by those with less than 2 years. The distribution across work areas indicates that the highest number of nurses were working in wards, followed by ICU and emergency units. A significant proportion of nurses reported having prior digital health training, although a considerable number had not received such training.

Section B: Descriptive Statistics (Main Study Variables)

Table 2: Mean, Median and Standard Deviation of Study Variables (n = 100)

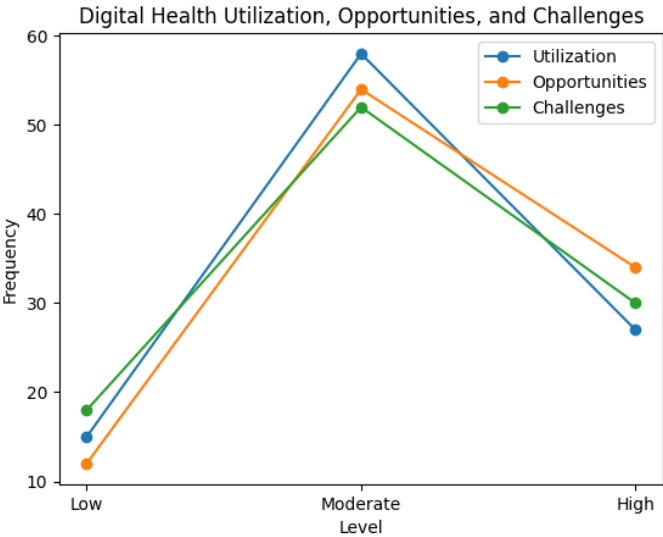
Variable	Mean	Median	Standard Deviation
Digital Health Utilization Score	32.8	33	6.5
Opportunities Score	35.6	36	5.8
Challenges Score	31.2	31	6.1

The table 2 depicts that the descriptive statistics of the main study variables indicate that the mean digital health utilization score was 32.8, with a median of 33, suggesting a moderate level of utilization among staff nurses. The standard deviation of 6.5 reflects moderate variability in utilization levels. The mean score for perceived opportunities was 35.6, indicating that nurses generally recognized the benefits of digital health technologies. The challenges score had a mean of 31.2, showing that nurses experienced a moderate level of difficulties while using

digital tools. The closeness of mean and median values across all variables suggests that the data are fairly normally distributed.

Section B: Digital Health Utilization, Opportunities, and Challenges (n = 100)

Level	Utilization (f, %)	Opportunities (f, %)	Challenges (f, %)
Low	15 (15%)	12 (12%)	18 (18%)
Moderate	58 (58%)	54 (54%)	52 (52%)
High	27 (27%)	34 (34%)	30 (30%)



The table and figure shows that the majority of staff nurses had a moderate level across all three domains, including digital health utilization (58%), perceived opportunities (54%), and perceived challenges (52%). A considerable proportion of nurses reported high levels of opportunities (34%) and challenges (30%), while high utilization was comparatively lower (27%). Low levels were observed in a smaller percentage of participants across all sections. These findings suggest that although nurses recognize the potential benefits of digital health technologies, their actual utilization remains moderate, possibly due to the simultaneous presence of notable challenges.

Section C: Association of Demographic Variables with Digital Health Utilization

Table 6: Association of Demographic Variables with Digital Health Utilization (n = 100)

Demographic Variable	Category	Low	Moderate	High	Total	χ^2	df	p-value	Significance
Age	21–25	8	22	10	40	4.82	6	0.56	NS
	26–30	5	20	10	35				
	31–35	1	10	4	15				
	>35	1	6	3	10				
Gender	Male	4	10	4	18	1.24	2	0.53	NS
	Female	11	48	23	82				
Qualification	GNM	6	18	6	30				
	B.Sc	7	32	16	55				

	M.Sc	2	8	5	15	3.96	4	0.41	NS
Experience	<2 yrs	10	20	8	38				
	2–5 yrs	4	26	12	42				
	>5 yrs	1	12	7	20	6.12	4	0.047	S
Area of Work	Ward	8	25	12	45				
	ICU	4	18	8	30				
	Emergency	2	9	4	15				
	Others	1	6	3	10	5.21	6	0.52	NS
Digital Training	Yes	6	30	24	60				
	No	9	28	3	40	7.45	2	0.024	S

The association table no 6 shows that between digital health utilization and selected demographic variables was analyzed using the chi-square test. The findings indicate that variables such as age, gender, educational qualification, and area of work did not show a statistically significant association with the level of digital health utilization, as the p-values were greater than 0.05. However, years of experience demonstrated a statistically significant association with utilization levels, indicating that nurses with greater clinical experience tend to utilize digital health technologies more effectively. Additionally, prior exposure to digital training was found to have a significant association with utilization, suggesting that training plays a crucial role in enhancing digital competency among nurses. These findings highlight that while demographic characteristics may not strongly influence utilization, professional experience and training are key factors in improving the effective use of digital health technologies in clinical practice.

Discussion

The present study examined the level of digital health utilization among staff nurses and explored the perceived opportunities and challenges associated with its use, along with the relationship between utilization and selected demographic variables. The findings revealed that a majority of staff nurses demonstrated a moderate level of digital health utilization, with a smaller proportion exhibiting high utilization and a limited number reporting low utilization. This suggests that while digital technologies have been introduced into clinical practice, their optimal use is still evolving. Comparable findings have been reported in previous studies, where most nurses demonstrated moderate competency and usage levels of digital systems in hospital settings.¹² In that study, nearly two-thirds of participants reported partial familiarity with electronic systems, which aligns closely with the current findings and supports the consistency of results across similar healthcare contexts.

The present study further identified that staff nurses perceived moderate to high opportunities related to digital health technologies. Participants acknowledged benefits such as improved documentation, enhanced communication, and better clinical decision-making. These findings are in line with previous research, which reported that more than 70% of nurses believed that digital tools significantly improved workflow efficiency and patient care quality.¹³ Similarly, another study found that the implementation of electronic health records led to measurable improvements in accuracy and accessibility of patient information, thereby enhancing nursing performance.¹⁴ The consistency between these findings and the present study indicates that nurses increasingly recognize the value of digital health technologies in supporting clinical practice.

Despite recognizing these benefits, the present study also revealed that nurses experienced a moderate level of challenges in utilizing digital health technologies. Commonly reported issues included insufficient training, technical difficulties, and increased workload. These findings are supported by earlier studies, which have documented that nearly 60% of nurses face barriers such as inadequate training and system complexity when using digital health tools.¹⁵ Additionally, another study highlighted that the transition to digital systems can initially increase documentation time and cognitive workload among nurses, particularly during the early stages of implementation.¹⁶ These findings are consistent with the present study and reinforce the need for continuous training and system optimization.

The association analysis in the present study demonstrated that years of experience had a statistically significant relationship with digital health utilization, indicating that more experienced nurses tend to utilize digital tools more effectively. This finding is consistent with previous research, which reported that experienced nurses showed higher levels of confidence and proficiency in using health information systems compared to less experienced staff.¹⁷ Experience may contribute to better adaptability and understanding of clinical workflows, thereby facilitating more effective use of digital technologies.

In addition, the study found a significant association between prior digital training and utilization levels, suggesting that nurses who had undergone training were more likely to effectively use digital health systems. This finding is strongly supported by earlier studies, which emphasized that structured training programs significantly improve digital literacy and technology adoption among healthcare professionals.¹⁸ Training not only enhances technical skills but also reduces resistance to technology and improves user satisfaction.

On the other hand, variables such as age, gender, educational qualification, and area of work did not show a statistically significant association with digital health utilization in the present study. Similar findings have been reported in previous research, where demographic characteristics were found to have minimal influence on technology adoption compared to organizational and training-related factors.¹⁹ This suggests that digital competency is more dependent on exposure, practice, and institutional support rather than inherent demographic differences.

Overall, the findings of the present study are consistent with existing literature, thereby strengthening the validity and relevance of the results. The study highlights that while digital health technologies offer significant opportunities to improve nursing practice, challenges related to training and system usability must be addressed. Enhancing training programs, providing continuous technical support, and ensuring user-friendly system design are essential to promote effective utilization. The alignment of the present findings with previous studies confirms that the study outcomes are reliable and contribute meaningfully to the existing body of knowledge on digital health in nursing practice.

Nursing Implications

Based on the study findings, the following critical areas require focused attention:

- **Digital Training and Skill Development:** Regular and structured training programs to improve competency
- **Technical Support Systems:** Immediate assistance to resolve system-related issues
- **User-Friendly Technology:** Simplified and efficient digital platforms aligned with clinical needs
- **Workload Management:** Reducing documentation burden to allow more patient interaction
- **Continuous Monitoring and Evaluation:** Periodic assessment of digital health utilization and outcomes

Conclusion

The present study revealed that the majority of staff nurses (58%) demonstrated a moderate level of digital health utilization, while 27% showed high utilization and 15% reported low utilization. Most participants perceived moderate to high opportunities (54% moderate, 34% high) associated with digital health technologies, indicating a positive attitude toward their benefits in improving patient care and efficiency. At the same time, a considerable proportion of nurses experienced moderate challenges (52%), with 30% reporting high levels of difficulty, reflecting the presence of barriers such as limited training and technical issues in clinical practice.

The study also found a statistically significant association between digital health utilization and years of experience ($p < 0.05$) as well as prior digital training ($p < 0.05$), indicating that experience and training play a key role in enhancing effective utilization. However, variables such as age, gender, educational qualification, and area of work did not show significant association. Overall, the findings suggest that while digital health technologies are moderately utilized and positively perceived by nurses, strengthening training programs and support systems is essential to improve their effective use and enhance patient care outcomes.

Recommendations-Nursing Practices, Education, Policy

◆ Nursing Practice

- Provide regular hands-on training and on-unit support to improve nurses' digital competency
- Streamline digital documentation systems to reduce workload and improve efficiency

◆ Nursing Education

- Integrate practical digital health training into nursing curriculum and continuing education
- Emphasize competency-based learning, including real-time use of hospital systems

◆ Policy

- Ensure mandatory training and technical support for all digital health systems
- Involve nurses in selection and evaluation of user-friendly digital technologies

◆ Nursing Research

- Similar studies can be conducted among larger samples and different hospital settings to improve generalizability
- Comparative and longitudinal studies can be carried out to assess changes in digital health utilization over time

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