ISSNNo-2584-2706

Knowledge and Perception of Telenursing among Nursing Students in Selected Nursing Institutions, Lagos State.

Bashir Sadiq Samson
Gbadebo Zofiat

ABSTRACT

Telenursing involves addressing clients' health needs through information, communication, and web-based systems, facilitating the delivery, management, and coordination of care using telecommunication technology. This study aimed to evaluate the knowledge and perceptions of telenursing among nursing students in nursing institutions in Lagos State. This study utilized a descriptive research design, with a convenience sampling technique used to recruit 257 respondents. Data were collected using a self-structured questionnaire, and responses were analyzed using descriptive statistics with SPSS Version 25. The stated hypothesis was tested using chi-square analysis. The results indicated that the majority of participants were within the 18–21 years age group (108, 42.0%). Most respondents (88.7%) demonstrated a high level of knowledge about telenursing, while 29 (11.3%) exhibited a low level of knowledge. In terms of perception, 182 (70.8%) had a positive perception, while 75 (29.2%) displayed a poor perception of telenursing. Identified barriers to telenursing included a shortage of nurses (221, 85.9%), lack of interest (184, 71.6%), limited knowledge of telenursing (230, 89.5%), inadequate ICT device supply (249, 96.9%), insufficient funding from hospital management (247, 96.1%), lack of policy (222, 86.4%), inadequate power supply (241, 93.8%), poor team spirit among nurses (184, 71.6%), lack of administrative commitment (222, 86.4%), and poor Attitudes towards telenursing (214, 83.3%).The analysis revealed no significant relationship between academic level and knowledge of telenursing among nursing students (P = 0.407, X^2 = 1.798a). However, there was a significant relationship between knowledge and perception of telenursing (P = 0.016, X^2 = 5.766a) among nursing students in nursing institutions. In conclusion, the majority of respondents demonstrated a high level of knowledge and a positive perception of telenursing. Consequently, hospital administrators are encouraged to invest in and enhance ICT infrastructure within healthcare facilities to facilitate the efficient implementation of telenursing services.

Keywords: Knowledge, Nursing, Nursing student, Perception, Telenursing

CHAPTER ONE
INTRODUCTION
1.1 BACKGROUND TO THE STUDY

Telenursing utilizes Information and Communication Technology (ICT) to deliver healthcare services remotely (Poreddi et al., 2020). It enables nurses to address clients' health needs through web-based systems, communication tools, and technology to deliver, manage, and coordinate care effectively (Leong et al., 2021). Through the nursing process, nurses in telenursing assess, plan, implement, evaluate, and document care while also providing information, referrals, education, and support to clients (Kumara & Sudusinghe, 2022).

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

In the 21st century, technological advancements have accelerated significantly. Within the realm of telehealth, related concepts like telenursing have emerged. Telenursing involves the use of technology to deliver nursing care remotely, serving as a contemporary approach to enhancing nursing care quality, improving treatment outcomes, reducing healthcare costs and patient visits, fostering patient and family participation in decision-making, and enabling thorough monitoring through various technological tools (Lokmic-Tomkins et al., 2022). It allows patients to interact with nurses via mobile devices, computers, mobile applications, video technology, and remote patient monitoring systems. A range of tools is utilized in delivering care through telenursing. Information can be shared with patients via mobile devices, computers, video technology, and remote patient monitoring systems (Albarrak et al., 2021). Telenursing integrates audio, video, and text-based communication. It involves registered nurses and midwives using electronic methods to connect with clients or other healthcare professionals to provide professional nursing services. Essentially, it applies telemedicine technology to facilitate nursing care and practice (Chang et al., 2021).Nursing plays a vital role in enhancing the quality of healthcare, and one effective approach to achieving this is through telenursing (Rezaei et al., 2020). Telenursing and telemedical care offer numerous benefits to patients, including improved accessibility to medical facilities. Patients gain immediate and convenient access to healthcare services and are educated about their conditions, empowering them to participate actively in treatment-related decision-making (Butta et al., 2023). Additionally, telenursing saves both time and money as patients no longer need to travel to consult with doctors or nurses (Alsahali, 2021).

It is crucial for nurses and nursing students to cultivate a positive attitude towards telenursing and telehealth to enhance their application in clinical practice (Connolly et al., 2020). In today's world, the use of technology has become an integral part of daily life, making its effective application in critical situations indispensable (Das et al., 2022). Evidence suggests that Information and Communication Technology (ICT) can enhance healthcare outcomes while reducing associated costs (Majeed et al., 2019). The increasing adoption of ICT in telenursing and telehealth represents a significant advancement in delivering healthcare services, effectively addressing various health concerns (Ellatif et al., 2023).Telenursing offers several advantages, including reduced operational costs for providers of telemedicine services. For instance, expenses for front desk support or maintaining numerous exam rooms can be minimized. Additionally, healthcare providers may find that telenursing enhances their income potential by enabling them to care for more patients (Fathizadeh et al., 2020).

Remote consultations in telenursing reduce direct exposure to patients, thereby minimizing the risk of contracting pathogens carried by the patient. Additionally, when patients can avoid traveling to clinics or waiting for care, their satisfaction with the healthcare provider often improves (Kumara & Sudusinghe, 2021).

The services provided through telenursing include patient triage, symptom management, education, use of care tools, counseling, diagnosis, record-keeping, and more (Machado et al., 2019). These services extend across various settings, such as home healthcare, nursing homes, ambulatory care, hospital consultations, prison facilities, mentoring, ICU monitoring, and health promotion. The telenursing process and scope of practice remain consistent with

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

traditional nursing, despite the physical distance between nurse and patient (Alboraie et al., 2021).

However, telenursing presents unique challenges, including liability concerns related to technology failures, resource availability in the patient's home, confidentiality of health information, consistency in service delivery methods, and competency in using telecommunication tools (Ortiz, 2020).

Although telenursing offers significant benefits in addressing challenges such as manpower shortages, transportation difficulties, time constraints, costs, and the need for alternative ways to manage large patient populations, it is crucial to evaluate the knowledge and perception of nurses in training. This underscores the importance of studying the awareness and attitudes towards telenursing among nursing students in nursing institutions in Lagos State.

1.2 STATEMENT OF PROBLEM

The introduction of technology in healthcare has led to the development of telemedicine, eHealth, Telehealth nursing, and telenursing, all of which aim to improve care delivery (Leong et al., 2021). Telenursing is considered an effective approach to addressing challenges such as the uneven distribution of healthcare facilities, a shortage of professional nurses, limited access to health services, and transportation issues, all of which hinder the delivery of quality care. In Nigerian hospitals, nurses are often required to perform their duties manually, moving from one patient's bed to another, managing outpatient appointments, and providing patient education (Kunjumon et al., 2021). With a nursing workforce of just 125,000 to serve a population of over 200 million (National Association of Nigerian Nurses and Midwives, 2022), this leads to the overburdening of available nurses.The rapid advancements in technology and increased healthcare spending have prompted nursing professionals to integrate information and communication technologies (ICT) into their practice to better address patient needs (Taherdoost, 2019). The expanding use of ICT through telenursing and telehealth is seen as a promising development in healthcare delivery, aiming to reduce health-related challenges. Globally, there is a rising demand for alternative healthcare options due to the insufficient supply of healthcare services, particularly in African nations where there is a lack of healthcare facilities, poor access to care, high costs, and a shortage of healthcare professionals, especially nurses (Seboka et al., 2021).

This search for alternatives has led to increased reliance on traditional and herbal medicine or local practitioners (Rutledge & Gustin, 2021). In Lagos State, Nigeria, the situation is similar, with challenges such as poor facility distribution, ineffective policies, transportation issues, and a severe shortage of trained nurses. The need to reduce waiting times for physicians and nurses is urgent, and the goal remains to reach all individuals with effective care.

Telehealth has been widely implemented in more developed countries, but in less advantaged nations like Nigeria, the practice of telenursing may face significant challenges, even in areas where information technology is utilized (Taherdoost, 2019). These challenges include issues of acceptability, as well as the knowledge and perception of nurses. Knowledge is a critical factor in the effective use of telenursing, despite its potential to enhance nursing care for patients in remote or underprivileged areas. Therefore, it is important to assess the level of knowledge and perception of telenursing among nursing students in institutions in Lagos State.

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

1.3 OBJECTIVE OF THE STUDY

1.3.1 General Objectives

The general objective of this study is to assess the knowledge and perception of telenursing among nursing students in nursing institutions, Lagos State.

1.3.2 Specific Objectives

The specific objectives of this study are:

1. To assess the knowledge level of nursing students regarding telenursing in nursing institutions, Lagos State.
2. To assess the perception of nursing students towards telenursing in nursing institutions, Lagos State.
3. To explore any potential barriers or challenges faced by nursing students in adoptions of telenursing practices in nursing institutions, Lagos State.

1.4 RESEARCH QUESTION

1. What is the knowledge level of nursing students regarding telenursing?
2. What is the perception of nursing students towards telenursing?
3. What are the potential barriers or challenges faced by nursing students in adoptions of telenursing practices?
4.

1.5 RESEARCH HYPOTHESES

The following null hypotheses will be tested:

1. There is no significant relationship between academic level and knowledge of nursing students regarding telenursing in nursing institutions.
2. There is no significant relationship between knowledge and perception of nursing students towards telenursing in nursing institutions.
3.

1.6 SIGNIFICANCE OF THE STUDY

The findings of this study could contribute to expanding the overall knowledge base and provide valuable literature for future research on telehealth and telenursing. The results can be utilized in the development of health education and promotion programs to encourage the adoption of telenursing among nurses. For policymakers, the study's outcomes will offer insights to healthcare organizations, especially nursing bodies, on how they can revisit their policies related to telenursing and telehealth. The findings will also assist in designing training programs or seminars and in the creation of targeted policies by decision-makers regarding the implementation of telenursing. Additionally, the study may shed light on the prevalence of limited health literacy and its impact on the use of technology in nursing practices. It could also be valuable to government and non-governmental organizations in planning awareness campaigns to promote the use of telenursing.

1.7 SCOPE OF STUDY

The research is delimited to nursing students in nursing institutions in Lagos State. The nursing institutions that will be used in the study are Lagos state college of nursing, Igando and School of nursing, Lagos University Teaching Hospital.

1.8 OPERATIONAL DEFINITION OF TERMS

The following are the operational terms of the study which will further help to clarify the important areas of the study:

KNOWLEDGE: It refers to the awareness of basic principles towards nursing informatics in nursing care delivery

NURSING: It is the profession and practice of providing holistic care, including assessment, diagnosis, planning, implementation and evaluation of patient care.

NURSING STUDENT: It is an individual who is training to be a nurse at an accredited nursing institution

PERCEPTION: It refers to the way in which telenursing is regarded, understood, or interpreted.

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

STUDENT: It is a person who is currently enrolled in an educational program.

TELENURSING: This is a subset of telehealth that deals with the application of technology to all fields of nursing service, nursing education and nursing research.

CHAPTER TWO
LITERATURE REVIEW
2.0 INTRODUCTION

This chapter discusses the relevant literature review, which comprises the conceptual, theoretical and empirical reviews.

2.1 CONCEPTUAL REVIEW

Overview of Telenursing

Telehealth has emerged as a groundbreaking and enhanced approach to delivering nursing care (De Araújo Novaes & Basu, 2020). It utilizes information and communication technology (ICT) to provide remote nursing services, thus eliminating geographical barriers. The term "telenursing" is derived from the Greek word "telos," meaning "distance." Although the concept of telemedicine has ancient origins, its modern framework was first established in 1960 by the National Aeronautics and Space Administration (NASA) (Ellatif et al., 2023). Telenursing is a branch of nursing practice that incorporates telecommunications technology to support patient care. This approach involves using various electromagnetic channels, such as wire, radio, and optical methods, to transmit communication signals like speech, data, and video (Chang et al., 2021). By utilizing telemedicine technologies, telenursing facilitates the delivery of nursing care and the execution of nursing tasks, enabling healthcare services to reach individuals in remote locations (Ellatif et al., 2023).

Telehealth involves the use of technology to support the delivery of healthcare services, the dissemination of health-related information, and remote health education (HRSA, 2019). It includes the use of electronic devices, information systems, and telecommunications technologies to provide direct patient care, remote monitoring, and educational activities from a distance (Kannan et al., 2023). The American Association classifies telenursing as a distinct area within the broader field of telehealth, with a focus on nursing practice. Telenursing plays a crucial role in enhancing healthcare access for underserved populations, particularly those in rural areas (Yaghobian et al., 2020). Its applications span various aspects of nursing care, including diabetic counseling, dietary advice, promoting healthy lifestyles, postoperative monitoring, and other relevant nursing topics.

According to Ortiz (2020), telenursing is effective in reducing patient costs, decreasing the number of outpatient and emergency department visits, shortening hospital stays, enhancing health-related quality of life, and lowering overall healthcare expenses. Telehealth is increasingly recognized as a vital approach to delivering cost-effective, high-quality care to patients in remote areas. Ranjbar et al. (2021) highlights the importance of properly implementing telenursing technology, as improper use or failure to do so can negatively impact healthcare professionals' performance. Therefore, nurse practitioners, who often serve as the primary care providers for rural and underserved populations, must acquire the necessary knowledge, skills, and attitudes to effectively integrate telehealth technology into their practice.

A review of existing literature showed limited information on programs that focus on nurse practitioner training in telehealth (Purnell et al., 2020). Telenursing is an innovative approach that plays a crucial role in enhancing the overall quality of nursing care, improving treatment outcomes,

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

reducing medical costs, minimizing the need for in-person visits, promoting patient and family involvement in decision-making, and ensuring thorough patient monitoring (Malhotra et al., 2020). This model relies on a variety of technological tools and solutions to achieve these objectives. Therefore, it is essential for clinical nurses to develop a thorough understanding of information and communication technology (ICT) and telenursing to support their professional growth (Rezaei et al., 2020). To effectively integrate this modern approach, telenursing should be incorporated into nursing and midwifery education, enabling practitioners to develop the necessary skills and knowledge to implement these technologies successfully. Fostering a positive attitude toward telenursing and telehealth among clinical nurses and midwives is essential for improving its application in clinical practice (Ranjbar et al., 2021).

This highlights the importance of encouraging a positive attitude toward technological innovations among healthcare professionals to fully leverage their potential benefits. Telenursing practice is based on the use of nursing protocols, active listening, sound clinical judgment, up-to-date scientific knowledge, and building trust between tele-nurses and patients (Poreddi et al., 2021). Nurses must possess a deep understanding of electromagnetic channels, such as wire, radio, and optical media, to effectively engage in telenursing. These channels facilitate the transmission of speech, data, and video communication signals through electrical or optical connections between humans and computers (Loureiro et al., 2021). Nurses play a critical role in healthcare systems, often serving as the primary point of contact and communication between patients and other healthcare providers. They are responsible for a wide range of tasks, including patient care planning, coordination, delivery, and evaluation.

Tele-nursing, also referred to as telehealth nursing or telenursing, is a profession that has gained increasing popularity since the 1980s (Lokmic-Tomkins et al., 2022). It involves the use of telecommunications technologies, such as phone calls, video conferencing, and remote monitoring, to deliver nursing care and support to patients from a distance. Tele-nursing allows nurses to provide healthcare services to patients who are located far away or unable to visit healthcare facilities in person. By utilizing telecommunication methods, tele-nursing offers several benefits, including improved access to healthcare for patients in remote areas, enhanced convenience for those with mobility challenges, and more efficient use of healthcare resources (Machedo et al., 2019).

Tele-nursing encompasses tasks such as assessing patient symptoms, providing education and counseling, assisting with medication management, and remotely monitoring vital signs. With the advancement of technology, tele-nursing has evolved and gained significance, especially during the COVID-19 pandemic, as it enabled healthcare professionals to deliver care while minimizing in-person contact and reducing the risk of virus transmission (Kats & Shmueli, 2023).

Overall, tele-nursing plays a crucial role in modern healthcare systems by enhancing the quality and accessibility of care, addressing the evolving needs of patients.

As a part of telemedicine, it has become an essential avenue for advancing nursing practice. The primary aim of tele-nursing is to improve the quality of care and ensure prompt access to nursing services by overcoming geographical barriers (Ayalew et al., 2019). This approach focuses on promoting patients' long-term health and well-being, while also providing nurses with

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

opportunities for education, follow-up, and family support. These objectives are achieved through the use of communication technologies, such as telephones, SMS, e-learning tools, email, and smartphone apps (Fathizadeh et al., 2020).

Telenursing enables healthcare professionals to consult with one another without requiring physical patient visits, resulting in considerable time and cost savings for both providers and patients. By leveraging technology, healthcare providers can transmit and access patient data, interact professionally, and collaborate effectively to develop the most suitable care plan for each patient (Mantas, 2019).

Telenursing is recognized as an effective care delivery method designed to address challenges such as the uneven distribution of healthcare facilities, shortages of professional nurses, limited access to healthcare, poor transportation systems, and the geographical distance that hinders quality nursing services. It allows midwives to offer care by overcoming these geographical barriers and providing access to patients who would otherwise struggle to receive treatment. Distance has long been a significant obstacle for healthcare providers, but the rise of technology has led to a substantial transformation in healthcare, making it possible for providers to reach previously inaccessible areas (Buta et al., 2023).

The adoption of emerging technologies has opened up new possibilities for healthcare professionals to extend their services to remote and hard-to-reach areas that were once difficult to access. According to McKnight (2020), technology plays a crucial role in enhancing access to timely and effective care for individuals in underserved areas, particularly rural regions. These areas often face challenges such as poor infrastructure, poverty, and limited healthcare services. However, technology helps to overcome these barriers, enabling the delivery of essential care services to these communities (Kumara &Sudusinghe, 2021). In addition to the challenges faced by people in rural areas, there is a significant need for continuous care, monitoring, and treatment, which requires regular visits from skilled healthcare providers.Telenursing addresses the challenge of long-distance travel for both healthcare professionals and patients by eliminating the need for physical visits to provide prescriptions or make diagnoses. As a result, telenursing ensures that individuals in rural areas have access to high-quality care, regardless of their location (Effken& Abbot, 2019). The implementation of telenursing has led to cost savings in the healthcare sector by improving overall efficiency. For example, it enhances the storage and retrieval of patient medication records. Telenursing allows healthcare providers to quickly and efficiently access important patient information, such as medical history, diagnoses, and conditions. This improved access to information accelerates decision-making, reduces administrative workload, and contributes to greater healthcare efficiency (Effken& Abbot, 2019).The use of telenursing has greatly enhanced the management of chronic conditions like heart disease and diabetes, which require continuous care even outside the hospital environment (Kunjuwon et al., 2021).

McKnight (2020) points out that healthcare professionals can access patients more efficiently without needing extensive travel, mainly through collaborative and inter-professional data sharing. Telenursing makes use of mobile phones, internet access, and various medical applications and networks for consultations. This method improves time management for healthcare providers and facilitates smooth information exchange, ultimately improving the management of chronic illnesses in a more efficient and

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

collaborative way (McKnight, 2020). Nurses use network-enabled systems to communicate with healthcare professionals, addressing patient evaluations and medication administration concerns.

Telenursing has played a crucial role in addressing the shortage of healthcare providers in various regions or countries, particularly in low-income nations where this is a common issue. Many healthcare facilities suffer from inadequate staffing, leading to higher mortality rates and increased co-morbidities. Additionally, individuals often face the financial burden of traveling abroad or to distant locations for professional healthcare services, covering not only transportation but also lodging and medical care. These financial challenges can make it difficult to access essential healthcare, particularly for those already facing economic hardship. According to Effken and Abbot (2019), telenursing has alleviated some of the difficulties faced by healthcare organizations with limited staff by enabling remote access to specialists and caregivers through video conferencing.This advancement enables remote interdisciplinary meetings and training sessions, as well as the electronic transmission of data, including patient medical records and vital signs information. Consequently, telenursing has enhanced the ability to evaluate, diagnose, and treat patients remotely, as well as facilitating discussions with families about home care plans before patient discharge (Atkin & Barrett, 2020).

Knowledge of Telenursing

The availability and use of personal computers (PCs) and internet access are crucial for the successful implementation of telenursing (Weldetsadik et al., 2019). Access to these technologies is essential for advancements and training within the healthcare sector, as much of telemedicine communication and data transfer relies on the internet. Therefore, computer access and digital literacy are vital to ensure healthcare professionals can effectively adopt and utilize telemedicine technology (Afik &Pandin, 2021).

A study found that a few participants had limited access to personal computers and internet connections, which hindered their ability to establish virtual communication with patients (Ayalew et al., 2019). Additionally, younger participants were more familiar with information and communication technology (ICT) tools like computers and telemedicine than their older counterparts. This is particularly significant because telemedicine depends heavily on ICT tools such as smartphones and online platforms, which are more commonly used by younger generations with greater exposure to technology (Connolly et al., 2020). It is recommended that healthcare students complete at least one academic unit focused on ICT to enhance telehealth competencies among healthcare professionals.

This type of ICT training can help enhance awareness and improve attitudes toward telehealth among future healthcare professionals.

A study by Dangy (2019) revealed that participants had a moderate level of knowledge about telenursing, with many showing insufficient understanding. The internet was found to be the most commonly used source of information for those with adequate knowledge, reflecting the increasing availability of information technology and social media platforms. This suggests that nurses exhibited a positive attitude toward seeking knowledge, which should be encouraged. Although the overall knowledge score was moderate, aligning with previous studies, there remains a need for further education and training for nurses in telenursing (Dangy, 2019).

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

A large proportion (84.2%) of participants had never visited a facility where telenursing is practiced and were unaware that one of its goals is to reduce hospital or follow-up visits by patients (Dangy, 2019). Additionally, only 68.0% of respondents were aware that nursing care could be accessed from any location. Alarmingly, when asked about the key issues in telenursing, only 4.4% of participants correctly identified all five issues. This underscores the need for extensive training and educational programs to ensure nurses develop a thorough understanding of telenursing (Dangy, 2019).

Perceptions of Nurses regarding Telenursing

A study by Hossein (2021) in Iran, which involved nurses, found that they had a better understanding of telehealth compared to other healthcare professionals, with a more positive perception of telenursing. The nurses believed that telenursing could reduce the need for direct contact between healthcare workers and patients. This indicates that nurses have a higher awareness and acceptance of telenursing's potential to decrease face-to-face interactions in healthcare. Based on the study by Kumara &Sudusinghe (2021), it is recommended that clinical nurses and midwives improve their information and communication technology (ICT) skills and adopt telenursing methods to enhance professional connections. Most participants saw telenursing as a complementary form of patient care in their work environments and believed it could improve staff efficiency in the healthcare system. Additionally, a large proportion (73.8%) thought that telenursing could help reduce nursing care costs.Most participants reported having access to the internet via computers or tablets, highlighting the potential for effectively implementing telenursing (Kumara &Sudusinghe, 2021).

Factors that Influence the Use of Telenursing

Several factors have been identified as influencing nurses' attitudes toward computer systems, including age, education level, years of nursing experience, and prior computer experience (Leong et al., 2021). These factors have consistently been highlighted as key contributors to nurses' perceptions of computerization in various studies. Additionally, research indicates that self-efficacy, confidence in using computers effectively, the adoption of computers to enhance nursing care, perceived usefulness and ease of use of computer systems, and knowledge of computer usage all significantly impact nurses' and midwives' attitudes and perceptions toward telenursing (Leong et al., 2021). These factors play a crucial role in shaping the acceptance and implementation of telenursing among healthcare professionals.A study by Napitupulu et al. (2021) among nurses in private hospitals found that nurses generally had a positive and supportive attitude towards computerization in their workplace. The results indicated that nurses were receptive to using computers and technology in their daily work. Similarly, Ortiz (2020) discovered that age played a significant role in shaping nurses' attitudes toward computers. Younger and less-experienced nurses tended to have more favorable views of computers compared to their older counterparts. This supports previous research suggesting that age is a key factor influencing nurses' attitudes toward technology, with younger generations being more open and comfortable with using computers. Overall, these studies highlight the importance of considering age and experience when examining nurses' perceptions of computerization, as these

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

factors can significantly affect their acceptance and attitude toward technology in healthcare.

A study by Westbrook et al. (2019) examined the effects of introducing computerized charting on three main aspects: nursing time distribution, nurse attitudes toward computerization, and adherence to charting standards. The results showed that the implementation of computerized charting brought about positive changes in these areas. The study found notable differences in how nursing time was allocated, suggesting that computerized charting systems helped nurses manage their time more effectively across various tasks and responsibilities. Additionally, the research explored nurses' attitudes toward computerization and found that the introduction of electronic charting was associated with more favorable opinions. This suggests that nurses were generally more receptive to the technology, recognizing its potential to improve their work processes (Westbrook et al., 2019).The study also examined adherence to charting standards and found that the implementation of computerized charting systems improved compliance with these standards, ensuring that documentation and record-keeping practices aligned with established guidelines and protocols. Overall, the findings emphasize the positive effects of computerized charting on nursing time management, nurse attitudes, and adherence to charting standards. These results suggest that computerized charting systems can enhance workflow efficiency, foster better acceptance of technology, and improve compliance with documentation standards in healthcare environments.

Potential barriers or challenges in adoptions of Telenursing practices

While telenursing is seen as a valuable tool for improving patient health, its application may be limited in certain situations. Nurses typically use various verbal and nonverbal communication techniques in patient care, such as physical touch, eye contact, gestures, silence, and facial expressions (Abdel-AleemMegahed, 2019). These actions are essential for demonstrating empathy, encouraging active listening, and fostering mutual understanding, which in turn creates respect between the patient and the nurse (Purnell et al., 2020). However, the implementation of telenursing through technology alters the concept of care, as virtual interactions may begin to replace in-person communication.This shift is important because it can alter the dynamics of nurse-patient interactions. The lack of physical presence and nonverbal cues in telenursing may lessen the depth of the connection, potentially impacting the overall patient experience (Atashi et al., 2020). While telenursing offers inherent advantages, it may not fully replicate the holistic care provided by midwives, which incorporates both verbal and nonverbal communication.

To ensure the best outcomes and patient satisfaction, it is essential to find a balance between the advantages of telenursing and the key elements of traditional care systems (Rutledge & Gustin, 2021).A related study found that some patients may face challenges with telenursing due to limited internet access or the lack of devices such as smartphones, tablets, or computers. Additionally, their unfamiliarity with technology might hinder their ability to engage with telenursing services. Moreover, virtual consultations may not allow for the same level of physical examination and diagnostic testing as in-person visits, leading to potential accuracy issues for both patients and healthcare providers (Reed et al., 2020). Another major challenge is the need for a license to offer telenursing services, a

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

process that can be complicated and time-consuming, adding further obstacles for healthcare professionals. Additionally, the payment for telenursing services becomes a concern, as the virtual nature of these visits may require specific agreements and definitions with insurers to ensure proper coverage for the services provided (Reed et al., 2020).The findings of this study shed light on the potential challenges and obstacles of telenursing. The complexities surrounding the implementation and adoption of telenursing in healthcare settings are intensified by factors such as limited access to technology, concerns over accuracy and effectiveness, licensing issues, and payment challenges. Addressing these issues is crucial for ensuring the successful integration of telenursing into clinical practice and fully realizing its benefits for both patients and healthcare providers. The field of telenursing faces numerous challenges that need to be addressed, including ethical and legal concerns, inter-professional disagreements, difficulties in ensuring quality transformation, the risk of misdiagnosis due to the inability to conduct physical exams, financial investments for implementation, lack of education and skills among rural populations in using telemedicine, and issues related to unreliable electricity and malfunctioning communication systems (Loureiro et al., 2021).Telenursing presents ethical and legal challenges, particularly regarding the need to protect patient confidentiality, privacy, and ensure informed consent in virtual healthcare settings. Conflicts between healthcare professionals may arise when there are differing opinions on how telenursing should be integrated and function within the broader healthcare system. Upholding and improving quality standards throughout the process is essential for ensuring a smooth transition from traditional care models to telemedicine. The lack of physical interaction during virtual consultations is a major hurdle, as it may hinder accurate diagnosis and appropriate treatment decisions. Significant financial investment is necessary to establish and sustain the technology infrastructure, equipment, and training needed for effective telenursing implementation (Napitupulu et al., 2021).Rural communities may face challenges in understanding and effectively implementing telemedicine due to limited access to information and resources, as well as lower levels of computer literacy. Additionally, inconsistent electricity supply and malfunctioning communication systems pose significant barriers to the smooth delivery of telenursing services, particularly in resource-limited areas. Addressing these complex challenges is essential to ensuring the successful integration and use of telenursing, while maintaining ethical standards, safeguarding patient safety, and enhancing healthcare outcomes. In a study by Dangyang (2021), several issues were identified within the Nigerian healthcare system, including a lack of team collaboration and division among nurses, which has negatively affected healthcare delivery.

Conflicts between nurses, doctors, and other healthcare professionals have led to strikes, work slowdowns, and prolonged closures of government hospitals, ultimately resulting in preventable deaths and a decline in healthcare quality.This challenge presents a potential barrier to the successful implementation of telenursing, as effective collaboration among healthcare professionals is essential for providing telehealth services. Another issue is the lack of short-term courses and training programs related to e-health technologies. Without these training opportunities, the adoption and efficient use of electronic health technologies, including telenursing, is hindered. Additionally, time constraints

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

faced by healthcare professionals further limit their ability to fully adopt and integrate e-health solutions into their practice. These challenges underscore the need for comprehensive strategies that address teamwork, training, and time management to facilitate the successful implementation of telenursing and broader e-health initiatives. By overcoming these obstacles, healthcare systems can improve their ability to utilize technology, thereby enhancing patient care and outcomes (Rezaei et al., 2020). Moreover, inadequate access to technology-based infrastructure, such as the internet and telephones, remains a key barrier to the implementation of telemedicine in both developing and developed countries, limiting the acceptance and use of telemedicine services. To address this issue, governments and hospitals must take proactive measures to ensure reliable internet connectivity and improve access to telecommunications resources. By guaranteeing the availability of necessary technical infrastructure, these institutions can help minimize barriers and create an environment conducive to the successful implementation of telemedicine programs (Grady et al., 2020).

2.2 THEORETICAL REVIEW

Diffusion of Innovation (DOI) Theory

The Diffusion of Innovation (DOI) Theory, formulated by E.M. Rogers in 1962, is a well- established social science theory that elucidates the process by which an idea or product gradually gains traction and spreads within a specific population or social system. Originally developed in the field of communication, this theory aims to explain how the adoption of a novel idea, behavior, or product occurs over time.Adoption refers to individuals embracing a new method or product, moving away from their previous practices. This process depends on the individuals perceiving the idea, behavior, or product as new and innovative. It is this perception that enables the diffusion of the innovation within a social system. The adoption of innovations is a dynamic process that unfolds over time and varies among individuals. It is not a one-time event but a continuous process characterized by different adoption rates. Early adopters tend to exhibit distinct traits compared to later adopters. Therefore, understanding the characteristics of the target adopters is essential when promoting an innovation to a specific group. Such understanding helps identify factors that can either facilitate or hinder the adoption process. By gaining insights into the target audience, effective strategies can be developed to encourage the successful adoption of the innovation within the social system. The adoption and diffusion of an innovation involve several stages: awareness of the need for the innovation, the decision to accept or reject it, initial trial use, and sustained adoption over time.

The adoption of an innovation is influenced by five key factors, which manifest in varying degrees across the five adopter categories.

i. **Relative Advantage** - The extent to which an innovation is perceived as better than the current concept, program, or product it aims to replace.
ii. **Compatibility** - Refers to how well the innovation aligns with the values, experiences, and needs of potential adopters.
iii. **Complexity** - Represents the level of difficulty involved in understanding and/or implementing the innovation.
iv. **Trialability** - The opportunity to test or experiment with the innovation before fully committing to its adoption.
v. **Observability** - The degree to which the results or benefits of the innovation are visible and noticeable to others.

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

Limitations of Diffusion of Innovation Theory

There are several limitations associated with the Diffusion of Innovation Theory, as outlined below:

i. The evidence supporting this theory, including the adopter categories, primarily comes from disciplines outside of public health and was not specifically designed to address the adoption of new health behaviors or innovations within public health contexts.

ii. The theory does not inherently advocate for a participatory approach to adopting public health programs, which may limit its effectiveness in situations where active engagement and involvement from the target population are essential.

iii. The theory is more suited for the adoption of new behaviors rather than the discontinuation or prevention of existing behaviors, which may limit its applicability in interventions focused on behavior change.

iv. The theory does not explicitly account for an individual's personal resources or social support systems, which may influence their ability to adopt a new behavior or innovation, potentially neglecting key factors that can affect the adoption process.

Application of Diffusion of Innovation Theory to the Study

Diffusion is a natural social process that takes place even without a specific theory to explain it. It involves the organic spread and acceptance of innovations, which may include new ideas, behaviors, or technological advancements. Diffusion can also be seen as a physical phenomenon, where an object or concept spreads across space and time.The key components of diffusion theory are:

1. The innovation itself, and how potential adopters perceive its attributes, including relative advantage (how effective and cost-efficient it is compared to alternatives), complexity (how easy it is to understand), compatibility (how well it fits with existing methods), observability (how visible its outcomes are), and trialability (how much commitment is required for full adoption).
2. The adopter, particularly their level of innovativeness, which refers to how early they adopt compared to others.
3. The social system, especially its structure, local informal opinion leaders, and the perceived social pressure to adopt from potential adopters.
4. The individual adoption process, which follows a sequence of stages: awareness, persuasion, decision, implementation, and continuation.
5. The diffusion system, particularly the role of an external change agency and its trained change agents, who seek out and work with key figures in the client system, such as opinion leaders, paraprofessional aides, and innovation champions.

The innovation in this context is Information Communication Technology (ICT), which includes its benefits to nursing care delivery. It highlights its effectiveness and cost-efficiency compared to traditional methods.The adopters are nursing students, and the focus is on how quickly they can adopt the innovation, how useful they perceive it to be, and how to use it effectively.The social system includes the structure in which nurses operate, the opinion leaders within the system, and the perceived social pressure to adopt the innovation. The individual adoption process involves stages such as becoming aware of the innovation, being persuaded to use it, making the decision to adopt it, implementing it in nursing practice, and ensuring its continued use.Since telenursing is an innovation in nursing, it is crucial for nurses to understand its importance and usefulness in their practice. Awareness and

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

knowledge of this technology will facilitate its wider use in the profession and influence how nurses perceive and adopt telenursing in patient care.The adoption of telenursing will enable nurses to perform their duties in a way that differs from traditional methods. It makes the delivery of nursing care more efficient, quicker, and more effective.

2.2 EMPIRICAL REVIEW

Butta et al. (2023) conducted a study on nurses' awareness and knowledge of telenursing care and the factors influencing it in a resource-limited setting. The study included 415 nurses, with a response rate of 98.5%. Among the participants, 49.4% and 45.8% demonstrated good awareness and knowledge of telenursing care, respectively. Factors influencing nurses' awareness included education level, job experience, information sources, digital training, internet access, and computer training. Additionally, factors such as nurses' awareness, social media use, experience with online patient interactions, sources of information, research, digital training, and computer training were linked to their knowledge of telenursing care. Overall, nurses' awareness and knowledge of telenursing care were found to be low. Taking these factors and user preferences into account could help shape strategies for improving nurses' awareness and knowledge, which is essential for future acceptance, use, and implementation of telenursing care.Ellatif et al. (2023) conducted a study on the knowledge and attitudes of nursing students regarding telenursing. The study found that 86% of the participants were between 20 and 22 years old, with an average age of 21.15±1.86 years. Of the participants, 69.2% were female, and 86% had not received any training on telenursing. Additionally, 45.8% of the students had an average total knowledge score, and 65.4% had a positive attitude toward telenursing. A significant correlation was found between the students' total knowledge and attitude scores. The study recommended developing and implementing educational programs to enhance nursing students' knowledge and attitudes toward telenursing.Tabish et al. (2021) conducted a study on the knowledge, attitudes, and perceptions of telemedicine among young doctors and nursing staff at King Abdul-Aziz University Hospital in Jeddah. The study had an 85% response rate, with 335 participants, including 171 doctors (51.1%) and 164 nursing staff (48.9%). Among the doctors, 50 (29.4%) were recent graduates, while 77 (46.7%) of the nursing participants were senior nursing students. The study found that the younger nursing staff had better knowledge and attitudes toward telemedicine compared to the senior staff, with statistically significant results. The young participants were enthusiastic and demonstrated good understanding of the benefits and limitations of telemedicine for managing certain patient groups. Their perceptions and attitudes were highly positive, which is encouraging for the promotion of telemedicine as a viable approach for managing patients with special needs. The COVID-19 pandemic has underscored the importance of telemedicine in emergencies, helping protect both patients and healthcare workers by reducing unnecessary hospital visits for chronic patients.

Poreddi et al. (2021) conducted a study on nursing interns' perceptions of telenursing and its implications for nursing education. The study found that most participants owned smartphones (74.8%), had internet access (96.7%), and used the internet for more than 3 hours per day (73.3%). While 65.6% of participants correctly identified the definition of telenursing, only 33.9% were able to define telemedicine accurately. The majority (92.4%) agreed that incorporating telenursing into undergraduate curricula

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

would be beneficial for future healthcare workers, and that telenursing could be applied across various medical specialties. While most nursing interns had positive perceptions of telenursing and recognized its value in nursing practice, their knowledge of telenursing was limited. The findings emphasize the need to include telenursing concepts in educational curricula to better equip future healthcare providers to deliver safe and effective care in an increasingly digital and technical environment.

Khraisat et al. (2023) conducted a study on telenursing's implications for future education and practice, focusing on nursing students' perspectives and knowledge from a course on child health. The findings revealed a positive attitude toward telenursing practice, though participants struggled to define it accurately. Factors such as age, internet usage, and knowledge were identified as predictors of telenursing adoption, with the model explaining 32% of the variance. The study concluded that incorporating telenursing into the curriculum would be beneficial for future nursing professionals. This would help expand the learning environment beyond the classroom and redefine the future of nursing practice.Kats & Shmueli (2023) conducted a study comparing nurses' perceptions of videoconferencing telenursing before and after the COVID-19 pandemic, focusing on the difference between frontal and online learning formats. The results showed that nurses had favorable attitudes toward telenursing, regardless of the training format. Willingness to adopt telenursing was significantly influenced by the perceived ease of use and subjective normsTo promote the adoption of telenursing, it is essential to provide managerial support, adequate training, and necessary resources to enable nurses to effectively use this technology for remote patient care.Kalia & Saggi (2019) conducted a study on telenursing and its challenges in India. Telenursing involves using telecommunication and information technology to deliver nursing services in situations where there is a significant physical distance between the patient and the nurse. This approach can reduce the need for hospital stays or shorten their duration. It is particularly beneficial for adults with chronic conditions who require frequent monitoring, assessment, and maintenance but do not qualify for home care or cannot afford such services. The use of telenursing leads to reduced overall healthcare costs and improved access to care, with more efficient use of resources. However, despite the many advantages of telenursing, including better resource allocation, time management, and patient access, it may also present ethical challenges.

Grinberg & Sela (2023) conducted a study on the quality of telenursing by examining Israeli nursing staff's perceptions. They found significant differences between nurses' perceptions of telenursing and face-to-face nursing. Generally, face-to-face nursing was perceived as offering better quality care, particularly in areas such as providing professional treatment, treatment response, and patient security. Despite the significant growth of telemedicine in recent years, nursing staff still rated face-to-face care more positively in terms of quality and follow-up. The study suggests that it is important to continue monitoring nurses' perceptions and attitudes toward these two methods of care, not just in crisis situations but also in broader populations, to explore the factors influencing these views.Firouzkouhi et al. (2021) investigated the challenges and opportunities of telenursing during the COVID-19 pandemic. Key findings included challenges such as implementation issues, insurance coverage, nurse prevention, continuity of care, and changing nurses' roles in infection control. However, despite these challenges,

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

telenursing proved to be an effective and reliable measure, helping control the spread of COVID-19 through proper planning and implementation.Tort-Nasarre et al. (2023) explored the experiences of telenursing in overcoming challenges faced by COVID-19 patients in home isolation. The study identified three primary challenges faced by these patients: physical symptoms, emotional and social difficulties, and a lack of information. To address these challenges, patients utilized three main strategies: self-care, emotional support, and personal commitment. The study emphasized that telenursing played a critical role in delivering patient-centered care, which may influence organizational policies and the development of best clinical practices

SUMMARY

Telenursing, a branch of telehealth, uses information and communication technology (ICT) to provide nursing services remotely, overcoming geographical limitations. It is used in areas such as diabetic counseling, dietary guidance, postoperative monitoring, and other aspects of nursing care. Telenursing increases healthcare accessibility, reduces patient costs, shortens hospital stays, decreases outpatient visits, and enhances the overall health-related quality of life. For successful implementation, nurses must develop ICT competencies, and integrating this technology into nursing curricula is essential for fostering positive attitudes toward telenursing.

Nurses' knowledge of telenursing varies, with younger individuals being more familiar with ICT tools. Education and training programs can improve both knowledge and attitudes. Key factors influencing telenursing adoption include age, education level, nursing experience, computer proficiency, self-efficacy, and perceived usefulness.

However, challenges exist, including limited internet access, lack of devices, limitations in nonverbal communication, licensing issues, payment barriers, as well as ethical, legal, and inter-professional conflicts. Concerns about care quality, diagnosis accuracy, financial investment, and the education and skills gaps—especially in rural areas—further complicate implementation. Addressing these issues is essential for the successful integration of telenursing.

The literature emphasizes the need to balance the advantages of telenursing with traditional care practices, ensuring both patient satisfaction and optimal outcomes. Effective strategies that focus on teamwork, training, and time management are vital for successfully integrating e-health solutions

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 INTRODUCTION

This chapter dealt with the research design, research setting, target setting, target population, sample size, sampling technique, instrumentation, pilot study, validity and reliability of the instrument, method of data collection, method of data analysis and ethical consideration.

3.1 RESEARCH DESIGN

A descriptive design was used to assess the knowledge and perception of telenursing among nursing students in nursing institutions, Lagos state.

3.2 RESEARCH SETTING

This research study was conducted in Lagos state college of nursing (LASCON), Igando and School of nursing, Lagos University Teaching Hospital.

3.3 TARGET POPULATION

The target population are nursing students in nursing institutions, Lagos State. Total population of nursing students in Lagos State college of nursing, Igando is 322 and School of nursing, LUTH is 241.

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

3.4 SAMPLE SIZE DETERMINATION

The sample size was obtained by using Taro Yamane (1976) formula with 95% confidence level with allowable error (0.05)
The formula is; $n= N/1+N(e)^2$
Where;
n= expected sample size
N = total population = 322+241=563
1= constant
e= level of significance
Therefore, $n = 563/1+ (563)(0.05)^2$
n= 563/1+ 1.41
n= 563/2.41
n = 234
Since the researcher was dealing with human beings, there is a tendency for some of the respondents not to return the instrument or the instrument would have been filled wrongly. By standard 10% attrition rate is sufficient.
Therefore, the researcher determined the attrition rate thus: -
Attrition Rate = ((10/100) x 234) + 234
= 23.4+ 234
= 257
Hence, the sample size will be 257
Proportionate sampling
LASCON= 322/563 x 257 =147
LUTH= 241/563 x 257 =110

3.5 SAMPLING TECHNIQUE

Convenience sampling technique was used to select the study participants. It is a non-probability sampling method where participants are selected for inclusion in the sample because they are the easiest for the researcher to access.
Inclusion criteria: Nursing students in LASCON and LUTH who are willing to participate in the study at the time of data collection and able to fully comprehend the questions.
Exclusion criteria: Other students outside the inclusion criteria will be excluded.

3.6 INSTRUMENT FOR DATA COLLECTION

The tool for data collection was a self-structured questionnaire with closed end questions divided into four sections as follow;
SECTION A: Socio-demographic characteristics of the respondent consisting of nine (9) items
SECTION B: Knowledge of telenursing among respondents consisting of ten (10) items
SECTION C: Perception towards telenursing among respondents consisting of ten (10) items
SECTION D: Potential barriers or challenges in the adoption of telenursing among respondents consisting of ten (10) items

3.7 VALIDITY OF INSTRUMENT

In order to ensure that the research instrument is valid and effective, the instrument was constructed based on the research specific objectives and it was examined by the college research committee who ascertained the face validity of the instrument and appropriate corrections to the instruments were made based on committee's suggestions. The content validity was determined by an expert in statistics.

3.8 RELIABILITY OF INSTRUMENT

Cronbach's alpha is the statistical tool that was used to determine the internal consistency of the instrument. This was done by selecting questions related to knowledge and perception of telenursing among nursing students, and these questions reflected the construct to be measured. The questions were administered to a sample of nursing students and responses were analyzed, and a reliability coefficient of 0.7 was used to judge the reliability of the instrument. Reliability of the instrument is checked so as

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

to ensure that the research instrument maintain internal consistency in measuring what it intends to measure.

PILOT STUDY

A pilot study was carried out by administering 10% of the estimated sample size and this equals to 26 questionnaires. The questionnaires were administered to 26 nursing students of Nigerian Army College of Nursing which are not part of the sample size. This was done to examine the feasibility of the approach intended to be used in a larger scale study.

3.9 METHOD OF DATA COLLECTION

The letter of approval to carry out the research received from the ethical committee was submitted to the head of departments in the nursing institutions. The questionnaires were administered to the respondents after gaining consent and explaining each item in the instrument to them. They were encouraged to fill the questionnaire faithfully and the right to withdraw from participation was clearly stated to each respondent. The questionnaire was collected by the researcher immediately it was filled. The researcher collected the data with the help of her research assistants.

3.10 METHOD OF DATA ANALYSIS

The statistical package for Social Sciences (SPSS package) 25th edition was used for the data analysis. The data was computed using descriptive and inferential statistical tool. The result of the analysis was presented in percentages, frequency and tables.

The chi-square inferential statistics was used to test for the hypothesis and relationship between variables by computing it using SPSS package, 25th edition.

3.11 ETHICAL CONSIDERATION

The letter of approval to carry out the research was collected from the ethical committee. Informed consent was also gained from the correspondents before the administration of questionnaire. They were assured of confidentiality and anonymity and that the data given will not be used to harm them.

CHAPTER FOUR

RESULTS

4.1 INTRODUCTION

This chapter deals with the analysis of collected data and presentation of results with the use of percentages, frequencies and are displayed using frequency tables. Relationships between variables were determined using Pearson's chi square with level of significance set at 0.05 ($p< 0.05$) to determine level of statistical significance. This section also answers all the research questions.Data were computer-analyzed using statistical package for social sciences (SPSS) 25.0 version.A total of 257 respondents were recruited and all the respondents completed the questionnaires and had adequate data for analysis. This translates to a response rate of 100%.

Presentation of Results

Table 4.1 showing the socio-demographic characteristics of respondents

Variables	Categories	Frequency	Percent
Age	<18 years	8	3.1
	18-21 years	108	42.0
	22-25 years	90	35.0
	26 and above	51	19.8
Gender	Female	199	77.4

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

	Male	58	22.6
Ethnicity	Hausa	13	5.1
	Igbo	26	10.1
	Others	25	9.7
	Yoruba	193	75.1
Religion	Christianity	157	61.1
	Islam	100	38.9
Relationship Status	Engaged	32	12.5
	Married	9	3.5
	Single	216	84.0
Academic level	100	25	9.7
	200	62	24.1
	300	170	66.1
Do you have access to computer during posting	No	75	29.2
	Yes	182	70.8
Do you have access to the internet during posting	No	54	21.0
	Yes	203	79.0
Can you use the computer efficiently	No	31	12.1
	Yes	226	87.9
	Total	257	100.0

From Table 4.1, the distribution of ages is as follows: under 18 years (8, 3.1%), 18-21 years (108, 42.0%), 22-25 years (90, 35.0%), and 26 years and above (51, 19.8%). The gender distribution shows a higher proportion of females (199, 77.4%) compared to males (58, 22.6%). Ethnic representation is mostly Yoruba (193, 75.1%), followed by Igbo (26, 10.1%), Hausa (13, 5.1%), and others (25, 9.7%). Most participants are Christian (157, 61.1%), while a significant portion are Muslim (100, 38.9%). In terms of relationship status, the majority are single (216, 84.0%), with fewer engaged (32, 12.5%) or married (9, 3.5%). The academic level is primarily in the 300 level (170, 66.1%), followed by 200 level (62, 24.1%) and 100 level (25, 9.7%). Access to computers during postings is high, with 182 (70.8%) having access compared to 75 (29.2%) without. Internet access is also widespread, with 203 (79.0%) having access and 54 (21.0%) without. Additionally, most participants are proficient in using computers (226, 87.9%), while a smaller number (31, 12.1%) are not.

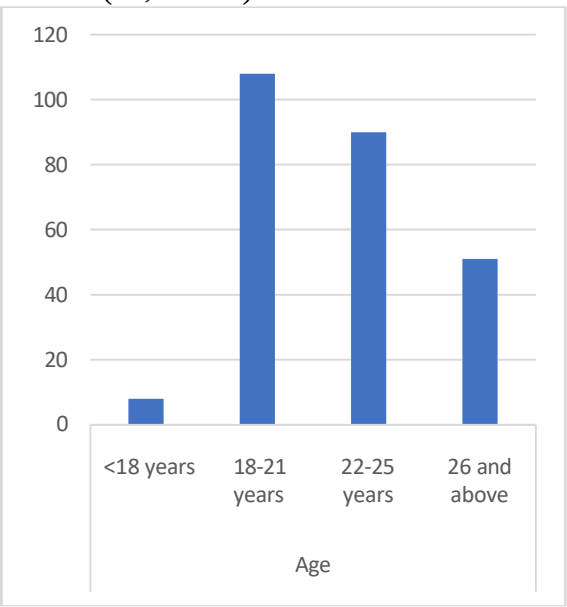

Fig 4.1 showing the age of the respondents

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

Table 4.2 showing the knowledge of telenursing among respondent

Variables	Categories	Frequency	Percent
Telenursing is a combination of telecommunications services with nursing	No	3	1.2
	Yes	254	98.8
Telenursing increases service coverage and effectiveness	No	9	3.5
	Yes	248	96.5
Telenursing increases patient and family participation in self-management care	No	26	10.1
	Yes	231	89.9
Telenursing can increase self-desire and increase patient awareness in adherence to diet, physical activity, and healthy behaviors related to disease	No	27	10.5
	Yes	230	89.5
Barriers to telenursing are unable to see patients, ethical dilemmas, technological difficulties, lack of direct contact with patients	No	21	8.2
	Yes	236	91.8
Requires training in technology resources in implementing telenursing	No	12	4.7
	Yes	245	95.3
A successful telenursing service requires technical and operational stability to meet patient needs	No	7	2.7
	Yes	250	97.3
Telenursing also increases the safety of nurses and clients	No	23	8.9
	Yes	234	91.1
Work productivity increases with the use of telenursing	No	29	11.3
	Yes	228	88.7
Phones, TV, TeleECG, audio & video conferencing system are common resources used in telenursing	No	6	2.3
	Yes	251	97.7
	Total	257	100.0

From table 4.2, nearly all respondents (254, 98.8%) agree that telenursing is a combination of telecommunications services with nursing. Most believe it enhances service coverage and effectiveness (248, 96.5%) and increases patient and family participation in self-management care (231, 89.9%). Similarly, a significant majority (230, 89.5%) think telenursing can improve patient adherence to diet, physical activity, and healthy behaviors. Despite this, some acknowledge barriers such as the inability to see patients, ethical dilemmas, technological difficulties, and lack of direct contact (236, 91.8%). The majority also recognize that telenursing requires training in technology resources (245, 95.3%) and technical and operational stability to meet patient needs (250, 97.3%). Most agree that telenursing

increases safety for both nurses and clients (234, 91.1%) and improves work productivity (228, 88.7%). Common resources used in telenursing, such as phones, TV, TeleECG, and audio & video conferencing systems, are acknowledged by 251 respondents (97.7%).

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

Table 4.3 showing the perception towards telenursing among respondents

Variables	Categories	Frequency	Percent
Do you think that telenursing in undergraduate studies would be useful for future healthcare workers?	I don't know	14	5.4
	No	15	5.8
	Yes	228	88.7
Would you like to use telenursing as an additional form of the patient care in your future work?	I don't know	13	5.1
	No	12	4.7
	Yes	232	90.3
Do you assess the need to introduce telenursing services in the healthcare of your country	I don't know	15	5.8
	No	29	11.3
	Yes	213	82.9
The facilities/possibilities of providing "telenursing" care are available in your clinical areas	I don't know	30	11.7
	No	80	31.1
	Yes	147	57.2
Telenursing can improve the efficiency of the medical staff	I don't know	16	6.2
	No	21	8.2
	Yes	220	85.6
Do you think that telenursing can reduce the cost of patient	I don't know	40	15.6
	No	78	30.4
	Yes	139	54.1
Is telenursing possible without technical problems (hardware, connections, etc.)	I don't know	17	6.6
	No	165	64.2
	Yes	75	29.2
Telenursing may result in the loss of direct contact between the medical staff and the patient	I don't know	19	7.4
	No	46	17.9
	Yes	192	74.7
It allows for timely monitoring and provision of care to outpatients	I don't know	17	6.6
	No	25	9.7
	Yes	215	83.7
Nurses can engage other nurses in telenursing conferencing to discuss and update knowledge	I don't know	5	1.9
	No	6	2.3
	Yes	246	95.7
	Total	257	100.0

The data reveals a strong endorsement of telenursing among respondents. A significant majority (228, 88.7%) believe that incorporating telenursing into undergraduate studies would be beneficial for future healthcare workers, and most (232, 90.3%) would like to use telenursing as an additional form of patient care in their future roles. The need to introduce telenursing services in the healthcare system of their country is recognized by 213 respondents (82.9%). Although 57.2% affirm that their clinical areas have the necessary facilities for telenursing, 31.1% do not, and 11.7% are unsure. Regarding its impact on healthcare efficiency, 220

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

respondents (85.6%) agree that telenursing can improve the efficiency of medical staff, and 54.1% believe it can reduce patient costs. However, 64.2% think telenursing may encounter technical problems, and 74.7% are concerned that it could lead to a loss of direct contact between medical staff and patients. Despite this, 83.7% see telenursing as a means for timely monitoring and care provision for outpatients. Additionally, a vast majority (246, 95.7%) believe that telenursing allows nurses to engage in conferencing to discuss and update their knowledge.

Table 4.4 showing the potential barriers or challenges in the adoption of telenursing among respondents

Variables	Agree	Disagree	Strongly agree	Strongly disagree
Shortage/Lack of manpower/Workload on Nurses	97(37.7%)	31(12.1%)	124(48.2%)	5(1.9%)
Lack of interest	113(44.0%)	67(26.1%)	71(27.6%)	6(2.3%)
Lack of knowledge of telenursing	107(41.6%)	22(8.6%)	123(47.9%)	5(1.9%)
Inadequate supply of ICT device and other equipment/facilities	79(30.7%)	6(2.3%)	170(66.1%)	2(0.8%)
Lack of funding by hospital management	91(35.4%)	10(3.9%)	156(60.7%)	0
Lack of policy	124(48.2%)	33(12.8%)	98(38.1%)	2(0.8%)
Inadequate power supply	74(28.8%)	13(5.1%)	167(65.0%)	3(1.2%)
Lack of team spirit among nurses	99(38.5%)	66(25.7%)	85(33.1%)	7(2.7%)
Lack of commitment from the Administration or Management unit	105(40.9%)	33(12.8%)	117(45.5%)	2(0.8%)
Poor attitude to telenursing among nurses	92(35.8%)	40(15.6%)	122(47.5%)	3(1.2%)

Table 4.4 highlights key barriers to telenursing adoption as identified by respondents. A significant proportion cited a shortage or lack of manpower and overwhelming workload as major challenges, with 48.2% strongly agreeing and 37.7% agreeing. Similarly, 44.0% agreed and 27.6% strongly agreed that a lack of interest in telenursing hinders its adoption.

Additionally, 47.9% strongly agreed and 41.6% agreed that insufficient knowledge about telenursing is a major obstacle to its implementation.Inadequate availability of ICT devices and facilities was identified as a critical barrier, with 66.1% strongly agreeing and 30.7% agreeing. Financial constraints, such as a lack of funding from hospital management, were strongly agreed upon by 60.7% of respondents, while 48.2% strongly agreed that the absence of policies further impeded progress. Inadequate power supply and lack of team spirit among nurses were seen as significant issues by 65.0% and 38.5% of respondents, respectively.The lack of commitment from administration or management was another concern, with 45.5% strongly agreeing and 40.9% agreeing. Lastly, 47.5% of respondents acknowledged poor attitudes toward telenursing among nurses as a notable barrier.

4.2 ANSWERING OF RESEARCH QUESTIONS

Research Question 1: What is the knowledge level regarding telenursing among nursing students in nursing institutions, Lagos State?

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

As shown in Table 4.2, respondents were assigned a score of zero for "no" responses and one for "yes" responses. The minimum scores a respondent could achieve was 0, while the maximum was 10. A total score of 0 to 5 indicates a low level of knowledge, whereas a score of 6 to 10 signifies a high level of knowledge. Based on these criteria, 228 respondents (88.7%) demonstrated a high level of knowledge about telenursing, while 29 respondents (11.3%) exhibited a low level of knowledge.

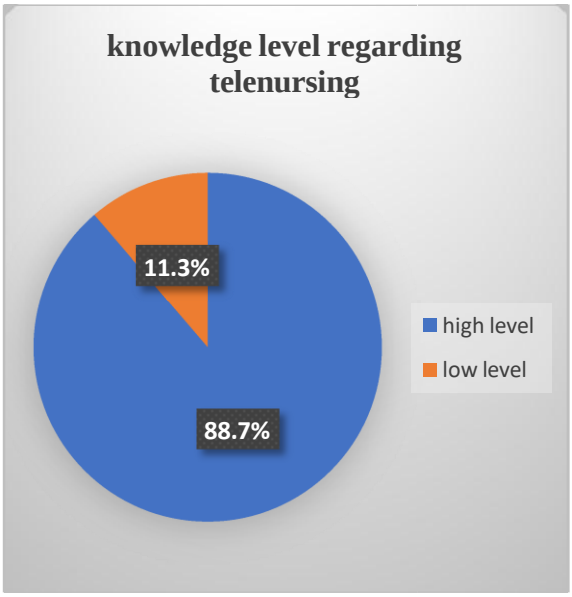

Fig 4.2 showing theknowledge level regarding telenursing among nursing students in nursing institutions, Lagos State

Research Question 2: What is the perception towards telenursing among nursing students in nursing institutions, Lagos State?

As shown in Table 4.3, responses were scored from 0 to 2, corresponding to "I don't know," "No," and "Yes," respectively. The minimum possible score for each respondent is 0, while the maximum possible score is 20. Respondents scoring between 0 and 10 are categorized as having a poor perception, while those scoring between 11 and 20 are classified as having a good perception. Based on these criteria, 182 respondents (70.8%) demonstrated a good perception of telenursing, whereas 75 res ondents (29.2%) exhibited a poor perception.

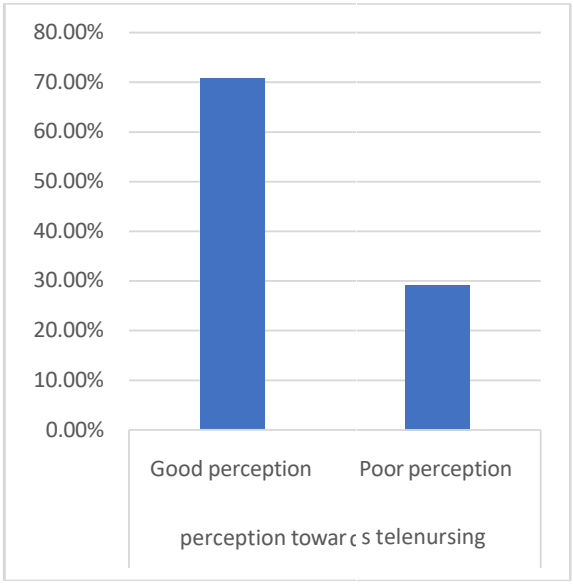

Fig 4.3 showing theperception towards telenursing among nursing students in nursing institutions, Lagos State

Research Question 3: What are the potential barriers or challenges faced by nursing students in adoptions of telenursing practices?

From Table 4.4, the identified barriers and challenges include: a shortage of nurses (221 respondents, 85.9%), lack of interest in telenursing (184 respondents, 71.6%), lack of knowledge about telenursing (230 respondents, 89.5%), inadequate supply of ICT devices (249 respondents, 96.9%), insufficient funding from hospital management (247 respondents, 96.1%), absence of policies (222 respondents, 86.4%), inadequate power supply (241 respondents, 93.8%), lack of team spirit among nurses (184 respondents, 71.6%), lack of commitment from the administrative unit (222 respondents, 86.4%), and poor attitudes toward telenursing (214 respondents, 83.3%)

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

HYPOTHESIS TEST

Decision rule: If the P-value is less than 0.05 the null hypothesis (HO) will be rejected and the alternative hypothesis (HI) will be accepted otherwise null hypothesis be accepted and the alternative will be rejected.

Hypothesis 1

Null Hypothesis (H_0): There is no significant relationship between academic level and knowledge of nursing students regarding telenursing in nursing institutions

Table 4.5 showing the relationship between academic level and knowledge of nursing students regarding telenursing in nursing institutions

		Knowledge regarding telenursing		Total	X^2	df	P value
		Low level	High level		1.798[a]	2	0.407
Academic level	100	4	21	25			
	200	9	53	62			
	300	16	154	170			
Total		29	228	257			

Inference: Since the P-Value (0.407) is greater than 0.05 level of significance, we accept the null hypothesis and reject the alternative hypothesis. Therefore, there is no significant relationship between academic level and knowledge (P= 0.407, X^2=1.798[a]) of nursing students regarding telenursing in nursing institutions

Hypothesis 2

Null Hypothesis (H_0): There is no significant relationship between knowledge and perception of nursing students towards telenursing in nursing institutions

Table 4.6 showing the relationship between knowledge and perception of nursing students towards telenursing in nursing institutions

		Knowledge of telenursing		Total	X^2	df	P value
		Low level	High level		5.766[a]	1	0.016
Perception towards telenursing	Poor	14	61	75			
	Good	15	167	182			
Total		29	228	257			

Inference: Since the P-Value (0.016) is lesser than 0.05 level of significance, we reject the null hypothesis and accept the alternative hypothesis. Therefore, there is significant relationship between knowledge and perception (P= 0.016, X^2=5.766[a]) of nursing students towards telenursing in nursing institutions.

CHAPTER FIVE
DISCUSSION

5.0 INTRODUCTION

This aspect of study deals with the discussion of findings, implication of findings to Nursing profession, limitation of the study, summary of the study, conclusion, recommendations and suggestions for further study.

5.1 DISCUSSION OF FINDINGS

Discussion of sociodemographic data

The sociodemographic data of nursing students indicate a young, predominantly female group, with a significant representation of the Yoruba ethnic group

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

and a high Christian affiliation. These findings align with similar studies. For example, Abdel-Aleem Megahed (2019) reported that nursing students are typically young, consistent with this study's finding that most participants fall within the 18–21 age range. This trend toward younger cohorts in nursing education has been noted globally, as highlighted by Ayalew et al. (2019). Additionally, the predominance of female participants reflects global patterns observed by Kalia and Saggi (2019) and Khraisat et al. (2023), which show that nursing programs are primarily attended by women.

In terms of technology access, most participants reported having access to computers and the internet, along with high computer proficiency. These findings align with Loureiro et al. (2021) and Poreddi et al. (2021), who emphasize the growing integration of digital technologies in nursing education and the critical importance of computer literacy for nursing students.

Conversely, the minority lacking access to these technologies' contrasts with findings by Butta et al. (2023), which highlighted significant challenges in technology access in resource-constrained settings. This difference underscores the need for targeted measures to address the digital divide among nursing students, promoting equitable access to technological tools and improving their educational experiences in telenursing.

Discussion of knowledge of telenursing

The findings reveal that most respondents accurately recognize telenursing as the integration of telecommunications with nursing, consistent with the broader definition by Afik and Pandin (2021), who describe it as a transformative approach leveraging telecommunications to advance nursing care. This widespread understanding of telenursing's potential to enhance service delivery and foster patient self-management aligns with studies like Das et al. (2022) and Butta et al. (2023), which emphasize its role in improving patient engagement and adherence to health behaviors. However, challenges such as limited patient visibility, ethical concerns, and technological issues echo those highlighted in another research. For instance, Firouzkouhi et al. (2021) and Ranjbar et al. (2021) identify similar barriers, underscoring the importance of comprehensive training and addressing technical limitations to optimize telenursing practices.

The recognition of the necessity for technical training and operational stability aligns with the findings of Fathizadeh et al. (2020) and Connolly et al. (2020), which emphasize the critical need to equip nursing professionals with the skills and resources required to effectively implement telenursing technologies. Similarly, the consensus on telenursing's positive effects on safety and productivity mirrors broader trends in the literature. Studies like those by Grinberg and Sela (2023) and Khraisat et al. (2023) underscore the enhanced outcomes and efficiency associated with the adoption of telenursing practices.

Discussion of perception towards telenursing

The findings reveal a largely positive perception of telenursing among respondents, particularly regarding its potential benefits for future healthcare professionals and its integration into nursing practices. This optimism is consistent with previous research advocating for the inclusion of telenursing in nursing education and practice. For example, studies by Kannan et al. (2023) and Rutledge and Gustin (2021) highlight the need to prepare nursing students for the increasingly digital landscape of healthcare, suggesting that integrating telenursing into educational curricula can enhance future practice.

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

Furthermore, the strong endorsement of telenursing as a complementary method of patient care aligns with the findings of Connolly et al. (2020) and Das et al. (2022), which emphasize its potential to augment traditional care models and improve patient outcomes. However, concerns about technical issues and reduced direct patient contact, as noted in the findings, echo challenges identified in studies by Firouzkouhi et al. (2021) and Alboraie et al. (2021).The findings highlight concerns about the technical challenges and ethical dilemmas associated with telenursing, which could affect its implementation and overall effectiveness. The apprehension regarding the loss of direct patient contact, reported by 74.7% of respondents, aligns with studies such as those by Poreddi et al. (2021) and Grinberg and Sela (2023), which stress the importance of balancing technological tools with personal interaction to ensure comprehensive patient care. Despite these challenges, the recognition of telenursing's potential for timely patient monitoring and knowledge sharing, as demonstrated in studies by Kalia and Saggi (2019) and Leong et al. (2021), underscores its significant role in improving healthcare delivery and supporting professional development.

Discussion of potential barriers or challenges in the adoption of telenursing

The concern about shortages in manpower and overwhelming workloads aligns with broader challenges identified in studies by Yaghobian et al. (2020) and Alboraie et al. (2021), which highlight that insufficient staffing and heavy workloads can hinder the effective adoption of new technologies like telenursing, as they place additional pressure on already stretched healthcare professionals. Likewise, the issue of low interest in telenursing, reported by many respondents, is consistent with findings from Firouzkouhi et al. (2021) and Ranjbar et al. (2021), who note that skepticism and a lack of enthusiasm among healthcare workers can impede the acceptance of innovative care models. Barriers related to inadequate ICT resources and insufficient funding also align with challenges discussed in the literature. For example, studies by Fathizadeh et al. (2020) and Butta et al. (2023) emphasize that limited ICT infrastructure and financial constraints are significant barriers to telenursing implementation, especially in resource-constrained environments.

The concerns regarding inadequate power supply and a lack of team spirit among nurses align with broader issues identified by Leong et al. (2021) and Ellatif et al. (2023), who highlight how technical limitations and poor team cohesion can impact the effectiveness of telenursing services. Additionally, the lack of commitment from administration and negative attitudes towards telenursing, as reported by respondents, reflect findings from studies such as those by Khraisat et al. (2023) and Ortiz (2020), which emphasize the importance of administrative support and positive attitudes for the successful adoption and long-term sustainability of telenursing practices.

5.2 IMPLICATION OF FINDINGS TO NURSING PROFESSION

The strong support for telenursing among nursing students reflects an increasing awareness of its potential benefits, such as improved patient care and expanded service coverage. This positive outlook suggests that integrating telenursing into nursing curricula could better equip future healthcare professionals for the evolving telehealth landscape. By providing students with knowledge and skills in telenursing, nursing programs can ensure that graduates are prepared to utilize these technologies in their practice, enhancing patient management and

DOI: https://doi.org/10.5281/zenodo.14304785

ISSNNo-2584-2706

boosting overall healthcare efficiency. However, challenges such as staffing shortages, inadequate ICT resources, and lack of funding highlight the need for targeted solutions to address these barriers. To effectively integrate telenursing into nursing practice, it is essential to tackle these issues through better resource allocation, increased administrative support, and the development of thorough training programs. Ensuring nurses have access to the necessary technology and support will be vital for overcoming technical difficulties and fostering engagement. Additionally, cultivating a supportive environment and positive attitudes toward telenursing within healthcare institutions will facilitate its adoption and improve its impact, ultimately leading to better patient outcomes and more efficient healthcare delivery.

5.3 LIMITATION TO STUDY

This study has the following limitations:

- **Funding:** Financial constraints limited the researcher's ability to include a larger population, which could have helped in generalizing the findings.
- **Time Constraints:** The researcher faced time limitations, making it difficult to balance the study with other academic responsibilities.
- **Single-site Setting:** The study was conducted at only one location, which may affect the generalizability of the results.

5.4 SUMMARY

This study aimed to assess the knowledge and perception of telenursing among nursing students in nursing institutions, Lagos State. The study used a descriptive design and data was gathered using self-structured questionnaire distributed to selected respondents who participated in the study. The collected data was analyzed using statistical Package for Social Sciences (SPSS) version 25 and the results were presented in tables.

5.5 CONCLUSION

The findings indicate that 22 (88.7%) of the respondents have a high level of knowledge, while 29 (11.3%) have a low level of knowledge regarding telenursing. Additionally, 182 (70.8%) of the respondents have a positive perception, and 75 (29.2%) have a negative perception of telenursing. The potential barriers or challenges identified include: a shortage of nurses (221, 85.9%), lack of interest (184, 71.6%), insufficient knowledge of telenursing (230, 89.5%), inadequate supply of ICT devices (249, 96.9%), lack of funding from hospital management (247, 96.1%), absence of policy (222, 86.4%), inadequate power supply (241, 93.8%), lack of team spirit among nurses (184, 71.6%), lack of commitment from the administration (222, 86.4%), and poor attitudes toward telenursing (214, 83.3%). Furthermore, no significant relationship was found between academic level and knowledge ($P = 0.407$, $X2 = 1.798a$) regarding telenursing among nursing students in nursing institutions. However, a significant relationship was observed between knowledge and perception ($P = 0.016$, $X2 = 5.766a$) of nursing students toward telenursing.

5.6 RECOMMENDATION

1. Nursing schools and educational institutions should incorporate telenursing training into their curricula to equip future nurses for the evolving digital healthcare environment.
2. Hospital administrators should invest in and enhance ICT infrastructure within healthcare facilities to ensure the successful implementation of telenursing services.
3. Policymakers should create and enforce policies that address funding and

DOI: https://doi.org/10.5281/zenodo.14304785

resource allocation for telenursing to tackle financial and logistical challenges.

4. Healthcare leaders should foster a culture of openness and dedication to telenursing among healthcare professionals by supporting ongoing professional development and providing administrative backing.

5.7 SUGGESTIONS FOR FURTHER STUDY

Future research could focus on this topic with a larger sample size and in different locations. Additional studies could explore:

1. The impact of telenursing on patient outcomes across various healthcare environments.
2. The long-term effectiveness and cost-benefit analysis of telenursing programs.
3. Identifying and overcoming barriers to telenursing adoption in resource-limited settings.

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