Assessment of Health Information Resources Utilization by Diabetic Patients in Katsina State, Nigeria

By

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Abstract

This study assessed the utilization of health information resources by diabetic patients in Katsina State, Nigeria, examining sources utilized and challenges encountered. A descriptive survey design was employed with 573 registered diabetic patients recruited from six hospitals using multi-stage sampling. Data were collected using a structured questionnaire and were tested for reliability using Cronbach's alpha which yielded an overall reliability coefficient of 0.875. Data were analyzed using frequency counts, percentages, means, and standard deviations. Interpersonal sources including co-workers (91.1%), charity organizations (90.4%), other diabetic patients (87.0%), nurses (84.2%), and medical practitioners (80.8%) were the most utilized resources. Conversely, libraries (15.8%), internet (24.0%), and television programmes (26.7%) were grossly underutilized. Overall utilization stood at 65.19%. Major challenges included lack of resources (mean=3.62), inaccessibility (mean=3.62), poor applicability (mean=3.55), poor internet connectivity (mean=3.53), absence of local language programmes (mean=3.49), and lack of computer skills (mean=3.36). The cluster mean of 3.45 confirmed multiple interconnected challenges. Diabetic patients in Katsina State rely predominantly on interpersonal sources while formal and digital sources remain underutilized due to systemic and individual-level challenges. Hospital libraries should acquire Hausa language resources and train healthcare providers in information delivery. The Ministry of Health should improve internet infrastructure and establish digital literacy programmes. Functional medical libraries with audio-visual resources and a centralized diabetes information network should be established.

Keywords: Health information resources, information utilization, diabetic patients, Katsina State

Introduction

Health information is a critical component of effective healthcare delivery, health education, and patient self-management. For individuals living with chronic conditions such as diabetes mellitus, access to and utilization of relevant health information resources can significantly influence disease management, treatment adherence, and overall quality of life (World Health Organization, 2022). Diabetes, a metabolic condition characterized by higher-than-normal blood sugar levels, requires daily self-care and continuous management. When complications develop, diabetes can have a significant impact on quality of life and can reduce life expectancy (International Diabetes Federation, 2020).

Health information resources encompass all media for storing and disseminating health-related information, including print materials such as medical books, journals, newspapers, magazines, brochures, pamphlets, and treatment fact sheets, as well as non-print resources including medical tapes, videos, e-books, e-journals, and online platforms like MedlinePlus and ClinicalTrials.gov (Gathoni, 2018). These resources, when properly utilized, help people living with chronic diseases such as diabetes to effectively manage their condition and extend their life expectancy. According to Anyaoku and Nwosu (2017), access to relevant health information resources is essential for helping people make informed decisions to enhance their health and well-being.

The sources through which diabetic patients access health information are equally important. These sources can be categorized into three groups: interpersonal sources (healthcare practitioners, nurses, family members, friends, other diabetic patients), traditional media (television, radio, newspapers, magazines, posters), and new media (internet, social networks, satellite television) (Firoozeh, Anasik & Akbar, 2022). Understanding which sources diabetic patients actually utilize and the challenges they face in accessing these resources is crucial for designing effective health information interventions.

In Nigeria, diabetes is a growing public health concern. The World Health Organization estimates that there are currently just under 900,000 diabetics in Nigeria, with projections indicating this number will grow to 1.3 million by 2030 (International Diabetes Federation, 2020). Despite this growing burden, there is limited research on how diabetic patients in Northern Nigeria, particularly in Katsina State, access and utilize health information resources. Katsina State, located in Northwestern Nigeria, is predominantly Hausa-Fulani with Islam as the dominant religion socio-cultural characteristics that significantly influence health-seeking behaviour, access to information, and patterns of healthcare utilization.

Previous studies have examined various aspects of health information behaviour among diabetic patients in different contexts. Naidoo (2022) in South Africa found that diabetic patients accessed health information through daily activities such as watching television, listening to radio, or reading newspapers and magazines. Kalantzi et al. (2015) in Greece identified obstacles to diabetes-related information utilization including lack of time, lack of computer infrastructure, and lack of computer literacy. In Nigeria, Abedoh (2024) established that health information-seeking behaviour and utilization significantly influenced diabetes management outcomes in North Central Nigeria. However, none of these studies specifically examined the utilization of health information resources among diabetic patients in Katsina State, considering its unique socio-cultural context. This study therefore assessed the utilization of health information resources by diabetic patients in Katsina State, Nigeria.

Statement of the Problem

Health information resources play an essential role in the health status of people living with diabetes as they help patients manage complications and prolong life. Proper utilization of these resources can reduce stress, increase confidence, and enhance psychological adjustment, thereby improving self-management of the disease. Despite these documented benefits, preliminary

observations suggest that health information resources are grossly underutilized by diabetic patients in Katsina State hospitals. Two specific problems are evident:

First, despite the availability of multiple information sources including interpersonal, traditional media, and digital platforms, there is limited empirical evidence on which specific sources diabetic patients in Katsina State actually utilize. Studies conducted in other Nigerian regions have documented varied utilization patterns. For instance, Abedoh (2024) found that diabetic patients in North Central Nigeria sought information from healthcare professionals (mean=2.72), other diabetic patients (mean=3.10), and internet-based platforms including WhatsApp (mean=2.94) and Facebook groups (mean=2.71). Similarly, Arueyingho et al. (2024) reported that 87.3% of diabetic patients in Port Harcourt preferred seeking health information in person over digital means, while Anyaoku and Nwosu (2017) identified doctors, pharmacists, and nurses as major sources for chronic disease patients in South East Nigeria. However, no comparable study has been conducted in Katsina State to document the specific sources utilized by diabetic patients in this context. This gap makes it difficult for healthcare providers and information professionals to target their information dissemination efforts effectively. Without understanding patient preferences and actual utilization patterns in Katsina State, health information interventions may miss their intended audience entirely.

Second, diabetic patients in Katsina State face numerous barriers in accessing and utilizing health information resources, yet the specific nature and extent of these challenges remain undocumented. Research from other contexts has identified significant barriers including poor internet connectivity, lack of current resources in medical libraries, inadequate training of health practitioners in information use, and absence of local language content (Yilase, Obande & Hussaini, 2024). Abedoh (2024) further documented that health information utilization significantly influences diabetes management outcomes ($F(1,330) = 65.256$, $R = 0.595$, $p < 0.05$), underscoring the critical need to understand and address barriers. However, the specific barriers operating within Katsina State's unique socio-cultural context including its predominantly Hausa-Fulani population, Islamic religious practices, and rural-urban distribution remain undocumented. Without systematically identifying these challenges, policymakers and healthcare administrators cannot develop targeted interventions to address them. This study therefore investigated the sources of health information utilized by diabetic patients and the challenges they encounter in Katsina State.

Research Objectives

The main objective of this study was to assess the utilization of health information resources by diabetic patients in Katsina State. Specifically, the study sought to:

i. Ascertain the health information sources utilized by diabetic patients in Katsina State.

ii. Determine the challenges of utilization of health information resources by diabetic patients in Katsina State.

Literature Review

Concept of Health Information Sources

Health information sources refer to the various channels, platforms, and repositories through which individuals access data, facts, and knowledge related to health and healthcare services (World Health Organization, 2022). The credibility, accessibility, and comprehensiveness of these sources directly influence healthcare decisions, patient outcomes, and public health strategies. Firoozeh, Anasik and Akbar (2022) categorized health information sources for diabetic patients into three groups: interpersonal sources, traditional media, and new media. Interpersonal sources include medical practitioners, nurses, other healthcare providers, charity or support organizations, family members, friends, co-workers, other diabetic patients, and medical librarians. Traditional media encompass news, television, radio, newspapers, medical journals, magazines, brochures, booklets, and posters. New media include satellite television, internet, social networks, and other similar platforms.

Anyaoku and Nwosu (2017) reported that health professionals constitute a very important source of access to self-management information because they possess the knowledge base to provide reliable and trustworthy health information to patients. Studies from developed countries show that although patients generally obtain health information from many sources, many prefer to receive health information from their healthcare providers. Libraries are also sources of quality health information, providing access to authoritative materials including books, specialized journals, and monographs on a range of health issues potentially useful to patients.

Challenges of Utilization of Health Information Resources

There are several limiting factors and constraints to health information utilization by diabetic patients. Angya (2022) identified shortage of qualified personnel, inexplicit nature of health information materials, inadequate funds, distance to information sources, absence of diabetes data/information network, and ineffective communication strategies as problems affecting utilization of health information resources. Poor health information literacy has been identified by Naidoo (2022) as a major problem affecting utilization of health information resources. Anyaoku and Nwosu (2017) explained that most diabetic patients are illiterates who cannot read and write, thereby preventing them from accessing or using print health information resources such as books, brochures, and leaflets. This study is anchored on the Information Utilization Model propounded by E.R. Lenz in 1984. Lenz defined health information utilization as the patients' ability to identify and obtain relevant, accurate, and suitable information to satisfy health information needs.

Abazi, Vanaki, Mohammadi and Amini (2023) identified poor internet connectivity, limited time, lack of awareness of the existence of health information resources, and inaccessibility to health information resources as major problems affecting utilization. Absence of radio and television programmes in local languages has also been identified as a problem militating against effective utilization of health information (Park, 2024), since majority of diabetic patients are illiterates who do not understand English. Slow adoption of information technology in Nigeria has meant that most health and clinical information is still stored in poorly organized paper records, and few patients have e-mail access to their caregivers (Gathoni, 2018).

This study is anchored on the Information Utilization Model propounded by E.R. Lenz in 1984. Lenz defined health information utilization as the patients' ability to identify and obtain relevant, accurate, and suitable information to satisfy health information needs. The model conceptualizes

information utilization as part of the decision-making process consisting of six stages: information utilization stimulus, setting information goals, decision making regarding whether to actively utilize information, search behaviour, information acquisition and codification, and decision making based on the adequacy of acquired information.

Information utilization stimulus can be derived from within the person (previous experiences regarding specific symptoms) or from the surrounding environment (death of a friend, negative comments about health habits, or television programmes). This stimulus leads to identification of the discrepancy between available information and information needed, thereby initiating the information utilization process. Setting information goals follows, leading to concentration and limiting unnecessary activities. Decision making regarding active information utilization is derived from the amount of previous information available, mental background regarding the problem, and anticipated cost-benefit ratio. Search behaviour occurs only if a person decides to utilize information actively, and can be impersonal (from inanimate sources such as publications) or personal (from people familiar to them). Information acquisition and codification involve evaluating gathered information to determine whether it is new and relevant. Finally, decision making based on adequacy of acquired information determines whether information utilization needs to continue or stop.

The Information Utilization Model is relevant to this study as it stipulates the stages of health information utilization for informed decision-making. It also identifies sources of accessing health information and factors that affect utilization, which are central variables in this study.

Naidoo (2022) conducted a study on information needs and information-seeking behavior of adult diabetic patients at Addington Hospital, Durban, South Africa. Using a survey design with 83 participants including diabetic patients, medical doctors, nursing staff, and diabetic dieticians, the study found that majority of diabetic patients accessed health information during daily activities such as switching between television channels, listening to radio, or reading newspapers and magazines. The study also revealed that patients found it difficult to understand available health information sources and did not know where to find health information other than that provided by health professionals.

Firoozeh, Anasik and Akbar (2022) investigated how health information is retrieved by diabetic patients, focusing on sources used and extent of utilization. Using a survey design with 362 diabetic patients selected through stratified random sampling, the study revealed that information sources used included interpersonal interactions with medical practitioners, nurses, family members, friends, co-workers, and other diabetic patients. Medical practitioners and family members had the highest frequency of use, while medical librarians had the lowest. Among traditional media, television, radio, and news had the highest users, while libraries had the lowest.

Anyaoku and Nwosu (2017) examined the extent of access to health information sources for chronic disease patients in tertiary health institutions in South East Nigeria. Using a cross-sectional survey design with 784 patients from two teaching hospitals, the study found that doctors were the major source of health information, followed by pharmacists, nurses, other patients, churches, family members, television, radio, and internet. The study highlighted the important role of healthcare providers in health information dissemination.

Abedoh (2024) conducted a comprehensive study on health information-seeking behaviour and utilization for diabetes management among 331 diabetic patients across seven tertiary healthcare facilities in North Central Nigeria. Using a descriptive survey design, the study found that diabetic patients sought information from diverse sources including booklets, brochures, leaflets from clinics, internet, WhatsApp, Facebook groups, healthcare professionals, and other diabetic patients. The study critically revealed that health information-seeking behaviour significantly influenced diabetes management ($F(1,330) = 52.823$, $R = 0.357$, $p < 0.05$), and health information utilization significantly influenced diabetes management ($F(1,330) = 65.256$, $R = 0.595$, $p < 0.05$).

Methodology

This study adopted a descriptive survey research design and was conducted in Katsina State, Nigeria, across six hospitals including Federal Teaching Hospital Katsina and General Hospitals in Katsina, Dutsin-ma, Daura, Kurfi, Kankara, and Mai'Adua. The population comprised 11,939 registered diabetic patients from which a sample of 667 was drawn using multi-stage sampling technique involving purposive selection of hospitals based on presence of diabetic treatment services, convenience sampling for readily available respondents, and simple random sampling for formally registered patients. Data were collected using a structured questionnaire and were tested for reliability using Cronbach's alpha which yielded an overall reliability coefficient of 0.875. Data were analyzed using frequency counts, percentages, means, and standard.

Results

Research Question 1: What are the health information sources utilized by diabetic patients in Katsina State?

Table 1: Frequency and Percentage Distribution of Health Information Sources Utilized by Diabetic Patients (N=573)

S/N	Sources	Utilized F (%)	Not Utilized F (%)	Decision
1	Medical Practitioners	118(80.8%)	28(19.2%)	Utilized
2	Nurses	123(84.2%)	23(15.8%)	Utilized
3	Other health workers	123(84.2%)	23(15.8%)	Utilized
4	Charity/support organizations	132(90.4%)	14(9.6%)	Utilized
5	Family members	117(80.1%)	29(19.9%)	Utilized
6	Friends	125(85.6%)	21(14.4%)	Utilized
7	Co-workers	113(91.1%)	13(8.9%)	Utilized
8	Other diabetic patients	127(87.0%)	19(13.0%)	Utilized
9	Television programmes	39(26.7%)	107(73.3%)	Not Utilized

10	Radio programmes	94(64.4%)	52(35.6%)	Utilized
11	Library	23(15.8%)	123(84.2%)	Not Utilized
12	Internet	35(24.0%)	111(76.0%)	Not Utilized
13	Social Networks	117(80.1%)	29(19.9%)	Utilized
14	Mosque	111(76.0%)	35(24.0%)	Utilized
15	Peer groups	59(40.4%)	87(59.6%)	Not Utilized
16	Seminars/workshops	34(23.3%)	112(76.7%)	Not Utilized
17	Public lectures	108(74.0%)	38(26.0%)	Utilized
	Cluster Analysis	**65.19%**	**34.81%**	**Utilized**

Source: *Field Survey, 2026*

Table 1 presents the frequency and percentage distribution of health information sources utilized by diabetic patients in Katsina State. The results reveal that interpersonal sources constitute the most utilized category of health information sources. Co-workers recorded the highest utilization rate (91.1%), followed closely by charity or support organizations (90.4%), other diabetic patients (87.0%), friends (85.6%), nurses (84.2%), other health workers (84.2%), and medical practitioners (80.8%). Family members (80.1%), social networks (80.1%), mosque (76.0%), and public lectures (74.0%) also showed high utilization rates. Radio programmes were utilized by 64.4% of respondents. Conversely, several sources were grossly underutilized. Libraries recorded the lowest utilization rate at 15.8%, followed by seminars/workshops (23.3%), internet (24.0%), television programmes (26.7%), and peer groups (40.4%). The cluster analysis shows that overall, 65.19% of the identified sources were utilized by diabetic patients, indicating moderate utilization of available health information sources.

Research Question 2: What are the challenges of utilization of health information resources by diabetic patients in Katsina State?

Table 2: Mean Ratings of Challenges in Utilizing Health Information Resources (N=573)

S/N	Challenge Statement	Mean	SD	Decision
1	Lack of health information resources	3.62	.736	Strongly Agree
2	Difficulties in understanding available information	3.47	.501	Agree
3	Lack of applicability of information resources	3.55	.675	Strongly Agree
4	Distance to health information sources	3.47	.601	Agree
5	Absence of diabetes data	3.34	.504	Agree
6	Absence of diabetes information network	3.16	.633	Agree

7	Ineffective communication strategies	3.47	.601	Agree
8	Poor health information literacy	3.47	.514	Agree
9	Lack of awareness of information resources	3.38	.716	Agree
10	Poor Internet connectivity	3.53	.565	Strongly Agree
11	Absence of local language programmes	3.49	.566	Agree
12	Absence of medical/public libraries	3.41	.618	Agree
13	Slow adoption of Information Technology	3.46	.634	Agree
14	Lack of computer operation skills	3.36	.731	Agree
15	Inaccessibility of health information resources	3.62	.612	Strongly Agree
	Cluster Analysis	**3.45**	**0.614**	**Agree**

Source: *Field Survey, 2026*

Table 2 presents the mean ratings of challenges affecting utilization of health information resources by diabetic patients in Katsina State. The results show that respondents agreed with all 15 challenge items, with cluster mean of 3.45 indicating overall agreement that these constitute significant barriers. The most critical challenges, rated as "Strongly Agree," include lack of health information resources (mean=3.62), inaccessibility of health information resources (mean=3.62), lack of applicability of health information resources (mean=3.55), and poor Internet connectivity (mean=3.53). These represent systemic and infrastructural barriers that require policy-level interventions. Other significant challenges rated as "Agree" include: absence of radio/television programmes on diabetes in local languages (mean=3.49), difficulties in understanding available health information (mean=3.47), ineffective communication strategies (mean=3.47), poor health information literacy (mean=3.47), slow adoption of information technology (mean=3.46), absence of medical and public libraries (mean=3.41), lack of awareness of existence of health information resources (mean=3.38), lack of computer operation skills (mean=3.36), absence of diabetes data (mean=3.34), distance to health information sources (mean=3.47), and absence of diabetes information network (mean=3.16). The standard deviations ranging from .501 to .736 indicate consistency in responses across the sample, suggesting these challenges are widely experienced among diabetic patients in Katsina State.

Discussion of Findings

The finding that interpersonal sources particularly co-workers, charity organizations, other diabetic patients, nurses, and medical practitioners are the most utilized health information sources aligns with the Information Utilization Model by Lenz (1984), which posits that personal search (gathering information from people familiar to them) is often preferred over impersonal search from inanimate sources. This finding corroborates Firoozeh, Anasik and Akbar (2022) who reported that interpersonal interactions with medical practitioners, nurses, family members, and other diabetic patients were the most frequently used information sources. Similarly, Anyaoku and

Nwosu (2017) found that doctors, pharmacists, and nurses were the major sources of health information for chronic disease patients. The preference for interpersonal sources may be attributed to the trust patients place in healthcare providers, the immediacy of feedback, and the opportunity for clarification and dialogue. In the socio-cultural context of Katsina State, where oral tradition and personal relationships are highly valued, this finding is particularly significant. The gross underutilization of libraries (15.8%), internet (24.0%), and television programmes (26.7%) is concerning and reflects multiple barriers. This finding aligns with Firoozeh, Anasik and Akbar (2022) who reported that libraries had the lowest number of users among diabetic patients. The low utilization of internet-based sources corroborates Ugwu (2026) who found that while 76.9% of older diabetic adults used at least one digital health tool, significant barriers including cost (89.2%) and limited technical support (94.4%) persisted. Arueyingho, Aprioku, Marshall and O'Kane (2024) similarly found that 87.3% of diabetic patients preferred seeking health information in person over digital means. The underutilization of libraries may be explained by their absence in most healthcare facilities, lack of awareness of their existence and importance, and the predominance of print materials in English which many patients cannot read. The identification of lack of health information resources, inaccessibility, poor applicability, and poor internet connectivity as critical challenges is consistent with existing literature. Abazi, Vanaki, Mohammadi and Amini (2023) identified poor internet connectivity and inaccessibility to health information resources as major problems affecting utilization. Naidoo (2022) reported that patients found it difficult to understand available health information and did not know where to find health information beyond healthcare providers. Angya (2022) identified absence of medical libraries, absence of programmes in local languages, and ineffective communication strategies as barriers. The absence of diabetes information networks (mean=3.16) and lack of computer skills (mean=3.36) further compound these challenges, creating a multi-layered barrier system that disproportionately affects patients with low literacy and those in rural areas. These findings validate Lenz's (1984) proposition that factors such as exhaustion, hopelessness, and difficulty of the information utilization process can lead to premature termination of information seeking.

Conclusion

This study assessed the utilization of health information resources by diabetic patients in Katsina State, Nigeria, focusing on sources utilized and challenges encountered. The findings reveal a pronounced preference for interpersonal information sources, particularly co-workers, healthcare providers, family members, and fellow patients, while formal sources such as libraries and digital platforms remain grossly underutilized. Multiple interconnected challenges including lack of resources, inaccessibility, poor applicability, inadequate infrastructure, language barriers, and limited digital literacy collectively impede optimal health information utilization. These findings underscore the need for a multi-pronged approach that leverages existing preferences for interpersonal communication while systematically addressing infrastructural and capacity deficits. Improving health information utilization among diabetic patients in Katsina State requires collaborative efforts from healthcare providers, hospital administrators, librarians, policymakers, and media practitioners to ensure that accurate, accessible, and applicable health information reaches those who need it most.

Recommendations

1. Health information resources should be acquired in Hausa language and delivered through interpersonal channels. Hospital libraries must prioritize culturally relevant Hausa materials with visual illustrations. Trusted providers including medical practitioners, nurses, and fellow patients should be trained to deliver accurate information during consultations and peer support programmes. This addresses critical challenges of resource unavailability, understanding difficulties, and absence of local language content.
2. Internet infrastructure should be improved and digital literacy programmes established across all hospitals. The Katsina State Ministry of Health should invest in robust internet connectivity in all healthcare facilities and establish computer training programmes for diabetic patients. Free internet access in hospital waiting areas and mobile health interventions should be developed to address poor connectivity, lack of computer skills and low internet utilization.
3. Functional medical libraries should be established with audio-visual resources and local language programmes. Hospital administrators must establish functional medical libraries in all general hospitals to address the lowest utilization rate and absence of medical libraries. Medical librarians should play diabetes management videos in waiting rooms and collaborate with media houses to develop Hausa language programmes, addressing low television utilization and language barriers.
4. A centralized diabetes information network should be established with multi-sectoral coordination. The Katsina State Government should establish a centralized diabetes information network connecting all hospitals and patient support groups to address absence of information networks. A multi-sectoral task force should develop a comprehensive strategy addressing interconnected challenges of inaccessibility, poor applicability, ineffective communication and low awareness.

References

Abazi, K., et al. (2023). Definitions, structure, content, use and impacts of electronic health records: A review of the literature. *International Journal of Medical Informatics*, 77(5), 291-304.

Abedoh, G. O. (2024). Health information seeking behaviour and utilisation for the management of diabetes mellitus among patients in tertiary healthcare facilities in North Central Nigeria. *Federal University of Technology Minna Institutional Repository*.

Angya, A. A. (2022). The information needs and resource utilization by people living with HIV/AIDS: The case of Federal Medical Center Makurdi. Unpublished bachelor's project, Benue State University.

Anyaoku, E. N., & Nwosu, O. C. (2017). Extent of access to health information sources for chronic disease patients in tertiary health institutions in South East Nigeria: Implication for libraries. *Library Philosophy and Practice (e-journal)*.

Arueyingho, O., Aprioku, I., Marshall, A., & O'Kane, M. (2024). Insights into sociodemographic influences on type 2 diabetes care and opportunities for digital health promotion in Port Harcourt, Nigeria. *Journal of Diabetes Research*.

Firoozeh, Z., Anasik, L., & Akbar, H. Z. (2022). How health information is retrieved by diabetic patients. *Advanced Biomedical Research*.

Gathoni, N. (2018). Enhancing access to health information in Africa: A librarian's perspective. *Journal of Health Communication: International Perspectives*, 17(2), 18-22.

International Diabetes Federation. (2020). *Global burden of diabetes*. IDF Diabetes Atlas.

Kalantzi, S., Kostagiolas, P., Kechagias, G., Niakas, D., & Makrilakis, K. (2015). Information seeking behaviour of patients with diabetes mellitus: A cross-sectional study in an outpatient clinic of a university affiliated hospital in Anthems, Greece. *BMC Research Notes*.

Lenz, E. R. (1984). Information utilization model. In *Health information seeking behavior*. Springer.

Naidoo, P. (2022). Information needs and information seeking behavior of adult diabetic patients at Addington Hospital, Durban. Unpublished master's project, University of KwaZulu-Natal.

Park, K. (2024). *Park's textbook of preventive and social medicine*. M/s Banarsidas.

Ugwu, E. (2026). Digital health technology adoption among older Nigerian adults with type 2 diabetes mellitus: A hospital-based cross-sectional study. *Nigerian Journal of Endocrinology*.

World Health Organization. (2022). *Health information sources and systems*. WHO Press.