IJHRIM

Intl J Health Recs & Info Mgt. Jan – Dec 2024;7(1):11-19

Review article

Print ISSN 2645-2464; E ISSN 2695-1770

Minimum health datasets and peculiarities of the Nigeria healthcare system

Kayode Olayiwola Adepoju[1*], Tajudeen Temitayo Adebayo[2], Jacob Kehinde Opele[3], Ibrahim Taiwo Adeleke[4], Frederick Akinade Akindele[5]

[1]Department of Health Information Management, Ondo State University of Medical Sciences, Ondo, Nigeria; [2]Department of Health Information Management, Federal Medical Centre, Owo, Nigeria; [3]Federal University, Oye-Ekiti, Nigeria; Department of Health Records, Federal Medical Centre, Bida, Nigeria; Health Information Manager, Abuja, Nigeria

Corresponding author*: E-mail: *kayode_adepoju@yahoocomm*

ABSTRACT

Background/Objectives: Modern healthcare systems place a high priority on the intersection between innovation and healthcare data management. The discussion surrounding the Minimum Health Data Set (MHDS) gains great relevance in the context of Nigeria, a country distinguished by its distinct healthcare difficulties and complexities. Within the lens of the Diffusion of Innovations Theory. ***Methods/Design:*** This review discussion explores the MHDS, to clarify the importance of its adoption in the Nigerian healthcare system. Furthermore, it examines the fundamental elements of MHDS as well as the peculiarities of the Nigerian healthcare system and implementation challenges. ***Results:*** Challenges of MHDS implementation in Nigeria, include issues with timely reporting, lack of support and resources, concerns about data confidentiality, regulatory shortcomings in digitization, and gaps in staff training. These challenges are consistent with the global discourse on health information management. ***Conclusion:*** The audience will obtain a sophisticated grasp of how MHDS stands as a transformational innovation ready to handle the complex nuances of the Nigerian healthcare situation by participating in this intellectual journey.

Keywords: ***Keywords***: Electronic medical records; Health datasets; Health information management; Health information technologies; Minimum health datasets

Edited by *SQ Suleiman-Abdul; submitted on 27.11.2023; peer reviewed by AA Adebisi, JO Lawal; accepted 31.11.2024; published 02.12.2024.*

Please cite as: *Adepoju KO, Adebayo TT, Opele JK, Adeleke IT, Akindele FA. Minimum health datasets and peculiarities of the Nigeria healthcare system. Int J Health Recs & Info Mgt. 2024;7(1):11-19.*

Conflict of interest: None declared.

Funding disclosure: No funding was solicited for nor obtained for this study

INTRODUCTION

Modern healthcare systems place a high priority on the intersection between innovation and healthcare data management[1]. The discussion surrounding the Minimum Health Data Set (MHDS) gains great relevance in the context of Nigeria, a country distinguished by its distinct healthcare difficulties and complexities[2]. Within the lens of the Diffusion of Innovations Theory[3]. The Minimum Health Data Set (MHDS) is a key component of contemporary healthcare information management (HIM), which plays an essential role in improving data quality, interoperability and ultimately healthcare outcomes[4]. It is a standardized and essential collection of key healthcare information elements that are deemed necessary for proper healthcare data management and reporting. Its goals are however, beyond simple data gathering and encompass the creation of policies, evidence-based procedures and informed decisions[4]. The MHDS incorporates a range of important elements, each of which is essential to fully describe patient care[6]. One of its core elements; patient demographics, lays the groundwork for individualized care by providing a picture of the patient's identity, age, gender, and location[7]. A variety of critical health data, such as medical history, diagnosis, treatments and test results, are included in the clinical data in the MHDS[8]. The third pillar of healthcare resource management is administrative data, which includes information

regarding healthcare facilities, physician credentials and insurance information[9].

Standardizing methods for collecting health data is one of MHDS's key duties, as it guarantees consistency and comparability in health data across various healthcare settings by requiring a minimal set of data items and their clear definitions[10]. This standardization encourages uniformity in reporting and analytics in addition to facilitating easy data exchange[11]. While the MHDS idea is in line with global standards and best practices, its full implementation in Nigeria confronts several difficulties, given that a large range of healthcare providers, diverse levels of technological use, and a decentralized healthcare system define the Nigerian healthcare landscape[12]. These elements make it difficult to apply the MHDS consistently across the country[13].

Furthermore, the challenges associated with MHDS adoption in Nigeria are complicated by resource restrictions, infrastructural limitations and data protection issues[14]. It is therefore germane that the Nigerian healthcare stakeholders must engage in critical discourse, addressing these issues to unlock the transformative potential of MHDS within the Nigerian healthcare ecosystem, while also acknowledging the potential of MHDS to enhance data-driven decision-making, improve healthcare quality and inform public health policies[7].

The Nigerian Healthcare System

The Nigerian healthcare system is a complex structure that is made up of tripartite tiers - the primary, secondary and tertiary care tiers[15]. While primary care serves is the cornerstone of providing community-based fundamental healthcare services and preventative measures, secondary care entails more specialized treatments delivered by neighbourhood and general hospitals[16,17]. Medical centres and teaching hospitals frequently offer tertiary care, which includes highly skilled medical treatments however, this layered structure is characterized by severe difficulties that have a big influence on data administration and collection[18,19]. These difficulties include infrastructure shortages, whereby many healthcare institutions lack the necessary tools, amenities, and technology which interferes with data gathering and jeopardizes the accuracy and dependability of the information collected[20]. Additionally, there are gaps in the data for these underserved areas due to the unequal geographic distribution of healthcare facilities, which limits access to remote areas[21].

Another significant obstacle is the lack of funding[22]. The Nigerian healthcare system struggles with limited funding, which has an impact on the under-funding of healthcare facilities, the underpayment of healthcare personnel and the lack of investments in data infrastructure[23]. The ability to maintain reliable health information systems and data-gathering initiatives are both impacted by this financial burden and with lengthy wait periods and congested medical facilities, access to treatment continues to be a major problem[23]. This overcrowding may obstruct data collection procedures and contribute to inaccurate health records[24]. Furthermore, data gaps are exacerbated by healthcare differences between urban and rural locations, making it challenging to gather a complete national health dataset[25].

METHODS

A review of relevant literature on Minimum Health Datasets.

RESULTS & DISCUSSION

Adapting MHDS to the Nigerian Context

The Minimum Health Data Set (MHDS) implementation within the complex and varied Nigerian healthcare system necessitates a thorough investigation of its viability, difficulties, and possible advantages, as discussed below:

Feasibility and Adaptation: Nigeria's healthcare system is distinguished by a complex landscape that includes privately run hospitals, government-owned clinics, several healthcare delivery methods[26]. While MHDS must be flexible enough to accommodate this variability to be practical,

customization is essential since the data components of the MHDS need to be adjusted to take into account the specific healthcare goals of the nation[27,28]. To fully represent the complexity of the healthcare difficulties encountered, conditions common in Nigeria such as infectious illnesses, maternal mortality and non-communicable diseases should be included in MHDS[29].

To guarantee that data is consistent and comparable across various healthcare settings however, this personalization should be balanced with the requirement for standardization[30]. Achieving this balance is a critical challenge, as it requires a fine-tuned approach that accommodates regional variations, while maintaining national data standards[31].

Technological Infrastructure: Digital infrastructure is still a big problem. While electronic medical records (EMR) and data management systems have been adopted more widely in urban areas, many rural and underprivileged communities still lack the most fundamental digital healthcare infrastructure[12]. To solve this problem and close the digital gap, significant expenditures in technology, education and support networks are required[32]. To ensure the moral and secure processing of health data, data security and privacy issues must also be effectively handled[33].

Financial Considerations: Financial limitations engender a serious obstacle. In addition to initial expenditures, MHDS implementation needs continuing financing for data collection, management and analysis[7]. To maintain data relevancy and accuracy, adequate financial resources are required. Securing regular financing for MHDS is a difficult challenge given the conflicting demands on Nigeria's healthcare budget[23].

Potential Benefits:

The MHDS deployment in Nigeria's healthcare system has the potential to alter several facets of healthcare administration and delivery. The improvement in data quality is one of the most important benefits, as it eliminates mistakes and improves the uniformity and quality of health records by standardizing data collection procedures[34]. This advancement is essential for making well-informed decisions because, it allows medical professionals to base their clinical judgments and treatment decisions on high-quality data[35]. Additionally, planning and monitoring for public health might be greatly impacted by MHDS, given that the population-level aggregation and population-level analysis of the standardized data acquired by MHDS allows for the prompt detection of health trends, outbreaks and emergent concerns[36]. When it comes to quickly reacting to infectious disease outbreaks and other public health emergencies, this real-time surveillance capability is vital[37].

The MHDS can also act as a stimulus for medical research and advancement because studies on disease trends, treatment efficacy and health outcomes are made possible by researchers' access to extensive and standardized health data[38]. In turn, this research promotes innovation in healthcare procedures and helps to provide evidence-based medical recommendations[39]. Additionally, MHDS encourages interoperability among medical professionals, guaranteeing that patient data may be effortlessly exchanged across various hospitals, thus improving the continuity of care, when patients are referred or moved across healthcare facilities[40].

Theoretical Framework: Diffusion of Innovations Theory

The Diffusion of Inventions Theory, developed by Everett M. Rogers is a well-known framework for explaining how new concepts, innovations, or technology spread and become entrenched in a community or social system[41]. According to the theory, the adoption process follows a predictable pattern, and people are divided into several adopter groups depending on how likely they are to accept new technologies: innovators, early adopters, early majority, late majority and laggards[42]. The diffusion process is influenced by variables like communication routes,

social systems, perceived features of the invention and time.

The Diffusion of Innovations Theory has significant applications in the healthcare industry, as it discusses how advancements in healthcare, such as MHDS or EMR, are embraced or rejected by healthcare institutions[43]. To be widely accepted, innovations must exhibit comparative benefit, compatibility with current practices, simplicity, trialability and observability[44]. While the theory provides useful practical insights concerning MHDS implementation in Nigeria, it preaches, that MHDS's adoption would be effective if its benefits over existing data gathering techniques are highlighted, it is made compatible with Nigeria's healthcare system, its integration is made simple, opportunities for trial runs are given, and its advantages are made observable[7]. Effective MHDS dissemination depends on identifying the many adopter categories within the Nigerian healthcare system and addressing their unique requirements and concerns[45].

Challenges and Solutions: From the Literature

Some unique difficulties and obstacles must be overcome for the Minimum Health Data Set (MHDS) to be successfully adopted in Nigeria. The main issue is the poor data collection infrastructure that exists across most of the nation[46]. Nigeria's healthcare facilities often lack the necessary digital infrastructure, reliable internet access, and electronic medical record (EMR) systems[47]. These deficiencies hinder the efficient collection and management of health data, posing a significant obstacle to the adoption of MHDS[48].

Infrastructure for data collection: Nigeria's healthcare system is severely disjointed, with urban areas having greater internet connectivity and digitization than rural ones and this stark discrepancy makes healthcare disparities worse since MHDS adoption is extremely challenging in places with poor infrastructure[49]. Given that fair data collection should be the goal of comprehensive healthcare data collection, these differences are especially troubling[50].

Without a doubt, significant investment in digital infrastructure is the realistic option here, as it is urgent to provide dependable internet connectivity and the required technology and software for EMRs in all healthcare institutions, particularly those in underprivileged areas[51]. This not only assures the fair adoption of MHDS, but also deals with the core problems with healthcare accessibility[52].

Limited Technical Capacity: One of the biggest problems is the lack of adequate employment of personnel with the needed experience in operating EMR systems and healthcare data management[47]. Inadequate technical capability hinders the implementation of MHDS and prevents a wider uptake of digital health solutions. To address this, there must be programs that target both IT and healthcare workers, ensuring that there is a skilled workforce in place to realize the full potential of MHDS. Just as important as investing in technology is investing in human resources[53].

Data Privacy and Security: It is impossible to exaggerate how important data privacy and security are in the healthcare setting[54]. Wide-ranging repercussions of data breaches and privacy violations include a decline in public confidence in the healthcare system and a reduction in the willingness of people to provide their health information[55]. While data privacy protection is both a moral obligation and a legal duty, creating and implementing strict data privacy laws and security measures is a feasible approach to successfully protecting patient information, while also instituting legislative safeguards[56]. Data breaches may also be avoided by taking strict precautions and protecting the reliability of healthcare data collecting[57].

Financial Restraints: Nigeria's healthcare system struggles with a lack of funding, making it difficult to provide money for the necessary facilities and training in technology[58]. While financial limitations are a significant roadblock because MHDS implementation requires considerable expenditure, innovative finance

strategies, public-private partnerships and international assistance are needed to effectively address this problem[59]. These options can aid in obtaining the funds required for the creation of the MHDS and its infrastructure. To overcome the financial limitations and realize the full potential of MHDS, stakeholders must work together effectively.

Significant challenges hindering MHDS implementation in Nigeria

From the expert's opinions on the challenges of MHDS implementation in Nigeria, a spectrum of encompassing issues such as timely reporting, lack of support and resources, concerns about data confidentiality, regulatory shortcomings in digitization, and gaps in staff training were opined. These challenges are consistent with the global discourse on health information management and resonate with the findings, which posited that the challenges associated with MHDS adoption in Nigeria are complicated by resource restrictions, infrastructural limitations and data protection issues[14]. Previous findings also revealed that securing regular financing for MHDS is a difficult challenge given the conflicting demands on Nigeria's healthcare budget[23].

Impact of the challenges on healthcare data collection and management

The challenges identified by experts have significant implications for healthcare data collection and management across different levels of care in Nigeria. The lack of uniformity in data collection and the absence of a centralized database, as noted by experts, hinder the harmonization, interoperability and linkage of health records. This lack of standardization contributes to difficulties in consolidating information across primary, secondary and tertiary care facilities. In line with this, another study opined that the full implementation of MHDS in Nigeria confronts several difficulties, given that a large range of healthcare providers, diverse levels of technological use, and a decentralized healthcare system define the Nigerian healthcare landscape[12].

Additionally, as pointed out by experts on the issues related to poor data management processes, lack of support for these processes, and the multiplicity of data collection methods, all of which can contribute to data fragmentation and inconsistency. This is consistent with a findings[20] that opined that the difficulties of infrastructure shortages, whereby many healthcare institutions lack the necessary tools, amenities and technology, interfere with data gathering and jeopardize the accuracy and dependability of the information collected.

Recommended solutions to address the challenges of MHDS implementation in Nigeria

To tackle the challenges associated with the implementation of the MHDS in Nigeria, experts advise taking a comprehensive approach. This includes a call for the government to recognize data as a vital management tool, ensuring adequate funding and commitment. Furthermore, investing in Health Information Technology (HIT), capacity building and standardized training programs are highlighted, along with the necessity of interoperability, standardization of data collection tools and regulation of processing templates. These are in line with the opinion in a study that large investments in technology, education, and support systems are necessary to address this issue and close the digital divide[32].

It was also recommended that there should be recruitment of qualified personnel, continuous training and the establishment of committees involving HIM professionals for designing data collection tools. This is consistent with a study, which opined that to address this, initiatives that focus on healthcare and IT professionals are needed, guaranteeing that a trained workforce is in place to fully utilize MHDS[53]. Investing in human resources is equally as crucial as investing in technology. Also highlighted by experts are Public-private partnerships, community engagement, robust data security measures, collaborative research, and ongoing monitoring and evaluation. Correspondingly, a study believed that while financial constraints are a major barrier

because MHDS implementation necessitates large outlays and creative financing techniques, public-private partnerships and foreign support are required to solve this issue successfully[59].

Experts also revealed that revising the curriculum to incorporate practical skills relevant to digital health, emphasizing areas such as health information system design, data analytics, and information security is essential to the rapidly changing field of healthcare technology. This corroborates the finding, which proposed that the instruction on digital health ought to be grounded in practice and involve collaboration between various academic disciplines and institutions[60].

CONCLUSION

Finally, the introduction of the Minimum Health Data Set (MHDS) in Nigeria is a critical step in enhancing the management of healthcare data. Despite the significant obstacles, there are significant potential advantages. Healthcare inequities can be eliminated, data quality can be improved, and MHDS can help with decision-making. Nigeria must make investments in digital infrastructure, capacity building, data privacy, and creative funding structures if it is to realize its promise. Nigerian healthcare results have the potential to change with the equitable implementation of MHDS. To establish a data-driven approach to healthcare delivery for the benefit of all, it is crucial to promote additional research into and broad use of MHDS within the Nigerian healthcare system.

Recommendations

Following the critical review of the literature, the following evidence-based recommendations are provided:

1. Government at all levels, in collaboration with relevant bodies, should create standardized data collection tools and a centralized database, which should be used for data collection at all levels of the healthcare system to guarantee uniformity, harmonization, and interoperability of health records.
2. The government and management of healthcare institutions should prioritize the hiring and training of qualified HIM Officers at all levels of the healthcare system to improve data management capabilities.
3. Government and other stakeholders in the healthcare sector should support the deployment of secured electronic data management systems, such should be supported with massive investment in infrastructures to enhance its effective utilization, leading to the protection of the privacy and accuracy of medical records.
4. The Health Information Management training curriculum should be revised to incorporate practical skills relevant to digital health, including health information system design, data analytics, and information security
5. There should be advocacy for political will and government support for MHDS implementation, encouraging individual readiness to acquire new skills, and enforcing policies mandating digital proficiency for healthcare professionals
6. Stakeholders in the healthcare sector should formulate and enforce comprehensive policies governing health data management, ensuring effective implementation and budgetary allocations.
7. Government at all levels and management of healthcare institutions should invest massively in large-scale training and capacity-building projects that will improve the abilities of healthcare workers at all levels.
8. Healthcare institutions should participate actively in partnerships with global health organizations to exchange best practices, and experiences and to promote long-lasting health improvements.
9. Overall, government at all levels should establish a committee on Minimum Health Data Set, which should be made up of experts in Health Information Management, and task them with the responsibility of creating data collection instruments based on laws, regulations, and established standards, such as the Data Protection Act and the National Health Management Information System (NHMIS).

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Authors Contribution:

AKO conceived of the study, initiated the design, participated in literature search, data abstraction and collection, analysis and coordination. ATT, OJK, AIT and AFA participated in the design, literature search, records retrieval, technical process, data abstraction, data analysis and coordination and reviewed the final manuscript.

ORCID iD

Ibrahim Taiwo Adeleke

https://orcid.org/0000-0001-9118-2089