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Assessment of Data Management Process in Implementation of Health Management Information System in Central Senatorial District, Ondo State, Nigeria

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Abstract

It is necessary to have a coordinated Health Information Management System (HIMS), which will be used to generate information needed to make evidence-based decision-making at any level of healthcare delivery. Nonetheless, the situation concerning health information management in most African countries, including Nigeria, is alarming. This paper explores extent of adherence to the Health Information System (HIS) policy of the Federal Ministry of Health on submission of the National Health Management Information System (NHMIS) monthly summary in both the government and privately owned health facilities in Ondo Central senatorial district. Data was collected as part of a mixed methods cross-sectional study design using 172 healthcare facilities in Ondo State in six Local Government Areas (LGAs) in Ondo State. These results indicate a major difference in compliance in public health facilities (p-value = 0.000) which shows that the organization of administration cohorts and regulatory support might contribute to the NHMIS reporting policy adherence. When it comes to reporting, the vast majority of public facilities meet deadlines (p-value = 0.698), which means that they consistently report timely and preserve proper documentation. Though government owned facilities are more compliant to the NHMIS policy such as submission timelines and accuracy of the information, there was a wide spread mismatch to the policy in case of the private health facilities. Such data confirm that it is imperative to introduce focused interventions and future research areas on both NHMIS policy compliance and data quality among private healthcare providers.

Keywords: *Data Quality, Health Care Delivery, Health Information System Policy, Health Information System, National Health Management Information System*.

Introduction

A health information system (HIS) can be defined as an organised process of collection, storing, analysis, dissemination, and utilisation of data related to the aspects of health that support the decision-making at each level of a healthcare system. It is one of the pillars to a good healthcare system. It is essential to monitor the trends of diseases, the deficiency of health disparities, evaluate the development of the health sector, and ensure the proper distribution of resources. It facilitates evidence-based decision-making, increases performance of the whole health system and enhances service delivery. Member states of the WHO African Region have so far [1, 22] invested very little into their national health information systems, which are often hampered by numerous challenges. Rising amounts of data

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exist but with limited quality or coverage thus it is hard to relate data with national policymaking [2].

It is known that a coordinated health information management system has the capability to generate information required to make decisions at various levels of healthcare provision [15]. Nevertheless, the state of health information management in the majority of African states is tenuous, including in Nigeria [3]. In previous research, it has been noted that poor quality of professional training, lack of suitable qualified practitioners, disgruntled practitioners, lack of policies and inadequate technological infrastructures etc are some of the challenges that the practice of health information management faces in Africa [4].

Nigeria, as well as many other low- and middle-income countries (LMICs), has huge undertakings of integrating and transforming its health systems, and the routine Health Management Information System (HMIS) was the central feature of this change. The purpose of these reforms is to simplify the current data management frameworks and procedures as well as traversing the handing over of the traditional paper-based system to information and communication technology (ICT) based systems [17]. The National Health Management Information System (NHMIS) that was gradually developed by the Federal Ministry of Health (FMoH) is a direct descendant of an earlier framework on medical statistics developed in the 1960s, when the need to have quality data on which adequate decisions could be made, particularly in the healthcare sector, was felt [20]. This notwithstanding, the NHMIS has not been strong much as lasting underinvestment in the health sector has led an inability to effectively achieve all objectives. This has undermined the expertise of policymakers in effective use of evidence about allocating resources and evaluating programmes. Moreover, although there have been successes in some of the undertakings, the cumulative effect of the health information system has changed to levels which are not yet responsive enough to attend to the health data requirements of Nigeria [19].

Evidence suggests that engaging the private healthcare providers in the form of multiple stakeholder interactions, dispensing of data collection instruments, and ongoing on-site training and mentoring may contribute to durable changes in facility-level reporting [5, 21]. However, very few studies have been conducted on data quality at the ground level and the assessment of the implementation of the HIS policy in Nigeria since its inception in 2014. Such lack of literature can be explained by a number of reasons, such as the rather low degree of prioritizing Routine Health Information Systems (RHIS) as a research topic among the scholars of health services [4, 16]. There are significant differences at the facility and district levels in the use of tools and confidence of the data collected. District-level data does not reflect the source-level data in many cases signifying continuous gaps in the routine HMIS [6]. Thus the evaluation of compliance with HIS policy in Nigeria is important especially with regard to the directive on requiring all health facilities to report on monthly summary information to then LGAs and the evaluation of RHIS performance against the requirements on data quality and data use at facility level [18]. This evaluation is especially timely with the end of implementation of Nigeria HIS Strategic Plan 20142018. Its results will also give current and fresh data on the degree of observance within the HIS policy and functionality of RHIS hence, informed changes and developments in areas of policy formulations, mainly in Ondo State.

This research aimed at determining the level of adherence to the HIS policy of submitting monthly reports of the National Health Management Information System (NHMIS) reports initiated by the Federal Ministry of Health to both the public and the private health

facilities and assess the quality of the NHMIS data in the health facilities.

Materials and Methods

Description of the Site

This study was employed in the state of Ondo, South-Western part of Nigeria, whose population was projected to be 5,687,488 in the year 2025 according to the 2006 National Population Census. It consists of 3 senatorial districts namely Ondo South, Ondo North, and Ondo central. The state capital is Akure and it has eighteen (18) Local Government Areas as seen in figure1. The ministry of health oversees the health sector which has several agencies and parastatals i.e., Hospitals Management Board (HMB), Ondo State Primary Health Care Development Agency (OSPHCDA), Ondo State Emergency Medical Services (ODEMSA), Ondo State Contributory Health Commission (ODCHC), Ondo State Alternative Medicine Board (OSAMB), and Ondo State Drugs and Health Commodities Management Agency (ODHCMA). In this paper the area of study was precisely the Ondo Central Senatorial District. Our data in DHIS2 shows that in this district, there are 307 health facilities; 307 (74%) health facilities are public health facilities, and 307 (26%) health facilities are classified as a private health facility.

Figure 1. Ondo State Map

Description of the Experiments Done

The study design is a cross sectional one. In the analysis, the study uses the modified PRISM diagnostic tool (a questionnaire) that was to be used in the facilities during this study as a way of collecting and analysing data using the facility NHMIS register and the NHMIS forms that are submitted by the facilities to the local government area on the basis of the monthly reports so as to determine the policy implementation compliance, the completeness and accuracy including use of the NHMIS information at the facility in central senatorial district of Ondo state. The questionnaires were broken up into three parts. Part A, which has socio-demographical features, part B, compliance level with Nigeria HIS policy against the monthly reporting of the National Health Management Information System (NHMIS) monthly summary and part C, evaluating level of data quality of NHMIS in both the public and the private health facilities.

Sample Size Calculation

The sample design use to determine the section of the entire population was deducted using the Yamane's formula for calculating sample size. According to him, for a 95%

confidence level and e =0.05, the size of the sample should be

Mathematically,

$$\boldsymbol{n = \frac{N}{1+N(e)^2}}$$

Where:

N = 307

e = 0.05

$$n = \frac{307}{1 + 307(0.05)^2}$$

$$n = \frac{307}{1 + 307(0.0025)}$$

$$n = 173.691$$

$$n = 174$$

Sample proportion = $\frac{174}{307}\ X\ 100$ = 56.7%

Pilot Testing and Validity

The reliability coefficient studied (more than 0.6) corresponds to the generally accepted reliability coefficients of educational and behavioral forms of research, especially in regards to those instruments that are at an initial, developing stage, or those instruments that have a multiplicity of constructs. However, strong alpha values (>= 0.7) have generally been more desirable when attaining instruments in high-stakes situations. The sought reliability means that the instrument has good internal consistency between the items, which is why it can be further used.

Description of Statistical Methods Used

Data was cleaned using Microsoft Excel package and coded into the SPSS package descriptive analysis were done. Results are presented in tables and charts.

Results

Socio-demographic Characteristics of Respondent

This study was carried out across different health facilities including primary Health center 92 (54.1%), Healthcare clinic 43(25.3%), Secondary Hospital 33(19.2%), and Tertiary Hospital 2(1.2%). The study area covered both Rural (58.7%) and Urban (41.3%). 132(76.7%) government facilities and 40(23.3%) private facilities. Table 1.

Table 1. Socio-demographic Characteristics

	Frequency	Percentage (%)
Type of health facilities surveyed		
Tertiary Hospital	2	1.2
Primary Health centre	92	54.1
Secondary Hospital	33	19.4
Primary Healthcare clinic	43	25.3
Research setting		
Urban	71	41.3
Rural	101	58.7
Hospital Managing authority		
Government/Public hospital	132	76.7
Private Hospital	40	23.3

Assess the Level of Nigeria HIS Policy Compliance on Submission of the National Health Management Information System (NHMIS)

As Table 2 shows, 128 of 130 government-run facilities surveyed (98.5%) stated that they had established a deadline to submit RHIS each month, but only 2 of 40 privately operated facilities (5%) surveyed (95%) indicated the existence of a deadline. Such a significant difference can be determined to be statistically significant (p-value = 0.000), indicating that

government facilities have a higher tendency of structured reporting schedules. Moreover, 119 (91.5%) reported government facilities and 2 (100%) reported private facilities said their RHIS submission deadlines occur during the first week of the month, and 6.9 percent of government facilities recorded having deadlines at the end of the month. This trend was not statistically significant (p = 0.698), probably because the sample of private facilities was rather small. In terms of documentation practices, 123 (93.2%) government facilities versus 2 (5%) private facilities documented the date of their monthly RHIS submission to the LGA-difference that is statistically significant (p = 0.000), and this serves to underline that government facilities have higher documentation and accountability (Table 3). Eighty-six percent (126 out of 128) of the government facilities reported within or before the deadline in the first month, as did both of the privately owned facilities that had RHIS registers (100 percent). The second month had the same trend where 125 (94.7%) government facilities and 2 private facilities also reported in time. Within month three, 119 (90.2) government facilities retained timely submission of their RHIS reports and same 2 private facilities.

Table 2. Report Timeliness

	Frequency	**Percent (%)**
Is there a deadline for submission of the monthly RHIS report by the health facilities?		
No	42	24.4
Yes	130	75.6
If yes, the deadline is		
First week on the Month	121	93.1
Ending of the month	9	6.9
Health facility records the dates of submission of monthly RHIS reports to the LGA		
No	47	27.3
Yes	125	72.7
If yes, RHIS monthly reports is submitted on time for month 1		
No	44	25.6
Yes	128	74.4
If yes, RHIS monthly reports is submitted on time for month 2		
No	45	26.2
Yes	127	73.8
If yes, RHIS monthly reports is submitted on time for month 3		
No	51	29.7
Yes	121	70.3

Table 3. Bivariate Analysis between Data Quality and Compliance Level of Public and Private Health facilities

	Managing Authority		
	Government	**Private**	**Chi-Square**
Health facilities have written instructions/guidelines on how to perform a data quality review or data quality check			
Yes	40	0	X^2 =15.794
No	92	40	P=0.000

Health facilities conduct regular data accuracy checks (data quality self-assessment)			
Yes	69	2	X^2 =28.301
No	63	38	P=0.000
If yes, the health facility has access to data quality self-assessment tools (paper or electronic)			
Yes	56	1	X^2 =22.338
No	75	39	P=0.000
Health facilities maintain a record of health facility data accuracy self-assessments conducted in the past three months			
Yes	61	5	X^2 =15.004
No	70	35	P=0.000
Health facilities maintain records of feedback to staff on data quality self-assessment findings			
Yes	59	4	X^2 =16.168
No	72	36	P=0.000
Health facilities use an electronic database/system to enter and analyze routine health data			
Yes	44	4	X^2 =8.307
No	88	36	P=0.004
Deadline for submission of the monthly RHIS report by the health facilities			
Yes	128	2	X^2 =140.689
No	4	34	P=0.000
If yes, the deadline is			
First week of the Month	119	2	X^2 =0.151
End of the month	9	0	P = 0.698
Health facilities record the dates of submission of monthly RHIS reports to the LGA			
Yes	123	2	X^2 =120.202
No	9	38	P = 0.000
if yes, RHIS monthly reports are submitted on time for month 1			
Yes	126	2	X^2 =131.935
No	6	38	P = 0.000
if yes, RHIS monthly reports are submitted on time in month 2			
Yes	125	2	X^2 =127.850
No	7	38	P = 0.000
if yes, RHIS monthly reports are submitted on time in month 3			
Yes	119	2	X^2 =106.707
No	13	38	P = 0.000

Malaria Cases Source Document Available for Three Months

Malaria sources as malaria cases were complete in 122 facilities (70.9%) in the first month and partly in 10 facilities (5.8%). Also, 6 facilities (3.5%) possessed source documents with no data appearing and 34 facilities (19.8%) did not possess source documents at all. Complete documentation of facilities was recorded in 120 (70.2%) facilities in the second month, document with incomplete entries on sources forms was recorded in 11 (6.4%)

facilities, 7 (4.1%) facilities had document with no data recorded, and 33 (19.3%) had no source document. The third month showed that a total of 122 facilities (70.9%) reported full source documentation of malaria cases, 9 facilities (5.3%) had partly completed, 6 facilities (3.5%) had unfilled documents, and 34 facilities no documentation of source of the cases (19.9%), as shown in Table 4.

Malaria Cases Monthly Report Available for Three Months

In Table 4, numbers of malaria-case reports completion among the 172 malaria-related facilities during the first month were 115 (66.9 percent), 10 (5.8 percent), 5 (2.9 percent), and 42 (24.4 percent), respectively. As shown in table 2, 116 facilities (67.4%) in the second month submitted a complete report, 9 facilities (5.2%) made a partial report, 7 facilities (4.1%) submitted a report with no data, and 40 facilities (23.3%) had no report at all. Of the 117 facilities (68%) that had provided complete malaria case reports as required in the third month: 10 facilities (5.8%) provided incomplete report, 5 facilities (2.9%) submitted a blank report and 40 facilities (23.3%) did not submit a report at all.

Table 4. Monthly Report Availability

	Frequency	**Percentage (%)**
Month one: Recount number of confirmed malaria cases treated in the source document		
No	34	19.8
Yes, available and Complete	122	70.9
Yes, available but partly Complete	10	5.8
Yes, available but no data recorded	6	3.5
Month two: Recount number of confirmed malaria cases treated in the source document		
No	33	19.3
Yes, available and Complete	120	70.2
Yes, available but partly Complete	11	6.4
Yes, available but no data recorded	7	4.1
Month three: Recount number of confirmed malaria cases treated in the source document		
No	34	19.9
Yes, available and Complete	122	71.3
Yes, available but partly Complete	9	5.3
Yes, available but no data recorded	6	3.5
Month one: Record number of confirmed malaria cases treated in the monthly reports		
No	42	24.4
Yes, available and Complete	115	66.9
Yes, available but partly Complete	10	5.8
Yes, available but no data recorded	5	2.9
Month two: Record number of confirmed malaria cases treated in the monthly reports		
No	40	23.3
Yes, available and Complete	116	67.4
Yes, available but partly Complete	9	5.2

Yes, available but no data recorded	7	4.1
Month three: Record number of confirmed malaria cases treated in the monthly reports		
No	40	23.3
Yes, available and Complete	117	68.0
Yes, available but partly Complete	10	5.8
Yes, available but no data recorded	5	2.9

Malaria Cases Source Documents and Monthly Reports

In Table 5 and 6, at Month One, 126 facilities stated that they had source documents of malaria cases, whereas 120 facilities posted the respective monthly reports. In the source materials, the average figure of confirmed malaria cases was 30.58 as compared to 31.01 in the monthly reports meaning slight overestimation. The range of data is similar to each source and varied between 1 case as the minimum and 683 cases as the maximum. There were 129 facilities that verified that they had reported to have available source data in Month Two; however, only 119 per cent of facilities made monthly report submissive. That is a total of 10 facilities that reported source data availability but did not report to month. The mean true malaria cases, identified in source documents, were found to be 33.26, whereas the mean value of true cases identified in the monthly reports was 34.85 that indicates minimal overreporting. Source documents had a standard deviation of 80.99 compared to the monthly reports having a slight higher standard deviation of 84.07. After Month Three there were 130 facilities with accessible source publications, 123 of which produced monthly reports, and 7 of which contained source data that did not report. The higher malaria cases reported by the source documents average at 47.44 as compared to 47.06 reported by monthly summaries, which shows the country is slightly underreporting the malaria cases. The standard deviation was higher when it comes to the monthly reports compared to the source data since it shows more deviation in the reported figures.

Table 5. Review the Source Document used to Compile and Summarize Information for Monthly Reporting (i.e., register, tally sheet) for Confirmed Malaria Cases Treated from Month One to Month Three

		Recount the number of confirmed malaria cases treated in the source document for month1 (if none, enter 0)	**Recount the number of confirmed malaria cases treated in the source document for month2 (if none, enter 0)**	**Recount the number of confirmed malaria cases treated in the source document for month 3 (if none, enter 0)**
N	Valid	126	129	130
	Missing	46	43	42
Mean		30.58	33.26	47.44
Median		15.00	12.00	18.00
Std. Deviation		68.886	80.993	107.353
Range		682	743	1065
Minimum		1	1	1
Maximum		683	744	1066

Table 6. Review the Monthly Reports for Malaria Cases for Month One to Three

		Record the number of confirmed malaria cases treated in the monthly reports for month 1	Record the number of confirmed malaria cases treated in the monthly reports for month 2 (if missing, leave blank)	Record the number of confirmed malaria cases treated in the monthly reports for month 3 (if missing, leave blank)
N	Valid	120	119	123
	Missing	52	53	49
Mean		31.01	34.85	47.06
Median		14.50	13.00	16.00
Std. Deviation		70.264	84.074	109.638
Range		682	743	1066
Minimum		1	1	1
Maximum		683	744	1067

Assess the Level of Data Quality of NHMIS in public and private health facilities

Table 7 shows that 132 (76.7%) of the facilities had no written instructions or guidelines on how to undertake data quality checks, whereas just 40 facilities (23.3%) had them. In addition, 101 facilities (58.7%) do not perform routine checks of the accuracy of data but only 71 facilities (41.3%). Out of those who do some regular checking of data accuracy, only 33.3 percent may access data quality self-assessment tools, but 66.7 percent cannot. As far as maintaining records of data accuracy self-assessment reports developed within the past three months, only 66 facilities (38.6%) maintain such records, the rest 105 (61.4%) do not. Likewise fewer (108 or 63.2 %) facilities maintain records of the feedbacks offered to employees after data quality self assessments as compared to more facilities (63 or 36.8 %) that do maintain such records. Also, only half of the facilities (48 facilities (27.9%)) utilize electronic databases or systems to enter and retrieve routine data on health, with the remaining (124 facilities (72.1%)) continuing to work without them.

Table 7. Data Quality Assessment Mechanism

	Frequency	Percentage (%)
Health facilities have written instructions/guidelines on how to perform data quality review or data quality checks		
No	132	76.7
Yes, Observed	40	23.3
Health facilities conduct regular data accuracy check		
No	101	58.7
Yes	71	41.3
If yes, health facility has access to data quality self-assessment tools		
No	114	66.7
Yes, Observed	57	33.3

Health facility maintains a record of health facility data accuracy self-assessments conducted in the past three month		
No	105	61.4
Yes	66	38.6
Health facility maintains records of feedback to staff on data quality self-assessment findings		
No	108	63.2
Yes	63	36.8
Health facility uses an electronic database/system to enter and analyze routine health data		
No	124	72.1
Yes	48	27.9

Discussion

This study sought to evaluate the extent of compliance with Nigeria's Health Information System (HIS) policy regarding the submission of NHMIS monthly summary data by both public and private health facilities, as well as to assess the quality of the submitted data. The findings revealed a marked disparity in compliance between public and private facilities, particularly in relation to adherence to reporting deadlines, documentation practices, and data accuracy. Public health facilities demonstrated significantly higher levels of compliance, reflecting the influence of structured administrative systems and the role of regulatory enforcement in promoting adherence to HIS policies. Most public facilities adhered to the expected timelines, submitting reports promptly and maintaining accurate records of submission dates. In contrast, private facilities were largely non-compliant with these essential policy requirements. These findings are consistent with previous studies, which highlighted the underutilization of HIS and DHIS in countries like Pakistan due to poor integration between public and private healthcare providers [7]. Similarly, noted that despite the critical role played by private health providers in healthcare delivery across many low- and middle-income countries (LMICs), their involvement in disease surveillance and notification systems remains limited [8].

In addition, the analysis revealed that a large number of government buildings regularly filed reports within the first week of any month signifying that clearly established reporting times promote regular filing. Despite the use of the same reporting window in some of the private facilities, their total involvement was eclipsed with the sheer number that did not report to have a specified deadline-only 5 percent did-indicating a major lacking in terms of integration within their systems. In addition to submission practices, data quality and availability were also investigated, and I took malaria case records as an exemplar. About 70 per cent of health facilities possessed complete Malaria cases over a period of 3 months whereas a quarter remained non-responsive. This degree of incompleteness is noteworthy and it agrees with previous studies by [9, 10] which declared uniform underreporting of immunisation data. The relatively high but still insufficient documentation consistency between the months may indicate the relatively stable but still inefficient level of data availability provided by the facilities with the insufficiently consistent registration. There were also irregularities over monthly reporting of malaria cases detected in the study. Whereas about two-thirds of the facilities made complete reporting, the fact that incomplete submissions

and facilities without reporting occurred means that there is a gap in the data transfer and validation infrastructure. There were minor (1-2%) but systematic differences between originally introduced figures in the source documents and those in the monthly reports--that is, a tendency to slight overreporting on Months 1-2, slight underreporting on Month 3. Even though these differences were quite small, their manifestation, along with the large standard deviation within the data reported, serves as warning toward the accuracy and reliability of the overall information provided.

This problem is congruent with results of a previous study, which found that overreporting frequently occurs in Health Management Information Systems (HMIS), especially in the same cases where there is a push to achieve performance goals, or there are insufficient methods to verify data quality [11]. Furthermore, the lack of full documentation on sources and absence of respective monthly reports further suggest the administrative and logistical challenges of dealing with effective data management. Limited technical success or insufficient human resource could be the cause to such struggles, an event which is earlier identified by [12] when he attributed poor data quality to low staff training, inadequate supervision, and low infrastructural support.

Data Quality Compliance with NHMIS across Public and Private Health Facilities

The analysis indicates that the level of compliance with the set standards of data quality is low, and the validity and reliability of routine health data that is used in policymaking, planning, and resource allocation in Nigeria is questionable. Presence of written guidelines on how to perform data quality checks is one of the key aspects of data quality and the specified aspect was largely not in place across most health facilities surveyed. This is an indication of a weak institutional system of data validation. Moreover, frequency of data accuracy checks was not being done in almost fifty percent of the facilities revealing a vast deficiency in routine data quality assurance goes. Regular checks with identification and rectification of data manipulation errors, promotion of data use, and advancing accountability depend on an efficient data handling framework. Facilities lacking such checks are susceptible to data errors and inconsistencies, as they end up compromising the quality of their reports. These issues are reminiscent of other research in sub-Saharan Africa [11] and Kenya [12] where the lack of frequency in accuracy review of data became a problem leading to lack of informed decisions and efficient allocation of resources. Incorrect answers detection is poor even among facilities with accuracy checking in place, indicating ineffective operating support and insufficient resources to keep improving data quality. The fact that these tools are not available- when they can be essential in having facilities be able to monitor and refine their data processes on their own- is indicative of a larger systemic weakness. The solution to this specific issue is to have enforcement of capacity building, more funding, and better supervision as proposed in [13].

The second weakness is that there is no documentation of recent self-assessment, or feedback provided to employees. The deficit backfires internal process of learning as feedback recording is critical in ensuring that staff realizes while they make mistakes to enhance their practices in coming out. In the absence or poor feedback systems, similar weaknesses in quality of data can be expected again. This observation can be linked to prior studies, where the researchers found that feedback systems formed a core pillar of a sustainable data quality improvement in a health system [14]. Also, the paper notes that there is low application of electronic databases in data entry and analysis. Failure to have real-time data validation and operational efficiency, in addition to having increased chances of

errors, is a factor that aggravates the persistence of manual systems in numerous facilities. This alludes to a greater issue concerning technological and infrastructural capability in the health sector. The results of the study helped to find that, both the public and the private health facilities within the central senatorial district in Ondo State significantly lag behind in the attainment of the NHMIS standards on the data quality matters. Such difficulties surpass technical, but also structural and institutional.

Equations

The sample design use to determine the section of the entire population was deducted using the Yamane's formula for calculating sample size. According to him, for a 95% confidence level and e =0.05, the size of the sample should be

Mathematically,

$$\boldsymbol{n = \frac{N}{1+N(e)^2}}$$

Conclusion

To sum up, not only government-owned health facilities showed a high level of compliance with NHMIS policies especially regarding timely submission and adequate documentation, but also the number of non-compliant facilities among the private ones was found to be high. This is an indicator of an immediate cause to be met to ensure better-enforced policies, capacity building activities and formulation of better integration mechanisms to include the private sector. Malaria data analysis highlighted the ongoing data accuracy, completeness and timeliness issues, which under lifts the need to periodically evaluate data quality and invest more in human and technological capacity to enhance health information management in Ondo State and the Nigerian health system in general. Regulatory bodies must make sure that the standards of reporting on RHIS applied to public institutions be applied on the private health facilities in terms of submissions made monthly. These gaps in data quality assessments tools and feedback systems reiterate the importance of a nationwide data quality enhancement system. The future research must address the following issues: the study should be devoted to the determination of institutional, financial, and operational barriers preventing the adherence of the private sector to NHMIS policies as well as to the evaluation of the role of e-health information systems in the improvement of data quality and timeliness.

Conflict of Interest

There is no conflict of interest as it relates to the Study. The researchers have no financial, commercial, legal, or professional relationship with the organizations used for the study.

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References

[1]. World Health Organization African Region, 2025, *Health Information System. Accessed* 21/7/2025. https://www.afro.who.int/health-topics/health-information-system.

[2]. Esene, H., Obi, A., Okojie, P., Omuemu, V., & Okojie, O., 2017, Health infrastructural correlates and data quality in primary health care-health management information system in Edo State, Nigeria. *J Adv Med Med Res*, *23*, 1-10.

[3]. Ojo, A. I., 2018, Repositioning health information management practice in Nigeria: Suggestions for Africa. *Health Information Management Journal*, *47*(3), 140-144.

[4]. Chanyalew, M. A., Yitayal, M., Atnafu, A., & Tilahun, B., 2023, Assessment of data demand for informed-decisions among health facility and department heads in public health facilities of Amhara Region, northwest Ethiopia. *Health Research Policy and Systems*, *21*(1). https://doi.org/10.1186/s12961-023-01006-5

[5]. Ohiri, K., Makinde, O., Ogundeji, Y., Mobisson, N., & Oludipe, M., 2023, Strengthening routine data reporting in private hospitals in Lagos, Nigeria. *Health policy and planning*, *38*(7), 822-829.

[6]. Rumisha, S. F., Lyimo, E. P., Mremi, I. R., Tungu, P. K., Mwingira, V. S., Mbata, D., & Mboera, L. E. 2020, Data quality of the routine health management information system at the primary healthcare facility and district levels in Tanzania. *BMC medical informatics and decision making*, *20*(1), 340.

[7]. Khoumbati, K., Abbasi, M., Shah, S. G. S., & Stergioulas, L. K., 2018, Integration of public sector healthcare information systems with private sector healthcare providers in Pakistan: challenges, opportunities and solutions. *Emerging Markets from a Multidisciplinary Perspective: Challenges, Opportunities and Research Agenda*, 233-240.

[8]. Makinde, O. A., & Odimegwu, C. O., 2020, Compliance with disease surveillance and notification by private health providers in South-West Nigeria. *Pan African Medical Journal*, *35*(1).

[9]. Ziema, S. A., & Asem, L., 2020, Assessment of immunization data quality of routine reports in Ho municipality of Volta region, Ghana. *BMC Health Services Research*, *20*(1), 1013.

[10]. Karami, M., Khazaei, S., Babaei, A., Yaghini, F. A., Gouya, M. M., & Zahraei, S. M., 2019, Accuracy and quality of immunization data in Iran: findings from data quality self-assessment survey in 2017. *BMC health services research*, *19*(1), 371.

[11]. Mutale, W., Chintu, N., Amoroso, C., Awoonor-Williams, K., Phillips, J., Baynes, C., & with input from the Population Health Implementation and Training–Africa Health Initiative Data Collaborative. 2013, Improving health information systems for decision making across five sub-Saharan African countries: Implementation strategies from the African Health Initiative. *BMC health services research*, *13*(Suppl 2), S9.

[12]. Odhiambo-Otieno, G. W., 2005, Evaluation criteria for district health management information systems: lessons from the Ministry of Health, Kenya. *International journal of medical informatics*, *74*(1), 31-38.

[13]. Braa, J., Heywood, A., & Sahay, S., 2012, Improving quality and use of data through data-use workshops: Zanzibar, United Republic of Tanzania. *Bulletin of the World Health Organization*, *90*, 379-384.

[14]. Garrib, A., Stoops, N., McKenzie, A., Dlamini, L., Govender, T., Rohde, D., & Herbst, K., 2008, An evaluation of the district health information system in rural South Africa. *South African medical journal*, *98*(7), 549-552.

[15]. Pham, Q., Fang, F., Ha, V. N., Piran, M. J., Le, M., Le, L. B., Hwang, W., & Ding, Z., 2020, A survey of Multi-Access Edge Computing in 5G and Beyond: Fundamentals, technology integration, and State-of-the-Art. *IEEE Access*, *8*, 116974–117017. https://doi.org/10.1109/access.2020.3001277

[16]. Nguyen, T. N., Ha, S. T., & Braa, J., 2015, Assembling a national health information infrastructure: the case of Vietnam. *The Electronic Journal of Information Systems in Developing Countries*, *66*(1), 1–18. https://doi.org/10.1002/j.1681-4835.2015.tb00477.x

[17]. Gebre-Mariam, M., & Bygstad, B., 2018, Digitalization mechanisms of health management information systems in developing countries. *Information and Organization*, *29*(1), 1–22. https://doi.org/10.1016/j.infoandorg.2018.12.002

[18]. Chaulagai, C. N., Moyo, C. M., Koot, J., Moyo, H. B., Sambakunsi, T. C., Khunga, F. M., & Naphini, P. D., 2005, Design and implementation of a health management information system in Malawi: issues, innovations and results. *Health policy and planning*, *20*(6), 375-384.

[19]. Maina, M. M., Faggo, N., & Goje, L. A., 2024, The Role of Health Management Information System to Track the Nature, Efficiency and Quality of Tasks Carried out by Community Health Workers in Reducing Child Mortality, With Specific Reference to Pneumonia and Diarrhoea in Nigeria. *Fane-Fane International Multidisciplinary Journal*, *8*(1, June), 98-106.

[20]. Micah, E. E. M., Adekunle, M. K., & Adeboye, A., 2019, Assesment of Electronic Inventory Management Systems and Utilisation in the Healthcare System in Abuja, FCT Nigeria. *Europan Journal of Business and Inovation Research*, *7*(8), 1-17.

[21]. Oluwatuyi, M. F., 2020, A dive into problems of national health management information systems (NHMIS) in Nigeria. *Int J Innov Sci Res Technol*, *5*(6), 237-40.

[22]. Ezekiel, P. O., 2021, Comparing data Reported Using the National Health Management Information System and data Declared Validated on the PBF Declaration Forms in Funding Health Districts in Nasarawa State. *governance*, *2*(3), 4.