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Assessment of Challenges Faced by Healthcare Professionals in Reporting Heath Related Data: Antimicrobial Resistance (AMR) Data Using District Health Information System Version Two (DHIS 2)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Antimicrobial resistance poses a growing threat to public health worldwide, demanding comprehensive strategies for monitoring, surveillance, and intervention. In Rwanda, a country that has made remarkable strides in healthcare, the effective reporting of AMR data is crucial to ensure the judicious use of antibiotics, prevent the spread of resistant pathogens, and safeguard public health. Two prominent E-Health systems, DHIS 2 and Open Clinic, have been implemented in Rwanda's healthcare infrastructure, each with its unique features and capabilities. Therefore, this study seeks to evaluate the strengths and weaknesses of these systems in the context of AMR reporting within Rwanda's hospital network.

Methods: The research utilized a quantitative approach and it was conducted at CHUB, a teaching hospital in Rwanda's Southern Province. Participants included clinicians, administrative staff, and decision-makers, offering a comprehensive understanding of system usage where convenience sampling over a month yielded 50 participants while on data collection a questionnaire, with structured forms for end users, administrators, and ICT personnel. Ethical considerations were strictly followed, and finally with approval from the University's Institutional Review Board, informed consent, and confidentiality measures.

Results: The study involved diverse healthcare roles, with experience ranging from under a year to over ten years. All participants were familiar with DHIS 2 and Open Clinic. Most received training on both systems, and 31.3% preferred Open Clinic. DHIS 2's interface was considered user-friendly by 75% of users. DHIS 2 was more efficient in reporting time. Challenges included technical issues (22.9%), time-consuming data entry (14.6%), and data accuracy concerns (14.6%), with 41.7% facing a combination of these challenges. In conclusion, participants were proficient with both systems, but addressing technical issues, data entry, and accuracy challenges is vital for effective AMR data reporting. The choice of reporting platform and usability significantly enhances efficiency.

Conclusion: This study contributes to the enhancement of AMR surveillance and reporting mechanisms in Rwanda's healthcare system, aiming to strengthen the fight against AMR and improve healthcare outcomes. The acknowledgment of authors within the references section underscores the importance of ethical research practices and transparency in academic endeavors.

Keywords: AMR testing; AMR reporting; AMR integration; open clinic.

1. INTRODUCTION

In recent years, the global healthcare landscape has witnessed a significant transformation with the integration of digital health information systems. In particular, the use of Electronic Health Record (EHR) systems and Health Management Information Systems (HMIS) has become instrumental in improving healthcare delivery, data management, and decision-making processes [1]. Need assessment of the challenges faced by healthcare professionals in reporting AMR data using district health information system version two (DHIS 2) is needed to see if there a challenge in this new instance of DHIS 2 that are specifically designed for reporting aggregated data that was exported from Open clinic.

Antimicrobial resistance poses a growing threat to public health worldwide, demanding comprehensive strategies for monitoring, surveillance, and intervention [2]. In Rwanda, a country that has made remarkable strides in healthcare, the effective reporting of AMR data is crucial to ensure the judicious use of antibiotics, prevent the spread of resistant pathogens, and safeguard public health. Two prominent E-Health systems, DHIS 2 and Open Clinic, have been implemented in Rwanda's healthcare infrastructure, each with its unique features and capabilities. Therefore, this comparative study seeks to evaluate the strengths and weaknesses of these systems in the context of AMR reporting within Rwanda's hospital network [3].

Currently, the reporting of Antimicrobial Resistance (AMR) health data presents a significant challenge in terms of data management and analysis. Typically, health information within reference hospitals is documented using the Open Clinic system, and subsequently, it is exported into DHIS 2 for comprehensive data analysis and knowledge extraction. This process entails several intricate steps, necessitating careful attention and expertise in both data handling and analytical methodologies [4].

Through an in-depth analysis of DHIS 2 and Open Clinic E-Health System, this study aims to shed light on their respective contributions to the accurate and efficient reporting of AMR data. By understanding the nuanced differences between these two systems, healthcare policymakers, practitioners, and stakeholders can make informed decisions about optimizing AMR surveillance and response efforts in Rwanda, ultimately advancing the nation's healthcare goals and ensuring the responsible use of antibiotics for the benefit of all Rwandans. This comparative study is not only timely but also essential in the pursuit of a healthier and more resilient healthcare system in Rwanda and serves as a valuable reference point for similar initiatives in other regions [5].

Digital health has the capacity to revolutionize healthcare delivery and enhance health outcomes by harnessing the potential of technology and data. It is a dynamic and evolving field that holds great promise in transforming the delivery and experience of healthcare for both patients and providers [6]. However, despite these advancements, some diseases are becoming resistant to available drugs and are not benefiting from the progress made in the healthcare sector. They are defying medical assistance and ignoring the technological advancements made in healthcare [7].

Antimicrobial resistance (AMR), is a global health concern, diminishes the effectiveness of antibiotics and other drugs used to treat bacterial infections. The development of AMR is a complex problem influenced by factors like improper use of antibiotics, inadequate infection control measures, and insufficient systems for monitoring and reporting [8].

AMR is a natural occurrence in which microorganisms adapt and develop resistance to drugs, resulting in a decline in the effectiveness of these medications. This resistance is driven by the evolutionary pressure exerted by antimicrobials, which promotes the survival and proliferation of microorganisms with genetic modifications that confer resistance. Over time, this process leads to a reduction in the efficacy of antibiotics and, in severe cases, renders them entirely ineffective [9].

The healthcare costs for patients with resistant infections are higher compared to those with non- resistant infections, as the illness lasts longer, additional tests are required, and more expensive drugs are used. In 2016, around 490,000 individuals worldwide developed multi-drug resistant tuberculosis, and drug resistance is starting to complicate the fight against HIV and malaria [10]. High rates of antibiotic resistance have been observed globally for common bacterial infections such as urinary tract infections, sepsis, sexually transmitted infections, and certain types of diarrheas. This indicates a concerning shortage of effective antibiotics. For instance, the rate of resistance to ciprofloxacin, a commonly used antibiotic for urinary tract infections, varied from 8.4% to 92.9% for Escherichia coli and from 4.1% to 79.4% for Klebsiella pneumonia in countries that reported to the Global Antimicrobial Resistance and Use Surveillance System (GLASS) [11].

African countries, such as Rwanda and many others, have specifically been dealing with the issue of antimicrobial resistance (AMR) and the associated risks to public health. To effectively combat AMR, it is crucial to have timely and accurate surveillance of resistance patterns, develop effective treatment strategies, and implement appropriate public health interventions. In this regard, the adoption of electronic health (e-health) systems has become increasingly important to enhance healthcare service delivery, including monitoring and reporting of AMR [3,7].

Within the context of Rwanda, the Open Clinic eHealth and other health systems have been deployed, offering critical healthcare information needed directly for healthcare delivery and for data management and reporting [12]. Additionary, Open Clinic boasts 20 implementations across Rwanda, with various funding sources supporting its adoption in different hospitals. This includes support from organizations such as the Belgian Technical Cooperation, Luxembourg Development Agent, Rwandan Diaspora, and private hospitals' independent initiatives. However, there is a challenge in integrating DHIS 2, as it is primarily designed for data analysis, tracking, and reporting, while other health systems are designed for data management and storage. This integration issue hampers the tracking and management of challenges related to antimicrobial resistance [13].

The Ministry of Health in Rwanda shoulders the responsibility of integrating such systems, recognizing the pivotal role that the health of the population plays in a country's overall economic

growth and development. E-Health systems have been chosen to catalyze advancements in the healthcare sector. In this context, “health” extends far beyond the boundaries of medicine, disease, healthcare facilities, or hospitals. E-Health encompasses the broader spectrum of health, including public health, which is the domain of states, focusing on disease prevention and response at the population level, and healthcare, which addresses the individual patient's needs and treatment of diseases [14]. The implementation of E-Health in Rwanda promises substantial progress in improving the continuity and coordination of care, enhancing access to healthcare services, early disease detection, and providing better insights into healthcare needs and outcomes. These strides are essential to move Rwanda closer to establishing a sustainable, affordable, publicly funded healthcare system delivering exceptional quality care to its citizens [15].

The findings of this comparative study provided valuable insights for healthcare policymakers, administrators, and practitioners in Rwanda, as well as in other resource-constrained settings where AMR is a growing concern. Ultimately, the goal was to contribute to the enhancement of AMR surveillance and reporting mechanisms, which will play a crucial role in safeguarding public health and preserving the effectiveness of antimicrobial drugs in Rwanda and beyond.

1.1 General Objective

The main objective of this study is to assess the effectiveness of DHIS 2 and Open Clinic e-health systems in facilitating the reporting of Antimicrobial Resistance (AMR) data within healthcare facilities in Rwanda.

Specific objectives

i. To assess the challenges faced by healthcare professionals in AMR data reporting
ii. Assess the user-friendliness and user experience on ARM reporting instance

Research questions

i. What are challenges of AMR reporting in Open Clinic at CHUB in Rwanda?
ii. What is the user-experience and accessibility on EMR reporting at CHUB in Rwanda?

2. METHODS

The study took place at CHUB, a health facility situated in Mamba village, Butare Cell, Ngoma Sector, Huye District in the Southern Province of Rwanda. This facility is located near the University of Rwanda, Huye Campus, on the road crossing near IPRC South from Butare town Modern Market. CHUB was established in 1928 as Butare Hospital and initially operated under the management of the National University of Rwanda. In 1966, it was granted autonomy as a University Teaching Hospital, while still maintaining a close collaboration with the National University of Rwanda. In 2000, a law was passed to allow CHUB to be managed autonomously.

2.1 Study Design and Scope

This study used a quantitative methodology to investigate the research question. This method involves using quantitative techniques to analyze data. The quantitative component of the study aimed to determine the current situation using measurable metrics, while the qualitative component provided additional insights into aspects of the present state that cannot be quantified. The study took place at CHUB, a health facility situated in Mamba village, Butare Cell, Ngoma Sector, Huye District in the Southern Province of Rwanda. This facility is located near the University of Rwanda, Huye Campus, on the road crossing near IPRC South from Butare town Modern Market. CHUB was established in 1928 as BUTARE Hospital and initially operated under the management of the National University of Rwanda. In 1966, it was granted autonomy as a University Teaching Hospital, while still maintaining a close collaboration with the National University of Rwanda. In 2000, a law was passed to allow CHUB to be managed autonomously.

2.2 Study Population

The study examined a diverse group of participants who play a crucial role in the functioning of e-Health systems, with a specific focus on reporting of EMR from the data imported from Open Clinic. This group included various frontline healthcare providers such as clinicians, administrative staff like cashiers and receptionists, as well as key decision-makers like administrators and Information and Communication Technology (ICT) managers. Clinicians provided practical insights into system

usage,while cashiers and receptionists handled daily operational tasks. Administrators guided the strategic direction, and ICT managers ensured technical integrity. By including these different perspectives, the study aimed to gain a comprehensive understanding of system usage and provide targeted recommendations to enhance the effectiveness of e-Health systems, particularly Open Clinic, in healthcare facilities in Rwanda.

2.3 Sample size Determination and Technique

This study utilized a convenience sampling method to select participants within a healthcare facility. The data collection took place over a one-month period, specifically from April 1, 2023, to April 30, 2023. The participants were selected based on their roles within the facility, including 2 ICT managers, 10 cashiers, 10 receptionists, 20 clinicians, 3 data managers, and 5 administrators. The convenience sampling approach was chosen for its practicality and accessibility to these key stakeholders, enabling a comprehensive understanding of the research objectives. A total of 50 participants were included in the study during this timeframe.

2.4 Data Collection

The designed a closed-ended questionnaire as a tool for data collection to assess the need and it was composed of the closed-ended questions to health professionals and IT workers. It was built and tested through pre-collection of some data. the questionnaire were distributed using two methods, one was online through WhatsApp and emails and the other was on face to face due their availability whereby a google form link incorporating the closed-ended questions was shared andfilled.

2.5 Data Management and Analysis

The questionnaires were reviewed for completeness; they were corrected and numbered serially. Questions were coded and entered into the computer. The data were collected for the targeted 50 participants, the Statistical Product and Service Solution (SPSS) version 27 and excel sheet were used for data coding and processing. Frequency and mean summary statistics were performed to describe the study population characteristics. Data were analyzed, presented, and grouped using tables for easy interpretation.

3. RESULTS

3.1 Demographic Data

In this study, 50 participants were engaged to provide valuable insights and perspectives on the effectiveness of DHIS 2 and Open Clinic E-Health Systems in enhancing antimicrobial resistance (AMR) reporting efficiency within Rwandan healthcare facilities, with a specific focus on the Centre Hospitalier Universitaire de Butare (CHUB).

The participant demographics in terms of gender were well-distributed. Sixty percent of the participants were male, while forty percent were female. This balanced representation ensured a diverse range of perspectives and experiences in the study.

The participants' ages were distributed as follows: 2 participants (4 % of the total) were in the 26- 30 age range, while 11 participants (22 % of the total) fell in the 31-35 bracket. In the 36-40 age.

Group, there were 8 participants, constituting 16% of the total. The 41-45 age category had 9 participants, representing 28% of the total participants. Additionally, 5 participants (10% of the total) were between the ages of 46-50, while 6 participants (12% of the total) were in the 51-55 range. Finally, participants aged above 56 accounted for 9 individuals, making up 18% of the total.

The majority, comprising 68 % of the total, were healthcare professionals including doctors, nurses, clinical officers, lab technicians, and others directly involved in patient care. Administrators and managers accounted for 20% of the participants, bringing their unique perspectives to the study. Additionally, 12% of the participants were IT and technical staff, including ICT professionals and data managers, who played a crucial role in the implementation and management of healthcare systems.

A substantial 42% boasted between 6 to 10 years of experience, displaying a solid foundation in their respective roles. Additionally, 28% of participants had accrued between 11 to 15 years of experience, bringing a seasoned insight to the study. Furthermore, 14% of the participants had 16 years or more of experience, highlighting a wealth of expertise and deep knowledge in their respective domains.

Table 1. Demographic characteristics of study participants

Working field	Frequency	Percentage	Qualification	Frequency	Percentage
Healthcare professional	34	68.0	Diploma	8	16.0
Administrator/Manager	10	20.0	Bachelor's degree	38	76.0
IT/Technical support	6	12.0	Master's degree	3	6.0
			Ph.D	1	2.0
Total	50	100.0	Total	50	100.0
Gender			**Age category**		
Male	30	60.0	26-30	2	4.0
Female	20	40.0	31-35	11	22.0
Total	50	100	36-40	8	16.0
Work experience			41-45	9	18.0
Less than a year	8	16.0	46-50	5	10.0
Between 6-10 years	21	42.0	51-55	6	12.0
			Above 56	9	18.0
Between 11-15 years	14	28.0	Total	50	100.0
From 16 and above	7	14.0			
Total	50	100			

Source: primary data 2023

Table 2. Training on DHIS 2 and open clinic

	Trained on the DHIS 2 system		Trained on the Open Clinic E-Health System	
	Frequency	Percentage	Frequency	Percentage
Yes	44	89.5 %	47	95.8 %
No	6	10.5 %	3	4.2 %

Source: primary data 2023

A significant majority, comprising 76%, possessed bachelor's degrees, demonstrating a substantial academic background. Additionally, 6% of participants held master's degrees, indicating a higher level of specialization and expertise. Lastly, 2 % of participants had obtained a PhD, representing the highest level of academic achievement.

3.2 System usage and Challenges

3.2.1 Acquaintance with DHS 2 and Open clinic

All participants, comprising 100% of the respondents, indicated their familiarity with both DHIS 2 and Open Clinic. None of the participants reported being unfamiliar with either system. This finding underscores a high level of awareness and proficiency among the surveyed individuals regarding both DHIS 2 and Open Clinic platforms.

The results indicate that a significant majority of the participants have received training on both the DHIS 2 system and the Open Clinic E-Health System. Specifically, 89.5 % of the participants have received training on the DHIS 2 system, while 95.8 % have received training on the Open Clinic E-Health System. In contrast, a smaller proportion of participants have not received training on these systems, with 10.5% indicating no training on DHIS 2 and 4.2% indicating no training on the Open Clinic E-Health System. This suggests a high level of familiarity and proficiency among the participants with both systems, which could potentially influence their efficiency in reporting antimicrobial resistance (AMR) within Rwandan healthcare facilities, as outlined in thecontext of the study.

The results showed that 75% of users find the DHIS 2 system for reporting AMR (Antimicrobial Resistance) instance on DHS2 to be very user-friendly, while 25% of users find it not user-friendly. This suggests that the majority of users have a positive perception of the system's user-friendliness, which is a promising sign for its usability. However, it is important to note that individual experiences may vary, and there might be specific areas or functionalities within DHIS 2 that some users find more challenging than others might.

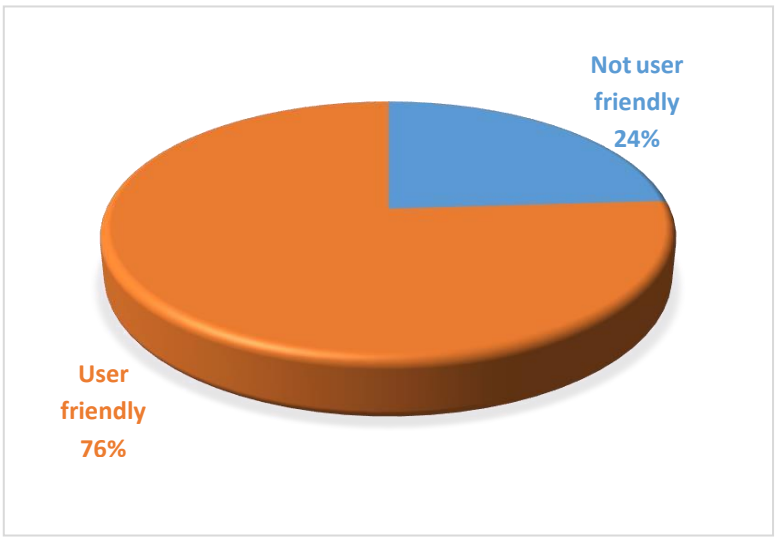

Fig. 1. Insights of User interface of DHIS 2 on AMR reporting

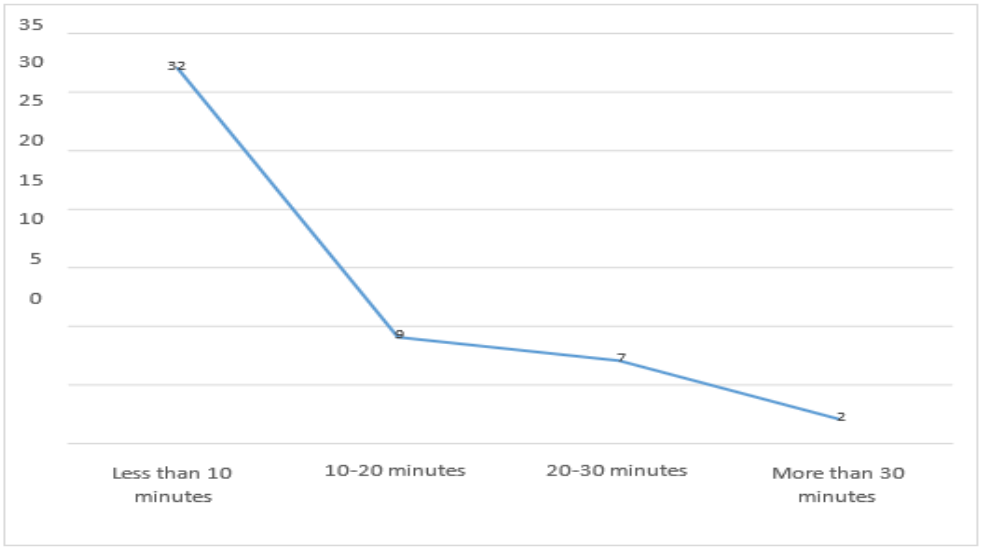

Fig. 2. Insights of User interface of Open clinic on AMR reporting

Table 3. Challenges healthcare providers face during EMR reporting

Indicators	Frequency	Percentage
Lack of training on the system	3	6
Technical issues with the system	12	24
Time consumes data entry process	7	14
Data accuracy concerns	7	14
All of the above items	21	42

Source: primary data 2023

The results indicated that the majority of respondents reported had completed an AMR data reporting using DHIS 2 in less than 10 minutes (64.3%). The next largest group reported taking between 10-20 minutes (17.9%), followed by 20-30 minutes (14.3%), and finally, a small percentage reported taking more than 30 minutes (3.6%).

The survey findings reveal the top three challenges faced by respondents when reporting AMR data, irrespective of the system used. The

most significant challenge, cited by 22.9% of respondents, is encountering technical issues with the system. This indicates a critical need for system reliability and performance optimization. Following closely, 14.6% of respondents highlighted time-consuming data entry processes as a major challenge, underlining the importance of streamlining data input methods to improve efficiency. In a tie for the third most common challenge, another 14.6% of respondents expressed concerns about data accuracy, emphasizing the need for robust data validation and quality assurance mechanisms. It is noteworthy that a substantial portion, 41.7%, selected "All of the above," indicating that many respondents face a combination of these challenges when reporting AMR data, underscoring the multifaceted nature of the difficulties encountered in this critical process. Addressing these challenges will be essential to enhance the effectiveness of AMR data reporting efforts.

Table 4. Efficiency on DHIS 2 system for data reporting

Measurement scale	Frequency	Percentage
Very inefficient	2	4.0
Inefficient	3	6.0
Neutral	4	8.0
Efficient	23	46.0
Very efficient	18	36.0

Source: primary data 2023

The DHIS 2 system's efficiency in data reporting is assessed based on the frequency of its performance across various categories. Overall, the data suggests a favorable perception of DHIS 2's efficiency for data reporting, with a significant portion of users deeming it efficient or very efficient. Only a minimal percentage of users find it very inefficient, comprising just 0.8 % of respondents. Slightly more respondents,at 1.3 %, perceive the system as inefficient. Most users, constituting 10.2%, report an efficient experience with DHIS 2, highlighting its effectiveness in handling data. Moreover, a substantial 7.3% of respondents find the system to be very efficient, indicating a commendable level of satisfaction and effectiveness in data reporting. A noteworthy proportion of users consider the system's performance as neutral, with 1.7% falling into this category.

Participants' confidence levels were assessed across five categories. A significant portion, constituting 8%, reported being "Not confident at all". Another 12% fell into the "Not confident" category. A quarter of the participants expressed a "Neutral" level of confidence. On the other hand, 26 % indicated feeling "Confident," while the highest proportion, at 30%, stated being "Very confident" in their respective domains. This distribution highlights a generally positive outlook, with a majority expressing confidence in their roles and expertise.

4. DISCUSSION

The study featured a well-distributed representation of participants in terms of gender, with 60% being male and 40 % female, ensuring a diverse range of perspectives. In relation to age, the participants were spread across various brackets: 4% were between 26-30, 22% fell in the 31-35 range, 16% were in the 36-40 group, 28% were categorized between 41-45, 10% were aged 46- 50, 12% fell in the 51-55 range, and 18% were above 56 compare to the results published on the study M-health Tools Utilization of Tele-home Healthcare Services for Diabetes Management Among Youth in Kigali City where findings , In terms of sex, female were up to 72, accounting for 59 % of the total, and 50 males, making up 41 % of the total. When examining age, the mean age was 20.3 with a standard deviation of 3.7 while in the age category, there were 64 individuals aged 20 or below, representing 52.5% of the total, and 58 individuals aged 21-35, accounting for 47.5 % of the total. Overall, there were a total of 122 individuals included in the data [16].

In this study, most participants (68 %) were healthcare professionals directly involved in patient care, 20% were administrators and managers, contributing their unique viewpoints, and 12% were IT and technical staff, crucial for system implementation. In terms of experience, 42% had 6 to 10 years, 28% had 11 to 15 years, and 14% had 16 years or more. Regarding education, 76% held bachelor's degrees, 6% had master's degrees, and 2% had obtained a PhD, indicating a high level of academic achievement across the board.

4.1 Training on DHIS 2 and Open Clinic

A substantial majority received training on both systems (DHIS 2: 89.5%, Open Clinic: 95.8%), indicating a high degree of proficiency that can positively affect reporting accuracy and efficiency. While most participants (64.6%) are familiar with

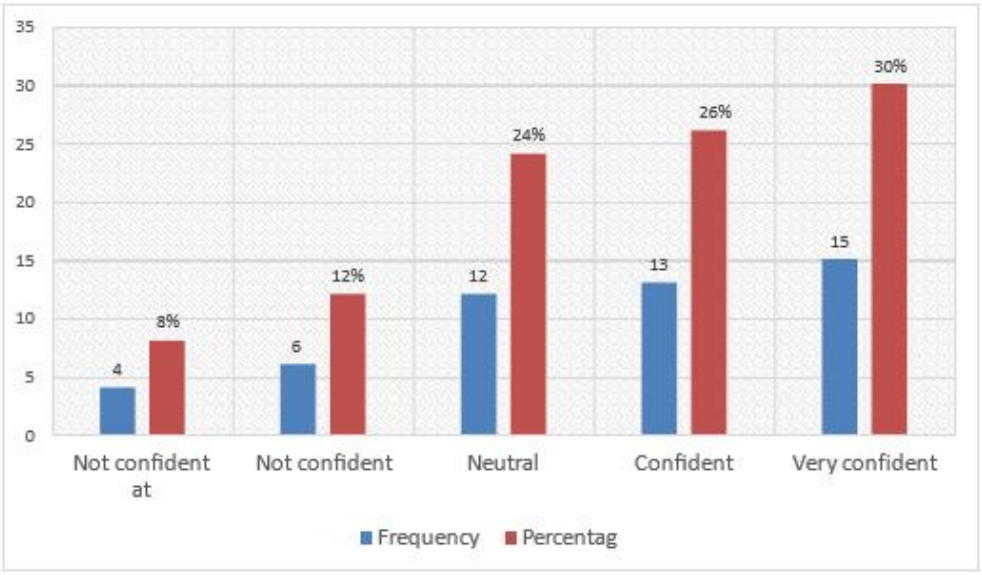

Fig. 3. Confidence in ARM Reporting using DHIS 2 instance

both systems, a notable percentage (31.3%) specifically, prefer the Open Clinic system, emphasizing the importance of offering options and considering platform strengths for AMR reporting.

Many users (75 %) find DHIS 2's interface for reporting AMR data very user-friendly, indicating a positive perception of its usability. While of challenges for reporting AMR data, most users take less than 10 minutes using DHIS 2 (64.3 %), while a majority take more than 30 minutes with Open Clinic (75.0 %). This suggests a potential efficiency advantage for DHIS 2 in reporting time. The top challenges in AMR reporting are technical issues (22.9 %), time-consuming data entry (14.6 %), and concerns about data accuracy (14.6 %). A significant portion (41.7 %) face a combination of these challenges, highlighting the multifaceted nature of difficulties in AMR reporting. These challenges came because data is being captured using Open clinic instead However, DHIS 2 could improve the timeliness and completeness of data reporting over time if it were able to capture data from private health facilities [17].

5. CONCLUSION

The study provides valuable insights into the composition and experience levels of participants involved in the healthcare facilities under examination. Data Managers constitute the majority (47.4%), followed by Receptionists (73.7%), Cashiers (89.5%), IT professionals (18.4%), and Clinicians (4%). Regarding experience, a significant proportion are relatively novice, with less than a year of experience (29.2%), while the majority have one to five years of experience (62.5%).

A substantial concentration of mid-level practitioners with six to ten years of experience is observed (95.8%), and a small but highly experienced segment (100%) with over ten years of experience is identified. The study also highlights a high level of familiarity and proficiency with both DHIS 2 and Open Clinic systems among participants. Most participants have received training on both systems (DHIS 2: 89.5%, Open Clinic: 95.8%). The majority (64.6%) are familiar with both systems, while a notable percentage (31.3%) specifically prefer the Open Clinic system. User feedback indicates that 75% of respondents find the DHIS 2 interface for reporting AMR data very user-friendly, indicating a positive perception of its usability.

In terms of reporting time, most users take less than 10 minutes using DHIS 2 (64.3%), while a majority take more than 30 minutes with Open Clinic (75.0%). The top challenges in AMR reporting include technical issues (22.9%), time-consuming data entry (14.6%), and concerns about data accuracy (14.6%), with 41.7% facing a combination of these challenges. Addressing these challenges will be crucial for enhancing the effectiveness of AMR data reporting.

6. RECOMMENDATIONS

While the majority have received training on both DHIS 2 and Open Clinic, a small percentage has not. It is recommended to provide further training to ensure all participants are proficient in using these systems.

Since a significant proportion (64.6%) of participants are familiar with both systems, it is recommended to leverage the strengths of both DHIS 2 and Open Clinic for efficient AMR reporting.

Given that Clinicians form a smaller portion of the sample, additional support or resources may be beneficial to ensure they are comfortable and proficient in using the reporting systems.

- ✓ Regular feedback mechanisms and monitoring should be put in place to assess the effectiveness of the chosen reporting systems and to address any emerging issues or challenges faced by participants.
- ✓ Given the diverse roles within the healthcare facilities, encouraging cross-role collaboration can lead to a more holistic and efficient approach to AMR reporting.
- ✓ The study reveals a diverse participant base with varying roles, experience levels, and familiarity with reporting systems. The high level of proficiency in both DHIS 2 and Open Clinic platforms is promising for efficient AMR reporting. Leveraging the strengths of both systems, along with targeted training and support, can enhance reporting efficiency within Rwandan healthcare facilities.
- ✓ Continuous monitoring and feedback mechanisms will be crucial in ensuring sustained effectiveness.

CONSENT

Prior to data gathering, all respondents were provided with a comprehensive explanation of the research and were required to sign a consent form indicating their willingness to participate.

ETHICAL APPROVAL

The study received ethical approval from the University of Rwanda's College of Medicine and Health Sciences Institutional Review Board. Subsequently, this clearance was presented to designated mental health facilities to request permission for data collection.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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