

Evaluating the Utilization of Human Resources for Health Information Systems at the Local Government Level: Findings from the Kilimanjaro Region

Anna Mmbando¹ & Mackfallen G. Anasel^{2,3}

1. Kilimanjaro College of Health and Allied Science, Kilimanjaro, Tanzania
2. Department of Health Systems Management, School of Public Administration and Management, Mzumbe University, Tanzania
3. Centre of Excellence in Health Monitoring and Evaluation, School of Public Administration and Management, Mzumbe University, Tanzania

Correspondence to: Mackfallen G. Anasel, Department of Health Systems Management, School of Public Administration and Management, Mzumbe University, P.O. Box 2, Mzumbe, Morogoro Tanzania. Tel: +255 784 705 072. E-mail: mganasel@mzumbe.ac.tz

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Abstract

Introduction

Human resources for health (HRH) are critical to healthcare delivery. Global HRH shortages hinder health service provision. This study explored how data from HRHIS is utilized to optimize HRH planning, management, and development.

Methods

The study used a utility-focused evaluation approach, employing multiple case study designs. Data were collected from seven (7) of the Ministry of Health and President's Office—Regional Administrative and Local Government through in-depth interviews and an observation checklist, whereas ten (10) participants were interviewed. Interpretative phenomenological analysis was used to describe individual experiences, practices of HRH management, and data use from HRHIS.

Results

The study found that staffing levels, DHIS2, Work Indicators, Staff Needs and Prioritization, and Optimization Analysis are key data sources for HRH planning, allocation, and deployment decisions. However, relying on multiple systems for employee data management proved challenging due to inconsistencies and errors. While essential, HRHIS lacks integration with other systems, hindering data utilization. Manual data entry further exacerbates data quality issues, emphasizing the need for a more robust and integrated HRH information system.

Conclusion

HRHIS is a valuable tool for HRH data management, but its potential is underutilized in Kilimanjaro. Despite implementation, challenges persist in using HRHIS data for planning, management, and development. Significant efforts are needed to promote data utilization and improve HRHIS's contribution to Tanzania's healthcare workforce. The study recommends accelerating the integration of HRHIS with other systems, such as the District Health Information System, the Human Capital Management Information System, Professional Councils databases, Regulatory bodies – Tanzania Commission for University, NACVET, Health Facility Registry, and TrainSmart. This integration will enhance data accessibility and improve HRH planning and management.

Keywords: *Data use, HRHIS, HRH, Tanzania*

INTRODUCTION

Tanzania was among the countries in Africa that needed a reliable, coordinated, and centralised information system for managing human resources for health (Ishijima et al., 2015). The MoH vividly experienced the failure of health information systems in the past; multiple information systems existed in the country in many different organisations, and each was designed for the specific objectives of the individual organisations rather than for national planning, projection, and forecasting purposes (Ishijima et al., 2015). Thus, MoH was keen to develop functional, practical, and sound computerised information systems explicitly designed to capture HRH information to be in an excellent position to generate quality data to inform decision makers for better planning, development and management of HRH at all levels (Ishijima et al., 2015).

Most countries, particularly those from developed countries, started using electronic information systems to plan, manage, and develop HRH in some decades (Udekwe et al., 2021). However, in most African countries, including Tanzania, the momentum of establishing a reliable and sound information system to manage HRH picked up after the first global forum for HRH, which was held in Kampala, Uganda (Ishijima et al., 2015). Part of the Kampala declaration and agenda for international action included establishing health workforce information systems to improve data management for evidence-based decision-making (WHO, 2010).

To make this happen, in 2008, the MoH successfully established two HRH information systems nationwide in collaboration with the Japan International Cooperation Agency (JICA). These are the training institution Information System (TIIS) and HRHIS with the primary goal to strengthen the country's health system by providing timely and accurate information on health workforce availability, distribution, and performance; the aim is to help decision-makers in the planning, allocation, and management of healthcare personnel (Ishijima et al., 2015). As it is well known, HRH is the engine of the health sector of any nation (Williams & Thomas, 2017). According to George et al. (2018) the article, HRH is the heart and soul of health systems and a vital change agent in our communities and societies. However, regardless of its potentiality in the health sector, the shortage of this central resource is globally declared to impact the provision of health care services negatively (WHO, 2010).

HRHIS was developed with high expectations of solving some of the critical shortages of Human Resources for Health (HRH) that have existed for decades (Matimbwa et al., 2021). However, according to the WHO (2021) report, most African countries are still battling a critical shortage of health workers despite increasing efforts to address the shortage, which has compromised the provision of quality health services.

Apart from the WHO report, different scholars have also reported the shortage of HRH, with its attached consequences in health care provision (Miseda et al. 2017). Miseda et al. (2017) added that this shortage has not only considerably constrained the achievement of health-related development goals but also impeded accelerated progress toward universal health coverage. Alongside the HRH shortage, the healthcare system is also experiencing other HRH challenges, such as maldistribution, insufficient knowledge and skills, lack of motivation, promotion attrition, and low incentives, to mention a few (BMF, 2021).

In their report, Arakelian et al. (2021) revealed that many countries still need accurate counts of the workforce and their distribution by region, cadre, and sector. Despite the technological advances over the last twenty years, gaps in how countries manage their health workforce still need to be addressed. The report further elaborates that human resource information systems (HRIS) are critical for evidence-based decision-making, policy-making and practices. Still, documentation about the capabilities of existing systems in different countries for the collection, analysis, and use of data for HRH planning and management is limited.

Munir et al. (2020) propose that HRIS supports HRH's planning, administration, decision-making, and control. The system should enhance applications such as employee selection and placement, payroll, pension, reimbursement management, ingestion, training projections, career pathing, equity monitoring, and productivity evaluation. Munir further narrated that various benefits are provided by technology and information systems; however, he warned that, if not appropriately handled, technology and information will become a boomerang for an organization. Tanzania needs to strengthen the country's health system by providing timely and accurate information on health workforce availability, distribution, and performance. The aim is to help decision-makers plan, allocate, and manage healthcare personnel. HRHIS captures a wide range of data related to healthcare workers, including basic personal information, qualifications, work experience, training, deployments, and transfers. It allows for tracking of health workers' career paths and professional development. It enhances and facilitates the equitable distribution of health workers across the country.

Since 2018, HRHIS has been significantly improved, and the data entry feature has been removed to allow interoperability with PO-PSM HCMIS. Only after the study was conducted (March to September 2022) was HRHIS integration with other health information systems, especially with HCMIS, even though the rollout was completed in June 2024. Literature has shown that proper use of data from HRHIS in planning, managing, and developing HRH is the root of the solution to the health workforce shortage observed today

(Udekwe et al., 2021). Thus, this study aimed to evaluate the uses of data from HRHIS to improve the management and monitoring of human resources in the health sector.

METHODS

Study design

The research employed a utility-focused evaluation approach and incorporated multiple case study designs to collect implicit and explicit data from the participants. Utilizing a qualitative explanatory study approach, the investigators conducted interviews with seven (7) health secretaries, each representing a district in the Kilimanjaro region, namely: Moshi Urban, Moshi DC, Hai DC, Siha DC, Rombo DC, Mwangi DC, and Same DC. Moreover, two health secretaries were chosen from the President's Office, Regional Administration and Local Government (PO-RALG), while one was selected from the Ministry of Health (MoH). Face-to-face interviews were conducted with all Local Government Authorities (LGAs) participants, and phone interviews with the PO-RALG and MoH participants. The investigators adopted a purposive sampling technique to select health secretaries as participants due to their exclusive use of the HRHIS.

Study area

The selected study areas for this evaluation are MoH, PO-RALG, and the Kilimanjaro region. Kilimanjaro was chosen as a leading region with a high number of health workers above the density range of 16/10,000 population compared to Tabora, which ranked low at 2.8/10,000. The investigators are curious to determine if the Kilimanjaro region's good performance relates to utilising HRHIS data in planning, managing, and developing HRH.

Data collection tools and procedure

The investigators developed interview and observation checklist guides to enable data collection from the field. A semi-structured interview guide was created to allow the respondents to provide as many relevant details as they knew without limiting them. The purpose was to enrich the investigators with enough information to achieve the intended research objectives. An observation guide was framed to check the availability and accessibility of the HRHIS by users, its working condition, and evidence of reports generated from the system.

Data management and analysis

Data analysis was done simultaneously with data collection (iterative and progressive). The data was transcribed verbatim within 24 hours after collection. The transcriptions were translated into English, and after that, the review was done to ensure data accuracy and completeness; inductive coding was done with the aid of ATLAST.ti software. The interpretative phenomenological analysis (Masue et al., 2013; Anasel et al., 2019; Anasel & Swai, 2021) was used to describe individual experiences and practices of HRH planning and management and utilisation of data from HRHIS; the aim was to determine patterns raised from phenomena across HRHIS users. The pattern revolved

around the human resources for health management: planning, projection, staff allocation, recruitment, deployment, retention and staff management. Narrative analysis was also used to narrate the stories of individual respondents and how they plan for HRH management and development. During coding, the established patterns were grouped into themes; as such, thematic analysis was used to describe common themes that arise from the data that fall under each research objective.

Ethical Considerations

Approval for the study was granted by Mzumbe University (Ref. No. MU/DPGS/INT/38/VOL.IV/187) and the Office of the Regional Administrative Secretary of Kilimanjaro (Ref. No. DA.259/288/01/31). Participants provided informed, verbal consent before study participation, which was emphasized as voluntary and confidential. To maintain anonymity, participant names were omitted, and the seven districts of Kilimanjaro were coded as Districts 1-7.

RESULTS

Socio-demographic characteristics of study participants

Most participants were female (70%), between 36 and 45 years old, and held bachelor's degrees (70%). Most had substantial work experience, with 40% having worked as health secretaries for 11-15 years. These findings suggest a relatively mature and experienced group of participants.

Table 1: Characteristics of Respondents

Attributes of Respondents	Frequency	Percentage
Age of Participants		
30 – 35	3	30
36 – 40	5	50
41 – 45	2	20
Sex		
Male	3	30
Female	7	70
Education Level		
Bachelor	7	70
Master	3	30
Working Experience		
0 – 5 years	1	10
6 – 10 years	3	30
11 – 15 years	4	40
Above 15 years	2	20

Human Resources for Health Planning

Of the districts studied, six had functional laptop computers for accessing the HRHIS system. While most districts reported using dynamic passwords, one district lacked a usable password for nearly two years, preventing system access. In the six districts with active logins, the Health

Service (HS) successfully accessed the system's design module and found all components fully populated with data. An analysis of system data revealed that modules for data management, reporting, leave, and data transfer were populated. However, the training module lacked comprehensive data, with users citing insufficient update skills. Despite available data, no public evidence of system utilization was identified. Table 2 provides a detailed overview of findings across the studied districts.

Table 2: Observation Result

District	System Accessibility	Evidence of Data Use from HRHIS	Date of Last Update
Moshi DC	Active password and functioning system	NO	May 2022
Moshi Urban	Active password and functioning system	NO	February 2022
Same DC	The system was dormant, with NO active password	NO	March 2020
Mwanga DC	Active password and functioning system	NO	July 2022
Rombo DC	Active password and functioning system	NO	January 2022
Hai DC	Active password and functioning system	NO	June 2022
Siha DC	Active password and functioning system	NO	May 2022

Different data sources were mentioned during the interview, including guidelines, online automated systems, and offline system means of data collection, analysis, and storage. One of the most cited data sources in HRH planning was the Human Capital Management Information System (HCMIS).

A participant highlighted the system's capacity to accurately and efficiently capture comprehensive public servant data for HRH planning. Unlike other systems, its real-time operation ensures data quality and reliability. DHIS2, along with work indicators, staffing needs, prioritization, and optimization analysis (WISN&POA), were identified as primary data sources for HRH planning, enabling workload-staff ratio analysis. Various guidelines, including staffing levels, employee establishment, and standing orders, informed other HRH planning aspects. However, the seniority list emerged as a preferred data source due to its offline accessibility, facilitating easier data input and updates compared to the HRHIS.

Human Resource for Health Projection

The study identified staffing levels as the primary data source

for HRH projection planning. This data was deemed reliable for calculating maximum and minimum staff requirements per health facility and cadre. A participant emphasized the role of staffing levels in HRH projection, explaining that the Health Service (HS) utilizes it to determine the gap between the actual and required number of staff during personnel emoluments (PE) calculations. This gap forms the basis for HRH projections:

To determine the HRH projection in my district, I first check the staffing level and employee establishment guidelines; with employee establishment, you will know how many staff and which level of education are required at which level of health service provision, whether at the dispensary, health Centre, or hospital. Then, I use the data from the guidelines (HS from District 2).

Staff allocation and distribution

Respondents primarily relied on DHIS2 and WISN & POA data for staff allocation and balancing decisions. These systems offered valuable workload analysis compared to staffing levels. Additionally, facility in-charge reports presented at CHMT meetings provided real-time insights into staffing shortages and facility imbalances. As one participant emphasized:

I have always used DHIS2 reports; now, they have introduced another system called WISN & POA. This one is better, and after being introduced to it, it is the best system over DHIS2 regarding staff balance because it can provide you with an analysis of the workload of each health facility. It goes further by telling you the workload in this facility (HS from District 2).

Further inquiry was conducted on the data sources for the staff distribution plan. The respondents indicated the staff distribution decisions based on data from the CHMT meeting report, which provides daily information on each facility's actual number of staff available per cadre, the required number per staffing level guideline, and the gap. Data from the DHIS2 report was also mentioned as a good source of data for the distribution plan as the DHIS2 report can analyse the workload in each facility versus the number of available staff. One respondent stated:

This year, staff distribution was based on data from WISN&POA. The system distributes the new staff; it shows all the areas reported with their letter showing their workstation directly from the PO-RALG. However, recruitment has focused more on new facilities, which must remain operational. Now, have you seen the gap between these systems? We do not have that one system we can rely on regarding sound and accurate data (HS from District 1).

Registration

When asked about HRH registration processes, participants described a two-step approach. Newly hired staff initially reported to the district director for HCMIS registration. Subsequently, the health department registered these

employees in both HRHIS and the seniority list. The latter system was often preferred for its perceived ease of use compared to HRHIS. As one respondent explained:

All the HRH are registered to HCMIS first before coming to the health department, where we register them on the HRHIS and seniority list. However, registering employees to the HRHIS is tedious and time-consuming, so we usually provide employees with HRHIS forms to fill in their details accordingly. Later, I feed that information to the system in my free time. However, this is more complex than it sounds, as we always have a cue of tasking waiting for action, which sometimes may lead to a lack of accurate data at the right time (HS from DMOs District 2).

Succession

Participants identified HCMIS and the seniority list as essential data sources for HRH succession planning. These systems offer valuable insights into employee retirement timelines, allowing for proactive succession strategies. However, using multiple systems to track the same employee information was cited as a significant challenge, leading to data inconsistencies and delays in succession planning. As one participant noted:

We rely on data from HCMIS most of the time because it is the only system that can provide you with an employee's most recent data. I cannot count on HRHIS much because most of the time, the information on HRHIS does not match the one at HCMIS for the same employee (HS from District 3).

Attrition

Respondents were asked to describe how they learned and managed attrition in their district. They stated that attrition is well organised and is always done based on seniority list data, HCMIS and HRHIS. During the interview, respondents said that:

Data from HCMIS is more reliable as the system works automatically compared to the seniority list and HRHIS. They have provided the retirement example; with HCMIS, the system automatically removes the employee from the system; with HRHIS, you need to do it manually, which may not be done on time and, therefore, can lead to inaccurate data. We rely heavily on HCMIS for attrition management, although HRHIS can help if you have smartly updated all of your employees' information. One big problem with HRHIS is that it needs to be automated (HS from District 1).

Sources of Data for HRH Management

The study revealed a diverse range of data sources employed for HRH management. Key sources included standing orders, the Facility Financial and Accounting Report System (FFARS), and manual records. These documents were primarily used to manage various allowances for staff. Staffing levels and employee establishment data provided foundational guidelines. Additionally, DHIS2 data, coupled with reports from Regional and Council Health Management Teams (RHMT and CHMT), informed recruitment and deployment decisions.

Recruitment

Participants indicated that to determine HRH recruitment needs, annual planning occurs during the Personnel Emoluments (PE) process. Staffing levels from district councils serve as the primary data source, complemented by seniority lists, DHIS2 analysis reports, and insights from Regional and Council Health Management Team (RHMT and CHMT) meetings. Respondents explained that precise employee counts are calculated by comparing the required staffing levels outlined in establishment guidelines to the actual number of staff in each district. This gap analysis informs recruitment planning based on identified vacancies. As one respondent noted:

Every year, we organise PE exercises; during PE, we plan for all HRH aspects, such as recruitment, promotion, re-categorisation, and confirmation at work. The staffing level of each district council has always been our primary source of data for recruitment plans since the staffing level provides the actual number of staff available in each district. The required number of staff, and thus the gap, help us plan for recruitment in that particular year (HS from MoH).

Participants indicated that employee deployment decisions are guided by analyses of Council and Regional Health Management Team (CHMT and RHMT) reports. These reports identify facility staffing needs and vacant positions. As one participant explained:

We always plan for employee deployment based on several factors we find reasons to deploy, although sometimes it can be complicated. CHMT or RHMT committee report analysis helps a lot in planning for deployment. Through those meetings, information from different health facilities is shared by the facility in charge, so we know which position is empty or has weak personnel (HS from the RMO office).

3.3.3 Retention

Respondents were asked to identify their data source to plan and manage retention mechanisms based on standing order. The FFARS report also provided data to prepare additional allowance payments. Some internal arrangements as each district has its capacity to bear employee demand. This information was detailed by one respondent who explained:

We usually use different retention mechanisms to keep our employees at work. On their first appointment, we provide an induction course to orient them to their working environment; this is according to a standing order. We also deliver on-the-job training to update their knowledge and skills at every opportunity. This is done under an internal arrangement. Apart from that, we also offer subsistence allowances for all new hires, uniforms, houses, extra duty, and on-call allowances as per standing orders and are managed by FFARS (HS from DMO District 1).

DISCUSSION

The study revealed minimal HRHIS data utilization across all districts. While six district councils had implemented the

system, evidence of data usage was absent. HRH planning, management, and development primarily relied on manual records and other systems such as HCMIS, DHIS2, and seniority lists. These findings align with Matimbwa (2019), who highlighted the underutilization of HRHIS data and its subsequent impact on suboptimal outcomes for both government and non-governmental organizations.

The study revealed that while annual HRH projections are conducted, the underlying data sources rely heavily on manual systems rather than the HRHIS. This aligns with Udekwe's (2021) findings in South Africa, which highlighted the persistence of archaic manual systems within the health sector despite the presence of HRIS. As noted by Aigbavboa and Thwala (2019), many developing countries grapple with the limitations of paper-based data and basic spreadsheets, hindering the reliability of HRH information. The current HRHIS evidently requires substantial upgrades to integrate modern technology and become fully functional.

The study anticipated that HRHIS would streamline staff balancing planning. However, findings revealed DHIS2 as the more reliable source for this purpose. WISN&POA was also identified as a valuable tool for analyzing workload versus staffing levels at individual facilities, even suggesting optimal staffing requirements. While these systems offer valuable data, their multiplicity was reported to increase user burden and hinder data consolidation. These challenges align with Silva and Lima (2017), who emphasized the need for a comprehensive HRHIS capable of independently optimizing staffing without reliance on external systems. The study underscores the inefficiency of processing identical data through multiple platforms, advocating for a unified system.

The study further revealed that even with accurate data on staff imbalances, implementing effective staff balancing strategies proved more complex than anticipated. While reliable data is crucial, it is insufficient on its own. Successful HRH planning and management require additional considerations, including adequate funding, strong leadership support, reliable internet connectivity, appropriate infrastructure, and skilled personnel. These factors, as highlighted by Fazreen and Mohd (2019), are essential for optimal HRH utilization.

The transfer of employee data between multiple systems was described as a chaotic process prone to errors. Inaccurate information, including incorrect employment or promotion dates and duplicate records, were common outcomes. The reliance on multiple systems increased the risk of human error, leading to poor data quality and diminished trust in the systems (Udekwe & De la Harpe, 2017). In contrast, a study from Rwanda demonstrated the benefits of a unified HRIS. With a single system, employees had unique records, and employers could accurately track the number and qualifications of HRH at all service levels.

The study revealed effective HRH succession management practices supported by up-to-date data from HCMIS and the

seniority list. Accurate and reliable data are crucial for successful succession planning, preventing unforeseen HRH shortages, particularly in specialized cadres. This aligns with Davarpanah, & Mohamed, (2020) findings, emphasizing the advantages of centralized employee data within an HRIS for identifying trends and opportunities. Similarly, Field Makembo (2019) advocated for automated HRIS-driven succession planning to ensure continuous employee development and role preparedness.

The findings indicate that the recruitment plan is conducted annually during the planning and evaluation period. However, permission to recruit is granted based on the availability of funds. Therefore, the number of employees depends on the budget limit for that particular year. The preparation for a recruitment plan relies on data from individual districts' staffing level requirements and seniority lists, which are prepared according to job categories. This practice undermines the purpose of using a systematic method to organize, analyze, and store human resources for health (HRH) data. The intention of introducing a system for organizing, analyzing, and storing HRH data was to enable the Council Health Management Team (CHMT) to understand the HRH Information System (HRHIS) so they can create and analyze reports on the available health workforce and then develop and implement a recruitment strategy based on the findings of HRHIS data analysis (HRHIS guideline, 2011).

Sarnali (2021) and Lauren (2021) concur that HRIS should optimize recruitment by reducing administrative burdens and costs. An intuitive interface enabling interaction between HR professionals and applicants is essential. However, despite e-recruiting capabilities, many organizations still favor traditional methods. This study corroborates these findings, emphasizing the need to prioritize computerized recruitment for efficient administration. Chukwu (2017) underscores technology's potential to enhance HRH recruitment, selection, training, and development.

The findings showed that the deployment plan and management decisions were made based on reports from the RHMT and CHMT meetings at the facility. The committee agreed to reassign an employee to a different position based on the district's needs and the legitimate career aspirations of the employees. This approach differs from the guidelines outlined in the HRHIS (2011), which recommend that HRHIS should provide data to help districts appropriately balance the number of employees in each facility. This is important because over- or understaffing can make it difficult to manage human resources.

The findings of this evaluation study showed that all districts have a good retention mechanism practice for their HRH. The plan and management of employee payments and allowances rely heavily on the provided guidelines, such as standing orders, FFARS reports, and paperwork-prepared documents that are non-system data, such as attendance at extra duty work, on-call roster, travelling allowance claim

forms, etc. However, using the non-system mode of allowance payment calculations is no longer encouraged; every HRH allowance payment calculation should be systemised on HRHIS (HRHIS guideline, 2011). This argument is also supported by Adelekan (2018) in his study, which provided that HRIS should be used for payment processing since executing payments for each employee manually is resource-intensive. HRIS can make the process smooth because the system uses steps and procedures to calculate all the employer's payments (Casandra et al., 2021). HRIS can help the human resource management team track all time-off requests, grant approvals where needed, and alert employers about any issues with employees taking too much time off or working extra work (Kumari, 2017).

In addition, the finding is contrary to what the guideline provides; according to HRHIS guideline (2011), introducing CHMT members to the retention and its significance in HRH management was one of the goals of establishing HRHIS since it is costly for the district to hire and train workers to lose them. The guideline further narrated that retention is so crucial that members of the CHMT must comprehend the notion of retention to plan and implement effective retention strategies and prevent the district from experiencing a shortage of health workforce.

CONCLUSION

HRHIS is widely recognized as an ideal platform for collecting, analyzing, and storing HRH data within the health sector. However, this study revealed significant challenges in effectively utilizing HRHIS data for HRH management in all seven LGAs of the Kilimanjaro region. Despite evidence of HRHIS implementation, harnessing its potential for planning, management, and development remains problematic. While HRHIS is a critical tool, substantial efforts are required to promote data utilization and optimize its contribution to Tanzania's healthcare workforce.

RECOMMENDATIONS

The study recommends a comprehensive review and update of the current HRHIS to ensure it aligns with contemporary employee information requirements and eliminates data inconsistencies. To optimize data utilization, the HRHIS should be designed to capture and analyze data at its source. Moreover, the Ministry of Health should expedite the integration of HRHIS with complementary systems such as DHIS2, FFARS, WISN&POA, HCMIS, Professional Councils databases, Regulatory bodies – Tanzania Commission for University, NACVET, Health Facility Registry and TrainSmart. This integration will provide users with a comprehensive data repository to inform effective HRH planning and management.

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CONFLICT OF INTERESTS

The authors declare that they have no contending interest.

AUTHORS' CONTRIBUTIONS

APM designed the study, collected data, analysed it, interpreted it, and drafted the manuscript. MGA participated in the study design and critically reviewed the manuscript.

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