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The basis for better health policy and practice

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Obituary for Dr Harriet Nabudere (1973– 2021), Former Managing Editor of the East African Health Research Journal

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It is with great sadness we learned about the sudden demise of our colleague, and former Managing Editor of the East African Health Research Journal (EAHRJ) Dr Harriet Nabudere who passed away on 07th August 2021. Dr Nabudere is remembered as one of the founders of the EAHRJ. Dr Nabudere was instrumental for establishing the infrastructure of the EAHRJ notable the journal Editorial Manager (EM) system. Her range of contributions on publishing EAHRJ issues regularly was extraordinary. Dr Nabudere initially was an associate editor of the EAHRJ before she was promoted to the position of Managing Editor (ME).

Dr Nabudere also was the East African Health Research Commission (EAHRC) National Focal Point (NFP) Coordinator representing the Republic of Uganda, since the inception of the EAHRC 2015. She had coordinated the EAHRC activities in Uganda diligently by linking the Commission with the National Stakeholders. By doing so she significantly contributed to making the EAHRC known in the Republic of Uganda.



We remember Dr Nabudere for her outstandingly successful editorship and mentorship to the many young scientists in the region and advancing knowledge dissemination in the East African Community (EAC) region. She will be missed by many friends, the EAHRC, Uganda National Health Research Organization (UNHRO), authors as well as reviewers for the EAHRJ. She was a research manager and supported the development and evaluation of knowledge translation strategies for Health systems with European and Developing Countries Clinical Trials Partnership (EDCTP) between 2009 and 2014.

Dr. Nabudere studied at Makerere University, Uganda from 1992 to 1998 where she obtained MBChB. She proceeded with postgraduate studies at the BRAC University of Dhaka, Bangladesh where she obtained a Master's degree in Public Health in 2006. She had 15 years' experience as a Public Health specialist in knowledge management and translation. She had skills in research synthesis and developing policy formats for policy makers in low resource settings. She undertook several consultancies works in the EAC region providing technical support in training and mentoring of health workers.

Her research encompassed a broad range of area including research synthesis where research evidence from health research was acquired, assessed for quality, and packaged in user-friendly formats for policy makers and decision-makers to be adapted for application in low-resource settings. This included development and evaluation of research or knowledge synthesis products and services; such as evidence-based policy briefs and policy dialogues, to engage multiple national stakeholders within Uganda's health system and applicable across Low Middle Income Countries (LMIC) contexts. She authored and published several articles which has been cited worldwide.

One of the distinct hallmarks of her life will be her innate intellectual generosity and her ability to emotionally connect with her colleagues, academicians, and scientific collaborators, and her unselfishness in her support of people from different cultural environment and social attitudes.

Dr Harriet Nabudere is survived with a daughter Esther Mukite.

On behalf of all Editors, Associate Editors, and Editorial Board Members who had the privilege to work with or know Dr Harriet Nabudere, Our deepest condolences to the family.

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Experience in fostering regional collaboration and Coordination to use data for battling infectious diseases in sub-Saharan Africa.

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ABSTRACT

The emergence of COVID-19 highlights globalisation realities, where diseases may emerge from anywhere and rapidly spread globally. Lessons emphasise the necessity for strengthening regional and global collaboration and coordination to allow rapid risk identification, resource mobilisation and joint actions. We report the experience of the Regional Action through Data (RAD) partnership in fostering regional cooperation and collaboration to use data for battling infectious diseases and the effects of COVID-19. The Partnership comprised; BoadReach company, The West African Health Organization (WAHO) and the Intergovernmental Authority on Development (IGAD); Duke University Global Health Centre and the Jembi Health Systems, South Africa.

Main objective: To address the problem of limited use of data to drive performance in healthcare service delivery in sub-Saharan Africa; by changing how and why data is collected, analysed, and then used to achieve results.

Specific objectives: 1. Regional level: To equip and empower IGAD and WAHO with evidence-based analytics to drive data use for evidence-based policy and program action in public health (regional level). 2. Patient-provider level: To deploy and implement a digital health solution for childhood vaccination services focused on mobile cross-border populations along the Uganda-Kenya border.

Engagement approaches used included; meetings, workshops, technical working groups, establishing monitoring system and annual implementation revision. Targeted training and capacity building were conducted. All activities were built on existing systems and structures to strengthen ownership and sustainability.

Regional level achievements: 1. Regional health data sharing and protection policy, 2. Strengthened regional health information platform. Patient provider level: Deployment of a cloud based digital health solution to enhance childhood access to vaccination services for cross border populations of Kenya and Uganda, 3. Both regions developed resource mobilisation plans for sustainability.

RAD established the foundation for building trust and strengthening regional collaboration and coordination in health in Sub-Saharan Africa.

BACKGROUND

The frequent emergence of global health threats including the current COVID-19 pandemic highlights globalisation realities, where diseases may emerge from anywhere and rapidly spread across countries, regions, and continents.¹⁻³ Experience from past threats plus the current COVID-19 pandemic emphasise the role of strong regional and global collaboration and coordination of efforts in containing and or preventing these threats at source.¹⁻⁵ At the start of the 21st century, Severe Acute Respiratory Syndrome (SARS) was identified early as a global threat and successfully contained through collaboration and coordination across countries.¹ In contrast, unpreparedness at national and regional level to address disease outbreaks with potential for spreading rapidly globally led to the disastrous

social and economic effects of the 2014-2016 Ebola outbreak in West Africa.⁶⁻⁹

Preparedness is a continuous process of implementing actions before, during and after any public health event.⁷⁻⁹ Preparedness is establishing active surveillance systems able to detect earliest signals of disease outbreak and alerting countries and regions to respond early and adequately. Countries and regions are required to invest in preparedness to have the capacity to mobilise adequate resources to prevent or contain disease outbreaks at source. Necessary capacities include; well prepared and resourced infrastructure i.e. hospitals and facilities for quarantine, sufficient workforce ready to take actions, sufficient stocks of personal protection equipment, medicines and other logistics as may be required during emergency. It further requires a strong disease

surveillance system able to provide reliable data to inform policy, implementation, and practices fitting the moment (before, during or after outbreak).⁷⁻⁹

Maintaining functional country and regional public health infrastructures smoothens the implementation of public health interventions like quarantine and isolation of patients without delays. Such infrastructure must be adequately resourced to allow good patient care and ensure safety of health workers.⁸⁻¹⁰ Communities must be sensitised enough to understand the functions of such facilities and their protective values against disease spread among the community. Continuous advocacy and education build trust and prevents resistance to quarantine, isolation and other public health measures like contact tracing and safe burial. It is during peacetime that health personnel and social scientists may engage in educating communities and individuals to understand disease risks. This is the best time to advocate for effective interventions and change of practices that may fuel disease spread. It is the best moment to engage leaders and communities to change traditional practices that may fuel disease outbreaks and discuss alternative safe practices acceptable to the communities like safe burials.⁸⁻¹⁰ Communities and individuals need to be sensitised to understand and acknowledge their responsibilities towards preventing and addressing disease risks and to trust health workers as their helping hands. Preparedness further means anticipating health threats and their worst situations. This requires regular workforce rehearsal in the form of simulation exercises to remain ready to respond at any time.⁹ Regional preparedness means being ready to continuously share data and be informed early of any impending health threats. It further means readiness to mobilise and/ or share resources rapidly, devise and implement evidence informed strategies to contain any outbreak at source. Ability and readiness to help a member state contain an outbreak at source is critical to prevent regional health threat. Regional preparedness also calls for fostering the culture of using data for actions and practices which require continuous evidence informed dialogue on disease prevention and control.⁷⁻⁹ Regions should ensure availability of updated contingency plans and readiness to apply such plans at any moment when alerted. Countries are continuously reminded of their obligation to invest in building the core capacities outlined in the International Health Regulations (IHR) 2005.

Most of these preparedness aspects were missing during the 2014-2016 Ebola outbreak in West Africa.⁸⁻¹⁰ It took some time to recognise it as a regional and global threat following initial alerts. Countries acted in silos and in confusion and their efforts lacked multi-sectoral collaboration and coordination. Even the global community delayed in recognising and declaring global emergency thus delaying regional and collaborative actions. Lack of adequately prepared infrastructure and resources led to panic and putting of health workers at high risk. Lack of trust and community engagement led to community panic and spread of conspiracy theories including refusal to abide by public health measures like safe burials. Evidence based and effective interventions were resisted, and health workers were attacked.³⁻⁵

The West African leaders came to recognise this problem

and made commitments to strengthen collaboration to strengthen national and regional preparedness.¹¹⁻¹²

Following such recognitions, regional and global efforts were made to help countries prepare better for the next outbreak/pandemic. This included the launch of the Emerging Pandemic Threats Programs 1 (EPT-1) and 2 (EPT-2) by USAID.^{13,14} The programs aimed at strengthening developing countries' capacities to prevent, detect and control infectious diseases in animals and humans in recognition of the human-animal pathogens interphase. Projects under EPT-1 included; Predict, Identify, Prevent and Respond. Projects under EPT-2 were Predict-2, One Health Workforce, and Preparedness and Response (P&R). Among the achievements of the P&R project was the establishment of functional Multi-Sectoral Coordination (MCM) Mechanisms in Africa.^{15,16}

As a result, when the next Ebola outbreak happened in 2018, improved regional and global collaboration, coordination, resource mobilisation and understanding of community perceptions and needs favoured its containment in the Democratic Republic of the Congo (DRC). It also fast tracked the development, testing and deployment of an effective vaccine.^{16,17} Currently, effective global collaboration and coordination produced a vaccine for COVID-19 in a shorter than expected period, thus emphasising the power of collaboration and joint coordinated actions.^{2,3}

In this study, we report the experience and achievements of efforts to foster regional cooperation and collaboration for battling infectious diseases. We also discuss the effects of COVID-19 on the project. This study was conducted by a partnership called Regional Action through Data (RAD). The RAD partnership formation was facilitated by the United States Agency for International Development (USAID) by convening health technical experts from Africa and USAID to identify pressing African health needs and their solutions. Inadequate use of data to drive health policies and practices in Sub-Saharan Africa was identified as among the needs. The partnership involves the BroadReach company as the prime (providing oversight and technical support), the West African Health Organization (WAHO) of the Economic Community of West African States (ECOWAS) and the Intergovernmental Authority in Development (IGAD) of the Horn of Africa. It also involved 2 technical partners namely; the Duke University Global Health Innovation Centre (experts in data governance and protection) and the Jembi Health System a non-profit organisation working on digital health systems for Africa low-resource settings.

The main objective of RAD partnership was to address the problem of limited used of data to drive performance in healthcare service delivery in sub-Saharan Africa; by changing how and why data is collected, analysed, and then used to achieve results.

The specific objectives were: 1. Regional level: To equip and empower IGAD and WAHO with evidence-based analytics to drive data use for evidence-based policy and program action in public health.

2. Patient/ provider level: To deploy and implement a digital health solution for child-hood vaccination services focused on mobile cross-border populations along the

Uganda-Kenya border; for continuity of vaccination services regardless of their location

METHODS

The RAD project’s approach was to engage the regional Organisations (WAHO and IGAD) and their respective member states to participate actively throughout the project’s life from identifying the idea/s, setting the objectives and through implementation. The project provided technical and financial support, while the activities were implemented by the regions and member states. The implementation was therefore institutionalised within the regions’ health information systems, thus enhancing capacity building and ownership.

The RAD partnership structure was therefore constructed to allow two-way flow of information and dialogue between the project’s implementing technical, regional and national program managers and the top-level regional decision makers, the ministries of health. See figure 1

The initial steps included holding a project initiation meeting between technical experts and regional program managers of health to have the approval to conduct the project in alignment with regional needs. The meeting also served to define the projects’ governance structures. A similar governance structure was adopted in both regions as shown in figure 1. At the apex, the projects were linked to the regional inter-ministerial committee for health which is the regional decision maker on health. This link was provided through the projects steering committee formed by health managers who report and receive directives from the inter-ministerial committee/council (Ministers of health of member states). The steering committee oversees the overall management of the project, receives performance and progress reports and reviews proposed plans and policies before submitting them to the inter-ministerial committee for approval and ratification as regional plans and policies. The steering committee has technical working groups for the different lines of actions under the project objectives. These are comprised of selected technical experts from WAHO and member states. They are the implementers of the activities. They report and receive directives from the steering committee. Financial and technical support is provided by Broadreach. Technical support to for the establishment and implementation of regional health sharing and protection policies is provided by the Duke University, while technical support to strengthen cross border populations’ access to health services focused on enhancing childhood vaccination is provided by Jembi Health Systems, a Non-Profit Company based in South Africa.

To facilitate member states’ buy in and enhance projects’ advocacy, the technical working groups present their work at regionally organised Annual Health Information meetings with regional health program managers. From these meetings, comments/inputs are gathered which are used to come up with draft reports, plans and proposals for policy or practices before they are submitted to the steering committee. These meetings also receive reports of project progress and achievements.

Addressing the regional level targeted specific objective involved the following steps. In the WAHO region, initial

discussions for building consensus and getting approval to conduct the project were conducted at the regional joint Health Management Information System (HMIS), Integrated Disease Surveillance and Response (IDSR), and One Health data managers’ meeting held on July 2019, in Abuja, Nigeria. In August 2019, preparations for development of the WAHO institutional data governance and protection policy started. A consultant was engaged to conduct a survey to determine the level of data use in WAHO, data lifecycle from collection through storage, use and sharing. This involved field visits to WAHO offices involved in health data governance (Information Technology (IT), administration, finance, projects’ management, and health programs implementation).

The draft policy document was subjected to several rounds for review through member states consultations before it was validated at the 10th ECOWAS HMIS meeting in March 2020, Banjul, Gambia. The WAHO institution uses this meeting for both technical groups presentations and to submit documents to the Steering committee formed by HMIS national managers. The document was then handed to the WAHO institution legal board for finalisation with legal language formatting. Subsequently it was ratified by the Assembly of Health Ministers of ECOWAS and by the Council of Heads of States as a regional policy.



The Duke University Global Health Centre conducted a survey to identify gaps in data governance at national level that needed alignment with the regional health data governance and level of alignment to the regional data governance policy. The survey results and suggestions for aligning national data governance policies to the WAHO policy were shared with member states. A webinar to allow open discussions of the results among member states and build consensus on alignment approaches was planned for October 2021.

Through discussions and negotiations, WAHO demanded the strengthening of regional health information products to enable the region to track and address emerging infectious diseases outbreaks. This was driven by the COVID-19 pandemic as the region felt the urgency for quality data to inform regional policies, decisions, and guide practices.

RAD employed 3 technical staff to support WAHO to review the quality and regular production of existing health products. Revealed gaps in data quality, collation-

from different sources and irregular production pushed the development of a regional COVID 19 dashboard. A test dashboard was immediately developed and presented to the Health Management Information System (HMIS), Integrated Diseases Surveillance and Response (IDSR) and One health data managers during a virtual meeting. The meeting approved the dashboard developed and recommended the production of a weekly disease epidemiology bulletin, a quarterly epidemiological bulletin, and an annual regional disease profile. In addition, the regional Director demanded the production of an annual regional disease profile and a 5years regional disease profile. The RAD project supported the regional team through the newly employed technical staff to train countries to collate data from different sources and provide robust regional data. A regional health data platform was also refurbished with new equipment and technology updates to receive and store regional health data. A similar process, with exception of employing technical staff, was followed in addressing the same objective in the IGAD region.

The second specific objective was only implemented in the IGAD region. A baseline analysis was conducted to identify sites for testing and deploying the digital health solution for child-hood vaccination services focused on mobile cross-border populations along the Uganda-Kenya border, for continuity of vaccination services regardless of their location. 4 sites were identified based on the selection criteria which included; 1. Being served by a large mobile population, 2. Willingness to enter into an agreement to share immunisation data across borders 3. Trainable staff willing to collect data using special mobile phones and upload the data into data servers. Data servers were placed in safe positions within the facilities and a selected staff engaged in childhood immunisation data collection were equipped with mobile phones. Jembi health systems technical experts accompanied by Broadreach's technical IT expert visited the sites and deployed the server equipment at the facilities. They trained the facility nursing staff on the use of the mobile phones for data collection and appointed an administrator per facility to upload the data into the servers on a regular basis. Training was repeated annually to keep the staff updated. Ad hoc training was conducted whenever there were staff transfers to bring on board new staff. Regular quarterly site supervision visits were conducted to ensure staff morale and motivation while checking the conduct of project activities. Trouble shooting was conducted through the site supervisory visits and virtually in collaboration with Jembi health systems technicians and WAHO local IT personnel.

Mothers participating in the childhood immunisation programs were provided with electronic cards that store the vaccination information of their children. These cards can be read in any cross-border facility where the Journey solution was available. [Figure 2](#) & [Figure 3](#)

In general, before regional health data governance and protection policies were enacted, RAD engaged with member states and implementers through the signing of special agreements (Memorandum of Understanding (MoUs) to allow implementation and official recognition of project's activities.

FIGURE 2. Nurses Practicing how to Access Journey Solution Stored Health Information



IAD Cross-Border Immunisation. By Ahmed Bashir-2020

FIGURE 3. Training Session on Journey Solution Data Entry and Upload



IAD Cross-Border Immunisation. By Ahmed Bashir-2020

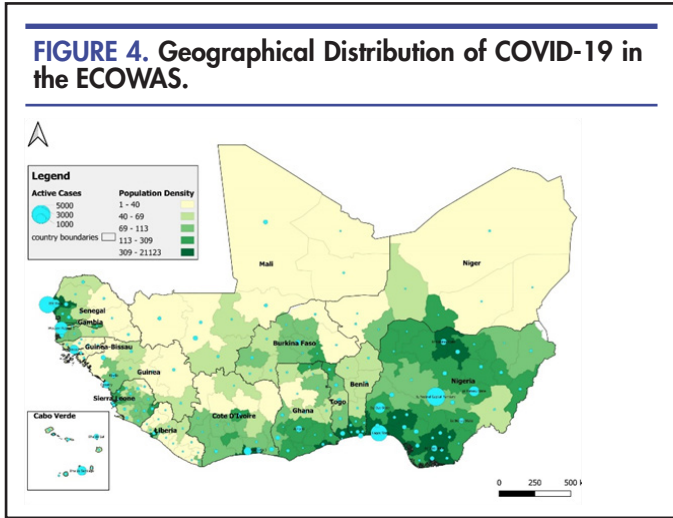


FIGURE 4. Geographical Distribution of COVID-19 in the ECOWAS.

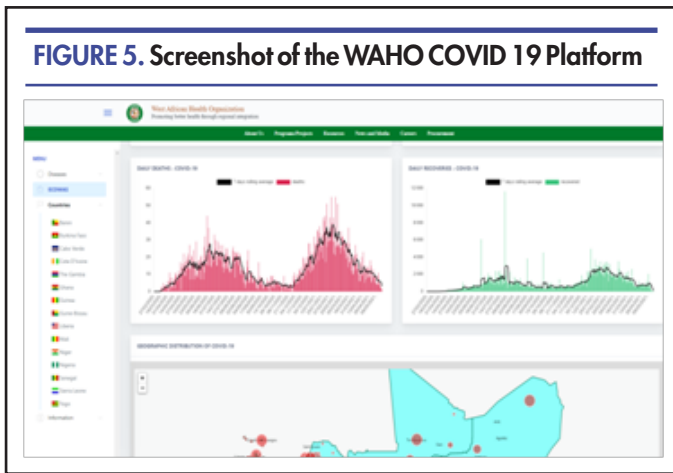


FIGURE 5. Screenshot of the WAHO COVID 19 Platform

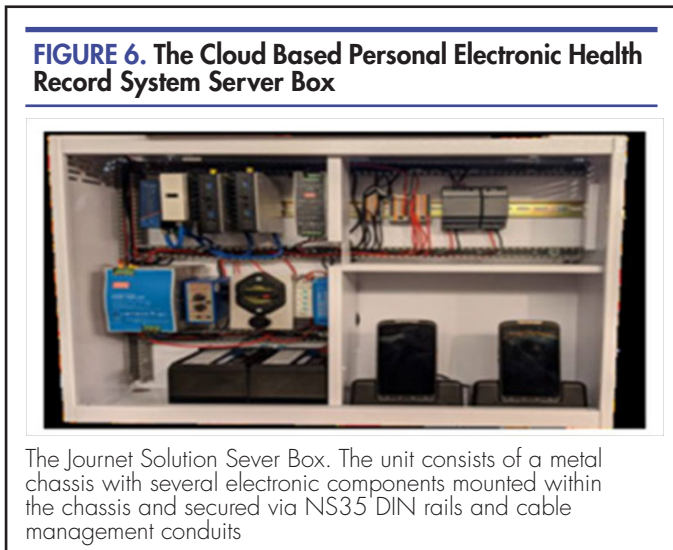


FIGURE 6. The Cloud Based Personal Electronic Health Record System Server Box

The Journey Solution Server Box. The unit consists of a metal chassis with several electronic components mounted within the chassis and secured via NS35 DIN rails and cable management conduits

The consortium created and applied a strong monitoring and evaluation system which included weekly activity -

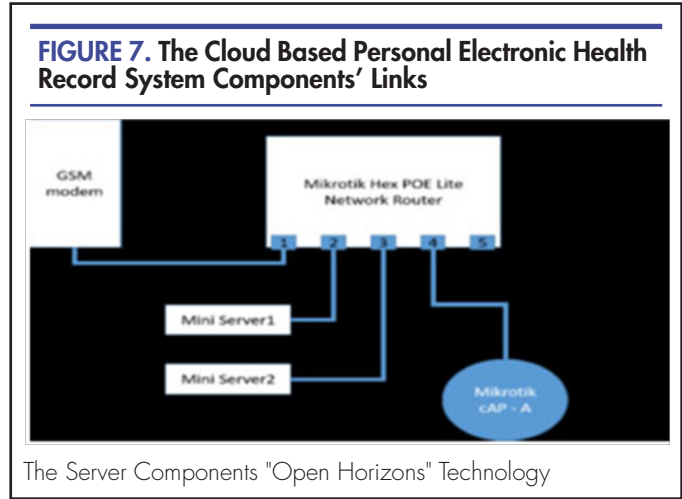


FIGURE 7. The Cloud Based Personal Electronic Health Record System Components' Links

The Server Components "Open Horizons" Technology

implementation reviews by the Broadreach team; Bi-weekly individual review with specific implementers like those involved in the production of weekly epidemiological bulleting or deployment of the Journey solution; Monthly project implementation updates with individual partners (WAHO, IGAD, DUKE and Jembi); Monthly progress updates to USAID; Quarterly consortium meeting to review progress and sharing experiences (joint BroadReach, WAHO, IGAD, DUKE and Jembi); Quarterly reports and annual reports. Annual project reviews were conducted to guide new year's activities planning, setting timelines, and budgets. Each partner reviewed their plans and submitted a fresh annual implementation plan for the new year.

RESULTS

In the fifth and final year of implementation, RAD achieved its key objectives and related deliverables. These include: 1. Regional data governance policies for WAHO and IGAD regions – Allowing regional health data sharing, 2. Quality enhanced health data sharing tools (regional health information products). 3. Cloud based Personal Electronic Health Record System (Mobile electronic health records) -to ensure quality and continuity of child health care (vaccination) regardless of their location. A summary of the achievements is provided in Tables 1 and 2.

Additional Achievements:

Both regions are sharing disease surveillance data and driven by the urgency for addressing the COVID-19 pandemic, they have established functional COVID-19 dashboards.^{18,19} The WAHO dashboard was developed with RAD support while the IGAD dashboard was developed by IGAD member states with support from the World Health Organization. Extracts from WAHO's COVID 19 Dashboard is presented in figure 4 and 5.

The Cloud based Personal Electronic Health Record System (Mobile electronic health records) server system using the Open Horizons technology is illustrated in Figure 6 and 7.

Currently, 4 facilities along the border between Kenya and Uganda are fully operating the cloud based Personal Electronic Health Record System in 4 health facilities.

TABLE 1: Regional Levels Achievements: Building a Culture of Data Use for Policy and Decision






| | |
|---|---|
|  <p>WAHO</p> <ol style="list-style-type: none"> 1. Regional data governance and protection policy <ul style="list-style-type: none"> • Established/ratified entering Implementation phase 2. We Strengthened Establishment of a Functional Regional Health Data Platform <ul style="list-style-type: none"> • Including COVID-19 Dashboard for WAHO 3. We Strengthened production of quality health products enhancing use of data for policy and practice <ul style="list-style-type: none"> • Weekly surveillance of epidemio-prone diseases, regional annual health situation reports developed between 2018-2020 (2021 in progress). A semi-annual health information bulletin and a year health profile (for ECOWAS Member Countries) have been developed, reviewed and finalization is in progress |  <p>IGAD</p> <p>Regional data governance and protection policy</p> <ul style="list-style-type: none"> - In final stages. Ratification by Regional Ministers and Enactment - October 2021 • Establishing/Strengthening Regional Health Data Platform <ul style="list-style-type: none"> • In final stages. Establishment expected in September 2021 • Strengthening production of quality health products enhancing use of data for policy and practice <ul style="list-style-type: none"> • Regional Health Profile 2020/21 in final stages to production by September 2021. |
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TABLE 2: Community Patient Provider Level Achievements: Enhanced Access to Health Services for Cross Border Populations

| | |
|---|--|
|  <p>IGAD</p> <p>Establishment of Cloud-based Personal Electronic Health Record System Integrating cross-border data collection to ensure quality and continuity of child health care (vaccination) regardless of their location</p> <ul style="list-style-type: none"> • Established <ul style="list-style-type: none"> • The Journey solution tested and validated • Cloud-based personal electronic health record system • We improved Vaccination efficiency (vaccine coverage, provider workload reduced) | |
|  | <p>© 2021 BroadReach Group. All Rights Reserved. Confidential Information of BroadReach Group.</p> |

The system will be established in 2 additional facilities along the same border by end of October 2021. Around 20,000 personal cards have been issued since 2018, covering 140,000 immunisation events. Data has indicated patient retention rate of 97%. Only 100 cards were replaced since the system began operating in 2018. 23 health workers have been trained to manage the tools and data upload and additional staff training is planned.

COVID-19 Effects

The COVID-19 pandemic took everyone by surprise. Neither the RAD partnership nor the regional organisations were ready for it. The pandemic posed the following challenges: 1. Delays in implementation of planned activities which required person to person meetings. 2. Additional pressure on the health systems on which RAD activities were being implemented. 3. Deviated attention by regional leaders towards the pandemic and less to projects like RAD. 4. Introducing a new regional priority to the fight against diseases. The situation was worsened by the already year 4 (2019-2020) project's budget cuts whereby the partnership was already operating under financial constraints. Undesirably, due to inadequate preparedness of the RAD partnership and member states, the implementation of RAD projects activities slowed down for about 4 months (January -April 2020). The required continuous engagement with the partners became cumbersome and slow. Actions which required decisions by regional leadership towards the projects' activities implementation took longer than usual. Fortunately, after 4 months of uncertainty and activities slow down, the RAD partnership recovered. It slowly began implementing innovative strategies to allow continuity of activity implementation. The new strategies included conducting activities virtually. All meetings were conducted virtually. Engagements with partners' representatives from member states became virtual and it became necessary to organise several smaller groups than large single group discussions with the virtual approach for better results. Field supervisory visits were conducted virtually and so were trouble shooting activities related to the operations of the cloud based personal health records system for childhood immunisation. However, the additional pressure on health services and regional leadership became an opportunity to support the health system to address the pandemic. The COVID-19 situation posed need for strengthening regional collaboration and coordination. The WAHO regional leadership demanded the production of quality health products and facilitated engagements and collaboration among different health programs working towards the same goals. The RAD partnership was flexible enough to allow adjustments of its activities to support regions to respond to the COVID-19 emergency needs. Improved collaboration between the Integrated Disease Surveillance and Response, One Health Multi-sectoral Coordination Mechanisms and Health Management Information Systems facilitated the production and use of health information products. The production and use of the weekly disease epidemiology bulleting improved to the extent that it was transferred to be under the ECOWAS management to enhance its use at regional level. The COVID-19 dashboard came about as a special demand from the WAHO leadership and as soon as it went live, countries began demanding assistance to-

establish their national dashboards. The same urgency pushed IGAD to develop its own COVID-19 dashboard in partnership with the World Health Organization

The application of the COVID-19 Best practices had also 2 sides. On one hand, workers were not used to wearing masks, hand washing and frequent use of sanitisers when attending their office duties. Therefore, it took a while to achieve full compliance. Broadreach applied social distancing at work and by restricting access to office to only needed workers. The staff were instructed to work from home. This deprived staff the usual social company they were used to. It was therefore stressful to miss the face-to-face contacts and be glued to one's computer at home for the working hours because this became the working tool. Broadreach therefore introduced regular "Be well" sessions to help people learn how to cope with stress. Feedback from staff during these sessions is that they were very helpful. Work performance does not appear to have been affected negatively by COVID-19 Best practices, but to maintain good work performance meant conducting of frequent tele-conferences and meetings, which were not compatible with working from home. Working from home requires time to spent with family members, Children demand extra attention which conflicts with work demands. On the other hand, working from home offered the opportunity to spend more time with beloved ones and also opportunity to help with family chores. The conflict between work and home demands may have added stress to those who could not cope well and again the "Be well" sessions including sessions on mental health became very useful. In general, when talking to staff members, it would appear that the worst has passed, but staff continue to miss each other's presence and the social interactions working together in an office gives. The limitations of this section on best practices is limited research.

DISCUSSION

Both regions have regional health data governance and protection policies (IGAD's policy is for ratification by the regional inter-ministerial committee in November 2021). To facilitate implementation of the policies, user-friendly shorter versions of the policy documents were developed. In addition, each region has been availed with a guide to use the policy document. The establishment of regional health data governance and protection systems in 2 economic regions of Sub-Saharan Africa was a breakthrough in enhancing regional collaboration and coordination of efforts to fight infectious diseases and other health threats. It is a significant achievement in that the 2 regions (WAHO and IGAD) have legal instruments allowing for formal discussions and formulation of regional health policies and practices which are informed by quality regional data. The need for stronger regional collaboration and coordination of efforts has been recognised by the regional leaders, but it required legal instruments to support actions.⁷. The 2 regions were encouraged to start sharing data even before the data governance policies were ratified. This helped to maintain continuous dialogue that allowed clarifications and trustbuilding. The implementation of the ratified policies is therefore a continuity of regional leadership initiated and led practice. For example, while all WAHO member states are currently sharing data with the regional -

health information platform, the transfer of data has been conducted manually to upload data from server to server. Now having established the data governance and protection policy, WAHO has initiated and is progressing well with arrangements to establish automatic data transfer (sharing) from country data servers to the regional health data server. 2 countries; Sierra Leone and Guinea have already received technical support, completed negotiations and are transferring automatically national health data to the regional server. 3 more countries including Ghana, Liberia, and The Gambia, are in the process of doing so while negotiating and building trust with other member states continues.

The IGAD region was slower in implementing RAD activities but is following closely on a similar path of collaboration and data sharing. The regional data server has already been secured and it is in the process of being deployed to serve the IGAD regional health information platform. Its regional data sharing policy is ready for submission to the Inter-ministerial committee for ratification and endorsement. The IGAD's slow pace was caused by the fact that the 2 regions entered the RAD partnership at different stages of development towards regional data sharing. The WAHO region entered the partnership having initiated its own regional health information platform and member states were better informed and prepared to move towards regional data sharing. Importantly the IGAD region manage to initiate bilateral agreements (Memorandum of understanding) to allow data sharing while developing the regional health data governance and protection policy. For example, through such arrangements it was possible to deploy the cloud based Personal Electronic Health Record System and strengthening cross border children immunisation programs of Kenya and Uganda.

CONCLUSIONS AND RECOMMENDATIONS

As pronounced by African wisdom "If you want to go fast, go alone. If you want to go far, go together", the RAD journey required patience and strong collaboration to maintain focus, momentum, and build trust among partners. Through RAD, we learn that nurturing regional collaboration and coordination for effective health solutions takes long and requires patience. Projects or programs of this nature should be long term and should also consider a phased handover period to allow maturity and sustainability of initiatives. We also learn that partnerships and regional institutions need to always be prepared to adjust quickly and respond to shocks. In addition, projects need to have flexibility to be able to adjust and respond to regional and country needs especially at times of emergencies. It is important for partnerships to support regions and countries to respond to emerging needs at times of emergency. That flexibility enhances trust building and adds value to the presence of the project. Furthermore, we learn that health emergencies can be opportunities for strengthening the weak health systems since they create demand to the health authorities. Projects and partnerships must have an eye for and be better prepared to seize such opportunities.

RAD established the foundation for building trust and strengthening regional collaboration and coordination in

health in Sub-Saharan Africa. This foundation has demonstrated great potential for fighting infectious diseases outbreaks including the COVID-19 pandemic. RAD also planted the seeds for a culture of data use to inform policy and decisions in Sub-Saharan Africa. The WAHO and IGAD regions need to implement their resource mobilisation plans to secure internal and external resources to maintain and build on RAD's gains. Regions and countries should invest adequately in strengthening and building on this foundation to strengthen their response to COVID-19. Such investment will have spill over benefits if used as an opportunity to strengthen regional and national preparedness to address the next pandemic.

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Implementation Challenges of Community Directed Treatment with Ivermectin Program for Control of Onchocerciasis in Ulanga, Tanzania

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ABSTRACT

Background: Community drug distributors (CDDs) have a crucial role in distributing ivermectin for onchocerciasis control and prevention. Their roles, experiences and challenges faced in the implementation of community-directed treatment with ivermectin (CDTI) programme could potentially affect coverage, consequently leading to persistent transmission. Therefore, this study aimed to explore the experience and the roles which CDDs plays in implementation of community directed treatment with ivermectin program for onchocerciasis control in Ulanga, Tanzania.

Methods: A cross-sectional study design was used to collect qualitative data in 2018 in Ulanga district, Tanzania. Five community drug distributors were purposively selected for in-depth interviews. Thematic framework approach for qualitative data analysis was used to generate codes, categories and themes.

Results: Out of the five community drug distributors interviewed, two had experience of 15 to 20 years on implementation of the community directed treatment with ivermectin programme while the remaining community drug distributors had experience of less than 10 years. The main challenges faced by CDDs in the implementation of the CDTI programme include; the geographical location of the hamlets (hard to reach hamlets), long distances between houses, low compliance of community members to medication due to fear of side effects experienced before and mistrust of methods of dose calculation, short time of drug distribution and absence of people from their households as the exercise was conducted when community members were involved in agricultural activities.

Conclusions: The challenges faced in the implementation of the CDTI programme could negatively affect the distribution and coverage of ivermectin treatment in the Ulanga district. It's now an opportune time to address the challenges that CDDs are facing in the implementation of the CDTI programme to ensure effective control of onchocerciasis in the district.

BACKGROUND

Onchocerciasis is commonly called River blindness after its geographic locus and most visible symptom. Overall, it causes blindness, disfigurement, and unbearable itching in victims, while rendering large tracts of farmland uninhabitable. This chronic parasitic disease affects skin and eyes. The causative agent for onchocerciasis is a parasitic filarial worm *Onchocerca volvulus*, of the family *filariidae*. Onchocerciasis is transmitted by the bite of infected black flies¹ of the genus *Simulium*. Black flies breed in fast flowing streams and rivers because of the demand for highly oxygenated water during the maturation of the larvae. Females require a blood meal for ovulation, and they transmit infective-stage (3rd stage) larvae as well as ingest microfilariae during the blood meal. The black fly tends to stay within 2 km of its breeding site. The adult worms pair and mate in the human host, and unlike most nematodes that produce eggs, the female *Onchocerca* gives birth daily to thousands of microscopic larvae known as microfilariae. Those microfilariae migrate to tissues

and induce inflammatory reaction when they die, and also, the parasite causes visual impairment and irreversible blindness.²

The recent World Health Organization (WHO) data reported that 198 million residents from 31 countries in Sub-Saharan Africa and five countries in the Americas and Arabian Peninsula are at risk of acquiring onchocerciasis. In 2017, 20.9 million people were infected with onchocerciasis, and among the infected people, 14.6 million had skin diseases, and 1.15 million had vision loss.^{3,4} In Tanzania, 6 million people are at risk of infection in seven foci, namely; Kilosa, Mahenge, Morogoro, Ruvuma, Tanga, Tukuyu, and Tunduru.⁵ The history shows that Mahenge's focus where Ulanga District is located carries the highest burden of onchocerciasis since the 1990s, with the microfilariae prevalence of around 60% to 87% and nodule prevalence of 95%.⁶

The burden of onchocerciasis in Tanzania led to the introduction of CDTI in 1997 by the African Programme for Onchocerciasis Control.^{5,6}

The CDTI is the main intervention for onchocerciasis control using community members known as CDDs for ivermectin delivery in the communities.⁷ The CDTI programme has proven to be successful in reducing onchocerciasis transmission and morbidity when applied annually at coverage of at least 80% within 12 to 15 years.^{8,9} However, the persistent transmission of onchocerciasis has been reported in some areas after 17 to 20 years of annual CDTI.^{10,11} Community drug distributors play a crucial role in the implementation of the CDTI programme, they consist of volunteers selected by community members to distribute ivermectin.¹² Community drug distributors are trained and re-trained every 1 to 2 years to deliver drugs in the community and educate community members on health issues.¹³

In Ulanga district where this study was conducted in Tanzania, a persistent transmission of 2.9% was observed after two decades of annual CDTI.¹⁴ This was supported by the presence of 0.57% infected black fly vectors from the same area indicating that the two decades of annual CDTI have not interrupted transmission.¹⁵ Community drug distributors play significant roles in ensuring the success of the CDTI programme. However, challenges faced by CDDs in implementing the CDTI programme have not been fully explored and mitigated. The challenges could be a hindrance to effective implementation of the programme hence elimination of the disease. Therefore, this study aimed to explore the implementation challenges encountered by CDDs and assess how these challenges impacted program outcomes in Ulanga, Tanzania.

METHODS

Study Design and Setting

A community-based cross-sectional study involving qualitative methods of data collection was carried out in Ulanga district between June and July 2018. This study was a part of the large study that was conducted in Ulanga district in June and July 2018. Ulanga was selected because of persistent transmission of onchocerciasis despite more than two decades of CDTI programme implementation.

Ulanga district is among the six districts of the Morogoro region located at latitude of -8°59'19.90" S and longitude of 36°36'47.92" E. The district has an area of 24,460 km² with an approximate population of 169,853 whereby females are 85,098 and males are 84,755.¹⁶ The main economic activities in Ulanga are subsistence farming, fishing, and mining.

The district has one hospital, two health facilities, and 21 dispensaries. In health services, the following are diseases present: onchocerciasis with nodding syndrome, epilepsy, malaria, worms (soil-transmitted helminths), anemia, diarrhea, pneumonia, protein-calorie malnutrition, tuberculosis, acute Respiratory Infection, diabetes, HIV/AIDS, hypertension, and asthma.¹⁷

The district experiences tropical climatic conditions characterised by annual rainfall approximately between 800mm and 1600mm every year. Also, the district is characterised by perennial rivers that support the survival and breeding of *Simulium damnosum* s.l.¹¹

Study Population

Study population included all 5 key informants (CDDs) from two villages (3 from Uponera village and 2 from Isongo village). Community drug distributors consist of volunteers, both women, and men selected by community members, for distributing ivermectin without payment. Therefore, they have their main jobs for earning income to support their lives.

Sampling

The study used a multi-stage sampling technique to obtain the representative villages. The first stage involved a random selection of the two representative wards from Ulanga district whereby Uponera and Isongo were selected. The second stage involved a simple random selection of one representative village in each of the selected wards whereby Uponera and Isongo were selected. In each of the selected villages, the total number of CDDs was obtained. Uponera village had three CDDs, and Isongo village had two CDDs hence, all of them were invited to participate in this study.

Data Collection

An interview guide was prepared by the researcher and had five sections. The first section collected information on the socio-demographic characteristics of respondents while the second section was composed of questions on experience, selection and training of CDDs. The third section was composed of questions on participation, distribution of drugs and coverage of the CDTI programme. The fourth section was composed of questions on challenges they were facing during the implementation of the CDTI programme and the last section had questions on improvement of the CDTI programme. The interviews were conducted in Kiswahili language and were audio taped. Short notes were also taken to ensure that all the questions and responses were properly recorded.

Data Analysis

The collected data from in-depth interviews were analysed qualitatively using a thematic framework approach. The collected audio data were transcribed verbatim in Kiswahili to obtain the textual format then translated to the English and thereafter back into Kiswahili. The data were coded manually and then organized into categories. Finally, analysis and interpretations were done by clustering similar and related topics together to form major themes as presented into results section.

Ethical Consideration

Ethical clearance was sought from the Muhimbili University of Health and Allied Sciences Ethical Review Board (Ref. No. DA. 287/298/01. A/). Permission to conduct the study in the Ulanga district was requested from the Regional Administrative Secretary of Morogoro, then-District Administrative Secretary, and District Medical officer of Ulanga district after submitting introduction letter attached with ethical clearance from MUHAS. Community drug distributors were informed about the study, given informed consent forms, and requested to sign if they were willing to participate in the study. Community drug distributors were assured that no one will be harmed in the participation of the study and a high level of confidentiality was maintained in the study whereby numbers were used instead of names of partici-

pants. All audio recorded data were transferred into the personal computer of the researcher and locked with a password so that nobody else could access the data.

RESULTS

Socio-demographic characteristics of the study respondents

A total of 5 CDDs were interviewed, their ages ranged from 25 years to 70 years. All CDDs interviewed were self-employed and residents of the Ulanga district as shown in Table 1.

Theme one: Experience, selection and training of CDDs

Out of the 5 CDDs interviewed, four of them were appointed by the village executive officer and members of the village committee because of their experience in community services and hard work except for only one who volunteered. This shows that community members in Ulanga did not have a chance to select their CDDs as recommended by the WHO regulations.

The results also showed that only two CDDs had worked in their position for 15 to 20 years and the remaining ones for less than 10 years, as revealed in the following statements;

“.....I have been working as a volunteer CDD for 15 years; I volunteered to work in this position because at that time no one wanted to work in this position” (Female respondent, Uponera, 55 years).

“.....I was a nurse assistant at the time CDTI programme started in 1997 people used to come and take ivermectin at the district hospital, so when the distribution of drug started directly in the community I was appointed by village executive officer to help my community because of my experience” (Female respondent, Isongo, 49 years).

When the CDDs were asked and probed on type of the training that was given for their position, all of them stated that they were trained every year before the distribution of the ivermectin. One of the CDDs, for example had this to say:

“.....The training is given once every year to remind each other on how to distribute drugs, the measurement to be taken to know the exact dose taken by a person, and how to manage side effects as a result of treatment” (Male respondent, Uponera, 70 years).

Theme two: Community participation, distribution and coverage on CDTI programme

Community drug distributors were asked to state how they distributed ivermectin and how do they ensured that community participated in CDTI programme. The results showed that “house to house distribution” was the main approach that was employed to distribute ivermectin and when it comes to participation of the community in the programme the CDDs said they had the following roles;

“.....After taking the medication from the district hospital, I must announce to community members, emphasize them to take medication and then I distribute the drugs from one house to another in the entire hamlets” (Female respondent, Uponera, 55 years)

“.....In the past community members used to collect medication at my house, but now I must pass house to house so as to ensure people take medication and if people are not there I must come

back or leave the message for them to come to collect the medication” (Male respondent, Uponera, 70 years).

The key informants indicated that women’s uptake of ivermectin was higher than men’s as confirmed by one of the CDDs;

“.....Women highly participate in the control programme compared to men except those who are sick, pregnant or have delivered within five days at the time of drug distribution” (Male respondent, Isongo, 51).

TABLE 1: Socio-Demographic Characteristics of Study Respondents (n=5)

| Characteristics | n (%) |
|------------------------------|--------|
| Gender | |
| Male | 2(40) |
| Female | 3(60) |
| Age group | |
| 25-35 | 1(20) |
| 36-45 | - |
| 46-55 | 3(60) |
| >56 | 1(20) |
| Level of Education | |
| Primary school education | 4(80) |
| Secondary education | - |
| College/University education | 1(20) |
| Occupation | |
| Employed | - |
| Self-employed (Peasants) | 5(100) |
| Duration of Residence | |
| 25-35 | 1(20) |
| 36-45 | - |
| 46-55 | 3(60) |
| > 56 | 1(20) |

Theme three: Challenges faced by CDDs on implementation of CDTI programme and recommendation for improvement

Community drug distributors were asked to state the challenges they were facing during ivermectin distribution because these challenges were thought to affect the use of ivermectin in the community and hindered effective success of CDTI programme to control the onchocerciasis disease. The mentioned challenges were mainly geographical related to the location of hamlets. Some of the hamlets were hard to reach (located in a remote and not easily accessible), and this led to the failure of CDDs to cover all houses, long distances between houses made the CDDs walking extra miles and spent more days distributing the ivermectin. Another challenge was low compliance of community members to medication due to fear of side effects experienced before and mistrust of methods of dose calculation. Absence of people from their houses was another challenge, as in Ulanga many community members were migratory farmers. The distribution of the drug for control of onchocerciasis was often conducted during farming season when many community members were involved in agricultural activities. Another challenge was duration of drug distrib-

ution, the time allocated for drug distribution was short and CDDs were required to return the ivermectin to the health centers after a month. The following are some of the responses as revealed by two CDDs:

“..... There are several challenges that I face as a CDD. Some community members are refusing to take medication because of side effects so its wastage of time going to a certain house and talking to them and at the end they are refusing to take medication. Also, the geographic location of our village is the problem because houses are far from each other so it's difficult to reach every house” (Female respondent, Isongo, 49 years).

Another CDD mentioned transport to be a critical problem;

“.....Transport is the problem in our village which makes the distribution to be difficult hence some of the houses are left unattended. The number of days for distribution of medicines are few that we are supposed to return the remaining medicines to district hospital after a month” (Male respondent, Isongo, 51 years).

On recommendations for improving the CDTI programme, the CDDs gave the following recommendations as a strategy to mitigate the challenges faced in the implementation of the CDTI programme. The distribution of drugs should be done after the farming season when people are at home and are free to participate. This will improve the participation of the migratory farmers in the CDTI programme. Transport fees should be provided to assist the CDDs to reach all villages at times of ivermectin distribution. Instead of a one-day training (current practice), key informants recommend three-day training to enable them comprehend the concepts. Health education about onchocerciasis should be given to community members at least once a year to avoid misconceptions about the effects of the treatment. Finally, all CDDs recommended allowance to be given to them to increase their morale for work as they were not benefiting anything from being CDDs and the work was very difficult.

DISCUSSION

Community drug distributors have a significant role to ensure the community participates in CDTI programme. It is important for community to be careful when selecting CDDs because they can influence, motivate and educate the community to participate in CDTI programme.^{11,18}

However, in Ulanga community members were not involved in the selection of CDDs, the majority of them were appointed by village executive officer with exception of one CDD who volunteered, the practice which is inconsistent with WHO regulations.⁸ It was observed that some of the appointed CDDs were highly experienced, this is because they had been working in this position for a long time since the beginning of the CDTI programme hence have undergone several short trainings. Community drug distributors in Ulanga were trained every year on how to distribute drugs properly in the community so that could educate community members on the importance of ivermectin treatment. Clearly, these findings are similar to the findings of the study conducted in North-Western Ethiopia on knowledge, attitudes and practices of CDDs about onchocerciasis and CDTI.¹³

Distribution of ivermectin in Ulanga was through house to house, the practice which is in accordance with WHO guidelines.⁸ Community drug distributors in Ulanga have a role to educate, motivate and ensure that the community members participate in the control of onchocerciasis which was done through households visits before ivermectin distribution to sensitize the community. Despite the efforts of the CDDs, the coverage of CDTI in Ulanga is fluctuating, ranging from less than 65% in 1997 to 2002, and more than 65% (mean 76%) for the years 2003 to 2017, being below the optimal coverage of 80%.⁵ Some of the barriers to sufficient coverage as mentioned by CDDs included; poor timing of drug distribution as most of the time distribution is done during farming seasons where people are away from their houses, insufficient time allocated for drug distribution as CDDs are required to return the ivermectin to the health centers after a month, hard to reach hamlets due to their geographic location and hence CDDs fail to cover all houses, doubt on the method of dose calculation and fear of side effects occurring as a result of taking ivermectin.

Of the mentioned challenges by CDDs, hard to reach hamlets, doubt on the method of dose calculation, and fear of side effects were also revealed by another study done in Tanzania.¹⁹ Side effects of ivermectin were among the major barriers of community participation in the CDTI program in Ulanga because when a community member experiences side effects or sees their fellows experience side effects may negatively affect uptake in the coming year due to worries, consequently causing fluctuations in coverage. Though the CDDs in Ulanga are trained, they lack the confidence to handle side effects because the community does not trust them, as previously documented in Morogoro, Tanzania.¹⁹ Hence, the recommendation of the provision of health education to the community is crucial to resolve the ongoing misconception on ivermectin treatment.

With regard to gender; women were highly participating in ivermectin control programme compared to men especially when they saw their fellow women as CDDs. This is in contrast with a study conducted in the previous year's which showed men as the head of the households were highly participated in the CDTI programme compared to women, and most of the CDDs were males.²⁰ Recently, in Tanzania, female CDDs have shown to be more tolerant and patient than men.²¹ Similarly, in Uganda, for example, about 70% of the community members believed that women were more persuasive, committed, and patient compared to men when it came to ivermectin distribution activities hence, improving the compliance of community members towards treatment.²²

Study limitations

The study had the following limitations; the CDDs were required to remember the previous year's information on their selection, training, and coverage of the ivermectin distribution hence, the high possibility of recall bias. Also, the study relied on the CDDs reported experiences and challenges rather than direct observation from the study area.

CONCLUSIONS

Community drug distributors have a critical role in ensur-

ing the success of the CDTI programme for onchocerciasis control in Ulanga. The low experience of some CDDs coupled with the challenges they are facing in the implementation of the CDTI has the potential to affect total uptake and coverage of the CDTI programme. Therefore, as we are aiming to eliminate onchocerciasis by 2030, now more than ever it's the opportune time to address the ongoing challenges so as to improve and sustain coverage of the CDTI programme in Ulanga district. Based on the CDDs' insights, there is a need for a neglected tropical disease control programme (NTDCP) to revise the existing guidelines for CDDs. The NTDCP should set the qualification and criteria of the selection of the CDDs, revising the training programme to add to the health education component, and mitigating the challenges faced by the CDDs. Also, the NTDCP should consider the provision of incentives to boost the working morale of the CDDs.

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Evidence Based Dentistry among Dentists in Low and Middle Income Countries: A Systematic Review

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ABSTRACT

Purpose of this systematic review was to bring together studies of evidence-based practice among dentists in low- and middle-income countries, where its use has been reported to be limited. The protocol was registered in PROSPERO. Methodology: We searched the evidence (in English only) from medical databases including PubMed, EBSCO, The Cochrane Library, CINAHL, ScienceDirect, HINARI summon, and SCOPUS and Web of Science via Research4Life, grey literature, hand search from relevant articles, and augmented results on Google scholar. Published reports were retrieved from relevant websites and organizations. Studies included those that looked at key factors that facilitate or hinder Evidence Based Dentistry (EBD), as well as outcomes in terms of: knowledge, attitudes and skills of EB practice among dentists; and the methodology used and their relevance in future EBD strategies. Main focus was on dentists, as practitioners and faculty members. Studies on students and non-dental personnel were excluded. Findings: A total of 4568 records were retrieved and five potentially relevant articles were selected after title/abstract screening. Two articles were excluded after full text screening, and therefore Three papers were included in this review. The studies report limited knowledge, unsatisfactory attitude towards EBD and low practice of EBD and use of scientific evidence databases. None of the studies reported implementation of EBD nor evaluation thereof. The main barriers that constrained application of EBD ranged from lack of interest to infrastructural limitations. Originality: The current review showed that there is a need to strategised implementation of EBD in this region.

BACKGROUND

Globally, there is improvement in accessibility to internet and search engines, leading to an ‘explosion of information’ which is made available widely to both professionals and non-professionals (consumers). This makes the situation complex when it comes to selecting sound research evidence for optimal care, hence, the concept of evidence-based medicine (EBM) was introduced. EBM is defined as a “conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients”.¹ This process integrates individual clinical expertise with the best available external clinical evidence from systematic research.^{1,2} It entails developments that take place globally from research activities, should be used as evidence in making decision while managing patients. It is recognised that healthcare is patient specific, constantly changing and involves uncertainties and probabilities.^{2,3} This process is applicable to all health fields, and dentistry included, which is termed as evidence-based dentistry (EBD).

The American Dental Association defines the evidence based dentistry (EBD) as “an approach to oral healthcare that requires the judicious integration

of systematic assessments of clinically relevant scientific evidence, relating to the patient’s oral and medical condition and history, with the dentist’s clinical expertise and the patient’s treatment needs and preferences”⁴ (<http://www.ada.org/en/about-the-ada/ada-positions-policies-and-statements/policy-on-evidence-based-dentistry>).

EBD refers to a broad set of three distinct skills: 1) the building of skills in students and dentists in assessing literature to directly allow them to knowledgeably read, interpret and assess clinically-relevant *original research articles*, i.e. what is often referred to as ‘primary sources of information’ or ‘primary literature articles’; 2) skills to directly allow them to knowledgeably read, interpret and assess clinically-relevant *literature review articles*. This might be either traditional literature review articles or systematic review articles, the latter either with or without meta-analysis (sometimes referred to as *summary articles* or the *summative literature*); and, 3) the building of Problem/population, Intervention, Comparison group, and Outcome (PICO) skills in students and dentists to generate an answerable question⁵. Ultimately, this will build on how they can incorporate the findings of either *original research art-*

icles or literature review articles into their 'evidence-based dentistry' decision-making process to provide 'evidence-based' care for their patients. Hence, the basis for clinical decision in EBD, involves a triad of best available evidence, together with practitioners' expertise and patient characteristics or preferences.

Utilisation of evidence in patient care has a number of benefits including but not limited to support practitioner's decision-making process as well as enhance trust in treatment by the community.^{6,7} EBD is useful when it comes to assisting in cost containment in health care and positively impacting on patient treatment outcome. EBD also makes practitioners more accountable in their practice; and allows incorporation of clinical research into practice. EBD, when included as an integral part in patient dental care, dental training and research was seen to improve skills and expertise and treatment outcome.

Efforts have been done to integrate evidence-based practice (EBP) into clinical practice worldwide. These efforts have been evaluated across different health fields including general physicians, nurses, occupational therapy, physical therapists, western herbal medicine providers, dentists and the like. Strategies utilized to incorporate EBD included: promoting online knowledge transfer on rapid access to information on EBD among dentists; inclusion of summaries of systematic reviews and recommended treatment and guidelines; and in dental education⁵. Due to the complexity of dental care, use of evidence in dental practice has been reported to be limited. The latter is reported to be due to scarcity of literature on high evidence research such as Randomised Control Trials (RCT)⁸. Models that specifically target dental profession are important due to the level of control a patient has concerning how, when and if it is necessary to treat dental problems in terms of personal desires and insurance benefits⁸. Building a research culture during undergraduate training is one of the basic strategies to inculcate utilisation of research evidence in patient care. In a study that assessed dental and medical students in Saudi Arabia, reported deficient knowledge and attitudes towards EBP and recommended changes that will enhance implementation of EBP.⁹ Studies have revealed marked improvement in students' knowledge, attitudes and skills to practice EBP following EBP training. This has been observed among nurses, medical, as well as dental students.¹⁰⁻¹²

Most decision making on treating patients in most low- and middle-income countries (LMICs), has been based on what has taken place during normal undergraduate or postgraduate training. Hay and colleagues also reported that, most physicians rarely used scientific evidence, but rely on their own or colleagues' experience in patient care.¹³ On the same note, few studies done in LMICs on EBP showed limited use of scholarly electronic journals and the use of non-scholarly information (such as Google) was high.¹⁴⁻¹⁶ Due to the fact that, developments in dentistry do occur significantly, having good understanding and knowledge on acquiring accurate information is one of the key components that will assist in translating research evidence into clinical practice / community decision making.

There is a lot of primary research regarding EBD among

dentists when it comes to their knowledge, practice and skills; as well as implementation strategies. The reported research has mostly been conducted in the upper middle- and high-income countries. The objective of this review, therefore, was to bring together adequate studies that assess the implementation of EBP among dentists in low and middle and income countries. We looked at the methodology used if they are adequate; and also, the key factors that facilitate or hinder EBD, as well as outcomes (knowledge, attitudes and skills) of EB practice among dentists, to assist in recommendation of future strategies.

METHODOLOGY

The protocol for the current study was registered with PROSPERO databases in 2018, ID CRD42018090216.

Criteria for Considering Studies for this Review Types of Studies

We included all cross-sectional survey studies, qualitative studies, case-control studies, randomised controlled trials, quasi-experimental studies, and cohort studies with or without comparison groups.

Participants/Population

We included studies that had focused on dentists, as practitioners and faculty members. We excluded dental students as well as other studies that had focused on both dentists and other medical practitioners such as medical doctors.

Intervention

We included studies that had the application of Evidence Based Dentistry (EBD) among dentists in terms of having knowledge and skills on acquiring accurate information and utilization of scientific evidence in patient care.

Main Outcome

The study assessed the improved levels of knowledge, skills, attitudes and practice of evidence-based dentistry among dentists from the low- and middle-income countries. The study compared the change of knowledge, skills and attitude and before and after the implementation of EBD. Additional outcomes included the following: Change of behavior towards EBD practice among dentists, formulation of guidelines, improved search strategies and discussions in meetings after implementation of EBD

Search Methods for Identification of Studies

We searched evidence from medical databases in November, 2018, and we updated the literature between October and January, 2020. These databases included PubMed, EBSCO, The Cochrane Library, CINAHL, ScienceDirect, HINARI summon, and SCOPUS and Web of Science via Research4Life. Moreover, we conducted a grey literature search from respective databases and conducted a hand search from relevant articles in the subject matter. We also searched Google scholar to augment results from other databases. Relevant literature and published reports were retrieved from other websites and organizations. We searched literature published in English only and without restricting time period. The search terms that were used for each database are attached in Appendix 1 (<http://tinyurl.com/EBDappendix1>).

Screening

Two review authors conducted the search and screened the research studies, by titles and abstracts for inclusion. Further, the authors conducted the full-text screening. Agreement on their inclusion was reached via consensus. Rayyan software was used to conduct the title/abstract screening, while CADIMA was used for full text screening. An experienced researcher was consulted in case of the discrepancies during data screening.

Data Extraction

Data extraction was carried out under the guidance of the PRISMA checklist¹⁷. Two review authors independently extracted data from the included studies using a standardized data extraction form that was created in CADIMA. Afterwards, the data compared. An experienced researcher was consulted in case of the discrepancies during data extraction.

Risk of Bias Assessment

The risk of bias of the included studies was assessed by using the scale for quantitative and qualitative studies developed by Kmet and co-workers¹⁸. The tool for the quantitative studies has 14 items, which can be scored based on the degree to which the specific criteria were met ("yes" = 2, "partial" = 1, "no" = 0). The items that were not applicable to a particular study were scored as "N/A"¹⁸. Thus, they were not included from the summary score. Therefore, the "summary score for each paper was calculated by summing the total score obtained across the 14 items and dividing by 28 of the total possible score"¹⁸. The tool for qualitative studies had ten items, and the scores can be calculated in a similar fashion as for quantitative studies. The 'not applicable' option is not allowed for quantitative studies. Therefore, the "summary score for each paper was calculated by summing the total score obtained across the ten items and dividing by 20 of the total possible score"¹⁸. Two raters (authors) performed independently the risk of bias and then resolved differences.

Data Analysis

Structured narrative review of the studies is presented in this review. We used Excel to code and categorize data for qualitative data analysis.

FINDINGS

Search Results

The search retrieved 4568 records, and 775 duplicated records were excluded (see [Figure 1](#)). About 3793 were selected for further screening, and 3788 were excluded following title and abstract screening. About five potentially relevant articles were selected, and two articles were excluded following full text screening based on the pre-specified inclusion and exclusion criteria. About three papers were subjected for quality assessment, and they were further included in the qualitative analysis.

Study Quality, the Risk of Bias, and Quality of Evidence

The risk of bias was further assessed for the two quantitative studies that were selected. The overall scores ([Table 1](#)) assigned by both reviewers was 0.9. Both reviewers allocated the same overall score to the two studies. The risk of bias was further assessed for the one

qualitative study that was selected. The overall scores (See [Table 2](#)) assigned by both reviewers was 0.5. Both reviewers assigned the same overall score to the study.

Methodological Issues of the Included Studies

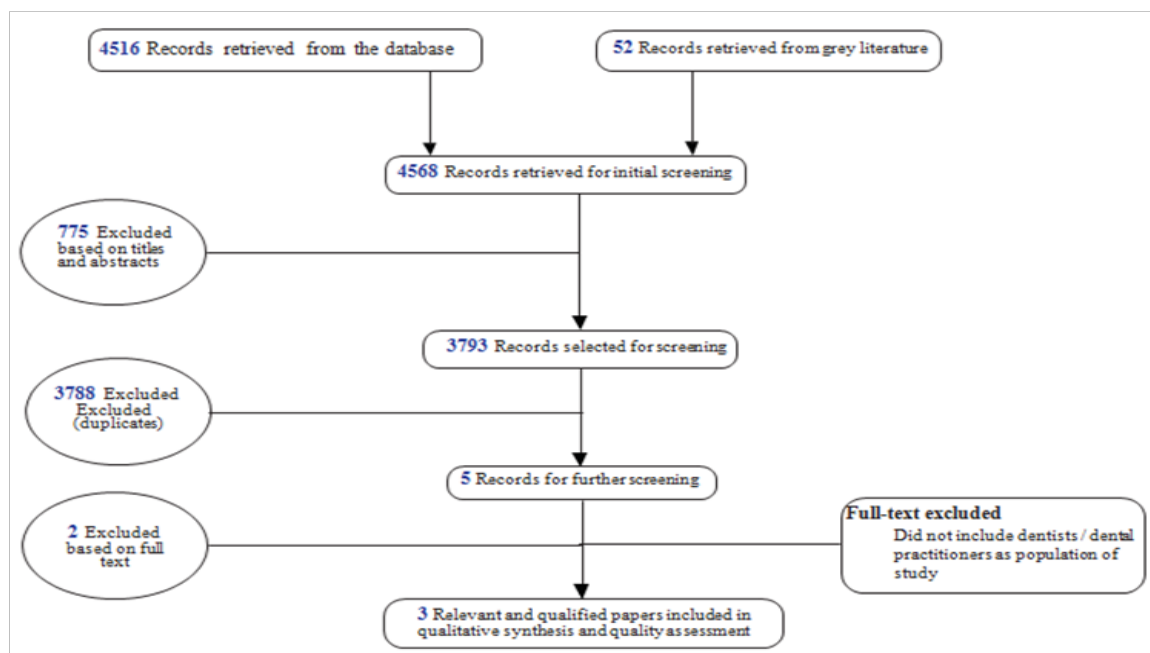
There was a total of three articles that fulfilled the criteria and were qualified in qualitative synthesis and quality assessment.¹⁹⁻²¹ Two studies were conducted in Nigeria and one in Rwanda.¹⁹⁻²¹ Two of these studies involved assessment of knowledge, attitude and practice of dental practitioners and faculty on EBD.^{19,20} The third article aimed to determine the level of knowledge, attitude, and practice of oral health care providers toward the use of online medical databases for clinical decision-making processes.²¹ None of the studies reported presence of EBD implementation strategies nor evaluation thereof. The first article aimed to assess the state of EBD in the four fully accredited dental schools in Nigeria as an example of a developing economy.²⁰

This study involved, firstly, literature search on EBD that included six articles. Secondly, faculty members, dental specialists and resident doctors were interviewed over the phone. Among the six articles retrieved from literature search, three of them reported on steps by step procedures to follow on how to conduct EBD practice; while the other two reported on application of EBD for different dental procedures; the last one was a letter to the editor.²²⁻²⁷ The second reviewed article conducted questionnaire survey among dentists registered with medical and dental council (N=114) in Nigeria¹⁹. While the third article involved oral health care providers (N=201) who are registered either with the Rwanda Allied Health Professional Council (RAHPC) or Rwanda Medical and Dental Council (RMDC)²¹. The latter also utilized self-administered questionnaires. See Appendix 2 for more details (<http://tinyurl.com/EBDappendixII>).

The studies were ethically approved by their governing bodies and permission to conduct studies were reported as University of Rwanda College of Medicine and Health Sciences (CMHS) Institutional Review Board and permission to obtain contact details from RAHPC and RMDC; and the Senate Research University of Western Cape^{19,21}.

Awareness and Knowledge on EBD

All studies report that knowledge and awareness of EBD to be below average or of low level.^{20,21} Similarly, on assessment of knowledge of different online databases, Adeoye reported that slightly over 50% were not aware of the Cochrane collaboration while about 20% had minimal knowledge of the same¹⁹. In addition, whereas systematic review could be defined by 42% of participants, 25.4% of them were not aware of the systematic review terminology. Critical appraisal terminology was understood by about 50%, but more than a third of them were not aware of it¹⁹. Less than one third of the respondents could choose correct definitions of EBD related terms, including evidence-based practice, critical appraisal and systematic review (30.7%, 31.6% and 21.1%, respectively). Among those who asserted to have knowledge on the three terminologies of EBP, systematic review and critical appraisal, only 32.5%, 40.4% and about half (54.4%) had truly answered corre-

FIGURE 1: Flow chart diagram: Publications screening process to get relevant papers that qualified for data synthesis and quality assessment**TABLE 1: Risk of Bias Results for Quantitative Studies**

| Criteria | Adeoye, 2008 | Nzabonimana et al., 2019 |
|---|------------------|--------------------------|
| 1. Question / objective sufficiently described? | 2 | 2 |
| 2. Study design evident and appropriate? | 2 | 2 |
| 3. Method of subject/comparison group selection or source of information/ input variables described and appropriate? | 2 | 2 |
| 4. Subject (and comparison group, if applicable) characteristics sufficiently described? | 2 | 2 |
| 5. If interventional and random allocation was possible, was it described? | N/A | N/A |
| 6. If interventional and blinding of investigators was possible, was it reported? | N/A | N/A |
| 7. If interventional and blinding of subjects was possible, was it reported? | N/A | N/A |
| 8. Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported? | 2 | 2 |
| 9. Sample size appropriate? | 2 | 2 |
| 10. Analytic methods described / justified and appropriate? | 1 | 1 |
| 11. Some estimate of variance is reported for the main results? | 1 | 1 |
| 12. Controlled for confounding? | N/A | N/A |
| 13. Results reported in sufficient detail? | 2 | 2 |
| 14. Conclusions supported by the results? | 2 | 2 |
| Total | 18/20=0.9 | 18/20=0.9 |

Key: 2 = Yes; 1 = Partial; 0 = No

ctly¹⁹. On the same note, Nzabonimana et al., reported that participants had low level of awareness of useful databases for clinical decision making such as PubMed (41%), Drug.com (29%), Medscape (16%), and MedlinePlus (14%).²¹

TABLE 2: Risk of Bias Results for Qualitative Study

| Criteria | Adeniyi & Adeyemo (2010) |
|--|--------------------------|
| 1. Question / objective sufficiently described? | 2 |
| 2. Study design evident and appropriate? | 2 |
| 3. Context for the study clear? | 2 |
| 4. Connection to a theoretical framework/ wider body of knowledge? | 1 |
| 5. Sampling strategy described, relevant and justified? | 0 |
| 6. Data collection methods clearly described and systematic? | 1 |
| 7. Data analysis clearly described and systematic? | 0 |
| 8. Use of verification procedure(s) to establish credibility? | 0 |
| 9. Conclusions supported by the results? | 2 |
| 10. Reflexivity of the account? | 1 |
| Total | 11/20=0.55 |

Key: 2 = Yes; 1 = Partial; 0 = No

Attitude towards of EBD

The reviewed studies indicated that poor attitude towards EBD was observed in most primary studies. Contrary to this, Adeoyereported that almost all (97.4%) the participating dental practitioners were interested in getting more informed on EBD with 42.1% desiring short courses as way to get the information.¹⁹ Additionally, the latter study stated that 46.9% of those with awareness on EBD concept felt that it was important while 17.7% felt the EBD concept was not important.¹⁹ Similarly, Nzabonimana et al., reported that positive attitude towards the use of online medical databases and resources is important to support clinical decision²¹. Furthermore, the oral care providers in this study, also believed availability of online resources is beneficial for patient care.

EBD Practice

The results indicate that there was low level of practicing EBD among dental professionals in the reviewed studies. EBD was not practiced by most dental practitioners, with majority utilizing clinical experience and expertise as the main basis for decision making during patient care at their centers.²⁰ Nzabonimana and co-workers in their assessment of utilization of online resources for clinical decision making, reported that slightly less than half (49.7%) of the oral health care practitioners agreed that use of online databases was useful for clinical decision making while 20.4% disagreed and 29% where neutral.²¹

Basis for decision making in patients care and information sources consulted

The results indicate that electronic resources and person to person communication as the main sources of information for dental professional's patient care services. For instance, Nzabonimana found that most dental professional relied on Google (81%) and 60% used YouTube videos for professional needs.²¹ Adeoye reported that, majority of the dentists (68.4%) consulted either friends / colleagues opinion; 18.4% used textbooks and 7.9% electronic database when uncertain about choices of treatment¹⁹. The study among Rwandese oral health care provides reported information sought for was about clinical procedures (34.8%), drug prescription (24.8%) and drug interaction (5%).²¹

Implementation Strategies of Evidence-Based Dentistry

None of the studies retrieved for this review reported structured implementation strategies on evidence-based dentistry by institutions or hospitals for students, postgraduates, faculty or dental / oral clinicians. All studies reported on knowledge, attitudes and practice of EBD. Therefore, evaluation of implementation was not applicable.

Behavior Changes

Adeoye reported that majority of the participants (82.3%) with awareness on EBD agreed to have changed their behavior to use the EB concept during practice¹⁹. The change was attributed to reading articles on EBD. The change in practice was also attributed to the quality of the journal articles read, the types of journals as well as the authors. Very few respondents (N=10) in the study reported to have participated in EBP courses.

Established EBD Activities

None of the articles reviewed reported any formal and structured EBD training for clinicians or dental students.

Barriers for EBD Practice

Two of the studies reported barriers perceived by dental practitioners towards practicing EBD. Adeniyi and colleaguereported five barriers as outlined here: firstly, deficient practitioner interest; secondly, in dental health care, conventional model was more convenient, beneficial and effective than the EB model; thirdly, for most dental health conditions, reliable and high-level evidence is scarce, and that the retrievable evidence may not be applicable in local settings as they are from dissimilar cultures²⁰. Fourthly, challenges in infrastructure such as unreliable electricity power supplies, limited access to web-based subscription medical databases, computers and internet services; and lastly, scarcity of mentors who are passionate about EBD. Additionally, Adeoyereported the most mentioned barriers being limited knowledge and awareness of EBP, inadequate finances, as well as equipment and materials¹⁹. Not having enough time for EBD practice was also cited as an obstacle due to high workload. Also stated was the fear related to slow rate of acceptance by dentists and limited opportunities for training EBP.

DISCUSSION

Methodological Issues

In this review, there were three articles that fitted the criteria for inclusion into this review, showing the scarcity of EBD research in LMICs. Similarly, the current evidence on implementation strategies of EBD in LMICs is lacking. We expected to carry out meta-analysis and therefore to deploy meta-regression analysis by age, geographical location as well as other demographic characteristics. This analysis could not be performed due to a limited number of quantitative studies that are comparable. Despite the minimal number of articles included, systematic review can assist to identify that as a gap and form basis to suggest further work on the area of interest.

Methodologically, the included studies mainly focused on the cross-sectional survey methods and qualitative interviews. Further, it is worth noting that the risk of bias assessment for qualitative studies was moderate, while the rating for the quantitative studies was above 0.9 percent. These findings indicate a good quality of the applied methods in the included studies. However, since the included studies only applied cross-sectional surveys, and minimal use of qualitative methods, there is a need for a more rigorous mixed method studies that will combine both quantitative and qualitative studies. Qualitative studies will assist to understand the context of EBD, while quantitative studies e.g., Randomized Controlled Trials (RCTs) will enable to ascertain the extent of the application of EBD, and areas for improvement.

Knowledge, attitude and practice of EBD

The reviewed studies report low and below average knowledge and awareness of EBD and low use of EB databases.¹⁹⁻²¹ Significant number of dentists with limited levels of knowledge on EBD has been reported elsewhere in countries like Iran and Pakistan^{28,29}. Studies reveal that having knowledge on issues pertaining to EBD, increases chances on uptake of EBD in patient care decision making¹². Currently, access to internet has increased globally, this is true also for the LMICs. The improved access to information, necessitates the need to strategize implementation of EBD, particularly, to build capacity in utilization of appropriate online peer reviewed medical resources and tools for clinical decision making. Training in the form of continuing educational programs to clinicians and faculty; and incorporation of EBD modules into degree/ certificate programs has been recommended.^{28,29}

A positive attitude is essential for a change to occur towards a desired outcome. The current reviewed studies showed variation in reported attitudes of the dentists towards EBD. The dentists in the study by Adeniyi and colleague, reported negative attitudes towards utilization of EBD, unlike the other two studies that showed positive attitudes towards EBD¹⁹⁻²¹. The negative attitudes stated were mostly related to lack of interest as well as unfavorable conditions for EBD practice, is a common phenomenon in most LMICs. This calls for interventions geared towards not only improved knowledge and attitudes but also making available the required tools to make EBD practical. The latter efforts are also applicable and may bring more effective outcomes, in situations where attitudes are positive among the dentists^{19,21}.

Practice of EBD and use of scientific evidence databases was low among the dentist in the current review. Moreover, even though a substantial number of dentists

reporting EBD practice in the current review, a large number could not correctly respond to the EBD knowledge questions.¹⁹ As reported in a previous study in Kuwait, despite the high percentage of dentists reporting the use of EBD, fewer than fifty percent had reasonable understanding of fundamentals related to EBD.³⁰ Majority of the dentists rely on experience and obtaining information from colleagues or textbooks and non-peer reviewed information, which are convenient to them, but are considered not to have sufficient evidence for decision making. The study found that electronic resources and person to person communication as the main sources of information for dental professionals' patient care services. On electronic sources, the findings further showed that dental professionals relied on the Google (81%) and YouTube videos (60%) for professional needs. The high use of Google search has also been reported in other studies¹⁶. This finding indicates that the use of e-resources is discouraging as one would have expected probably due to lack of awareness and skills on how to use e-resources. Although Google is a good resource for retrieving large amount of results for dental professionals, concerns have been raised about how reliable is the information that it retrieves.¹⁶

Implementation of EBD

The lack of studies, in this review, reporting implementation strategies for EBD in LMICs justifies why there was low or below average levels of knowledge on EBD. On the same note, EBD interventions, could improve dentists' attitudes towards the use of evidence in decision making and hence practice EBD. This underscores the need for EBD interventions among dentists in the region.

Perceived barriers to practice EBD

There was a high number of literature that assessed factors affecting uptake of EBP with more focus on medical profession. Despite the similarities in identified factors associated with EBP in other professions with those for dental profession, there is considerable differences in medical and dental practice due to differences in funding and organizational structures³¹. Accessibility to dental literatures, insurance coverage to name the few, require plans that will be based on barriers and promoters specifically for EBD^{31,32}

As reported a systematic review previously, shortage of time and financial constraints featuring as barrier to EBD practice³³

In our review similar barriers were noted, and in addition, cultural issues and non-supportive infrastructural were mentioned, requiring cultural and societal sensitive evidence to be obtained for effective implementation of evidence-based dentistry.

CONCLUSIONS

The current systematic review revealed limited number of studies on EBD, and that none of the studies reported presence of EBD implementation strategies nor evaluation thereof. The dental professionals mainly relied on the electronic resources and person to person communication as the main sources of information for their patient care services.

The study findings indicated a low and below average of

knowledge and awareness of EBD and relevant databases for EBD. Poor attitude towards EBD was observed in most primary studies. Practice of EBD and use of scientific evidence databases was low among the dentist in current review. In terms of behavior change, one primary study reported that most of the respondents were aware of EBD concept and that reading a research / scientific article caused them to change their practice.

None of the reviewed articles reported implementation of any formal and structured EBD training for clinicians or dental students. A number of barriers that constrained application of EBD were noted in the reviewed studies, which included: lack of interest, the traditional model for decision making is effective and more convenient than EBD, scarcity of reliable and high-level evidence in the world dental literature may require cautious application in our settings, infrastructural limitations (i.e. erratic electricity power supplies, limited access to e-resources, insufficient access to computers and internet facilities), lack of mentors, lack of adequate knowledge and awareness of EBP, limited finance, lack of sufficient time for EBD, and a lack of adequate training opportunities on EBP.

Methodologically, the included studies mainly focused on the cross-sectional survey methods and qualitative interviews. Given the fact that there is low application of EBD and poor use of EBD resources, the study had several implications to improve practice, policy and research methods, as shown below:

Practically, the study recommends the following: Dental schools and hospitals need to build capacity to dental practitioners, faculty and students in the form of continuing educational programs and incorporation of EBD modules into degree/ certificate programs. These training programs should inform them about evidence based online databases and resources to increase accuracy of their clinical decision making; Dental schools and hospitals libraries need to have promotion plan that will encourage the application of EBD to dental practitioners, faculty and students by using print and electronics means such as posters, leaflets, online videos on the websites etc.; Dental schools and hospitals need to form evidence-based study clubs between different specialties of healthcare in oral health to encourage adoption and use of EBD; Dental schools and hospitals need to ensure that libraries are kept up-to-date and relevant especially in healthcare as well as in the hospitals; Dental schools and hospitals need to improve the ICT infrastructure to ensure there is adequate access to computers, internet and electrical power for effective application of EBD; Responsible professional Council should give directives to the dental practitioners to regularly attend courses on EBD and to include it into their daily clinical practice; Methodologically, the study recommends a need for a more rigorous mixed method studies that will combine both quantitative and qualitative studies; The study also recommends the need for allocation of funding for future research on evidence-based dentistry in the region; In terms of policy, dental schools and hospitals need to set up policies and guidelines that will encourage oral health care providers to refer to peer reviewed sources to ensure that they utilize reliable current and evidence-based information for patient management.

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Successful Transabdominal Removal of Penetrating Iron Rod in the Rectum: A Case Report

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ABSTRACT

Foreign bodies in the anus and rectum are not uncommon presentations globally. Reasons for foreign bodies in the rectum can be trauma, assault, psychiatric reasons but the most common reason documented is sexual pleasure, and objects range from sex toys to tools to packed drugs. Regardless of the reason, health care providers must maintain nonjudgmental composure and express empathy.

Numerous cases have been reported of anorectal foreign body due to various causes. Removal of the objects has mostly been through rectally but some does need surgical intervention. A multidisciplinary approach and radiologic investigations are important to guide in the management outline. Establishment of guidelines for anorectal foreign bodies are needed to guide surgeons and emergency physicians on the course of treatment.

We present a case of an eleven-year old school boy slid and fell on an iron rod that penetrated his rectum through his anal canal. Presented with clinical features of peritonitis, where emergency laparotomy was done and the iron rod was extracted abdominally with primary repair of the rectum. The boy recovered well and was discharged four days after with no complications.

INTRODUCTION

The earliest cases of anorectal trauma due to foreign body reports go back to the 1500s and since then the numbers have increased of reports of foreign body in the rectum^{1,2}. Many objects have been mentioned to have been found in the lower gastrointestinal tract including screw drivers and even a tool kit, but the most common reason for anal insertion by far is said to be sexual pleasure^{1,3}. Occasionally some objects have been ingested and are passed through the entire gastrointestinal tract and be lodged in the rectum.^{2,4} Patients usually are reluctant to seek medical attention as it may be an embarrassing situation therefore it is important for clinicians to maintain compassion and nonjudgmental composure¹.

Penetrating injuries in the anorectal region in children are rare but when encountered they have high morbidity and mortality⁵. In young patients however, the incidence is rising due to auto-erotic acts and behavior disorders³. Generally colorectal trauma is mainly encountered in the military setting at 5-10% compared to civilian setting at 1-3% incidence⁶. It is essential in the management to have a multidisciplinary approach, from the paramedic surgeons and also the fire department, as they have the appropriate tools to cut the and free the object to aid transportation and removal^{3,5}. There are many endoscopic and surgical techniques on literature described on removal of various foreign bodies from

the anorectal. We report the successful extraction of an iron rod that penetrated the rectum through the anus in an 11-year old school boy.

CASE PRESENTATION

An 11-year-old boy presented to us after falling accidentally on a metal rod six hours after the incident. He was walking home from school, slid and fell on a metal rod with a curved end in an abandoned construction site. He was brought to the hospital in a private car by his mother directly after the incident. The iron rod went through his anal orifice. The child reported of some lower abdominal pain that was accompanied by some fresh bleeding from the rectum. The child denied urine incontinence. Upon examination he was a well nourished child, fully alert, in moderate pain, mild conjunctival pallor, saturating at 95% on room air, pulse rate of 104 beats per minute, blood pressure of 98/65 mmHg and had axillary temperature of 38°C. On local examination, there were no perianal injuries noted with normal anal verge and muscle tone but a rod into the anal orifice (Figure 1). His abdomen moved with respiration, had rebound tenderness and guarding, with reduced bowel sounds. Plain abdominal pelvic x-rays were done showing the rod in the rectum with no surrounding emphysema (Figure 2). Our working diagnosis was peritonitis due to perforated bowel, an-

d was scheduled for an emergency laparotomy. The boy was given tetanus toxoid, intravenous Ceftriaxone, Metronidazole and Paracetamol as pre and post operative antibiotics.

Intra-operatively, through a midline incision, there was turbid ascites that was not foul smelling. The iron rod hook noted in the abdominal cavity having perforated the anterior part of the rectum at the peritoneal reflection (Figure 3). The rod was extracted abdominally, refreshing and primary closure done of the rectum. The iron rod was hooked at one end, approximately a meter long, weighed about 400 grams and did not have rust on its surface (Figure 4). The boy fared well post operatively and was nursed in the general ward for four days before being discharged, as his vitals were within range with no complications encountered during the operation. During his stay there was no signs and symptoms of local and systemic infection and was passing stools normally per rectally. He was then reviewed at the outpatient unit three weeks later whereby his abdominal incision had healed, did not have any abdominal signs or symptoms and had resumed his normal activities including schooling.

DISCUSSION

Many patients with rectal foreign bodies are men aged between 20 and 40 years, and present to the hospital after exhausting all the efforts of removing the object at home^{2,3}. The most common causes are behaviour disorders and sexual pleasure in recent years³. The true incidence is not known of foreign bodies in the rectum as many do not seek medical attention for obvious reasons. Objects are sometimes inserted involuntarily and therefore require extra care as they are often cases of abuse or rape and especially in children³. Whatever the cause, the treatment of these patients require a multidisciplinary approach to avoid serious complications^{3,5}.

There are various methods mentioned by Gentile et al. on removal of the foreign bodies, and they include manual trans anal extraction under sedation, laparoscopic assisted trans anal extraction and laparotomy being the last resort. The authors also mention the attempt to milk the foreign body out during laparotomy even if the gastrointestinal tract is perforated³. Similarly, Gajjar et al. also state the importance of trans anal removal of the foreign object during a laparotomy with closure of the perforation with a diversion colostomy. The authors also highlight the importance of colonoscopy and abdominal x-ray to rule out injury after removal². A colotomy can be made if the object cannot be pushed out, and colostomy if the peritoneum is contaminated from a perforation³.

In our case, the rod had perforated the anterior rectum with minimal peritoneal contamination hence the object was abdominally removed and primary repair was done of the perforation successfully. This could also be because the patient presented early and surgery was done early resulted in successful outcome unlike the case reported by Shaban et al where their patient had a foreign body for a week and also perforated the rectum¹.

Shaban et al continue to mention that the preferred and first line management of foreign bodies in the rectum is conservative followed by minimal invasive and lastly surgery with or without colostomy if the gastrointestinal

tract has been perforated. They state that primary repair can be done if the patient has limited injury (lacerations less than 50% of the circumference) which was in our case, however the surgeon should decide intra-operatively depending on the contamination of the peritoneal cavity¹.

In a similar case report by Ozaydin et al, the authors highlight the importance of early intervention for improved outcome in terms of sepsis control and early wound healing, as this was the pathway of management in our case⁵. A French study by Goin et al studied the feasibility of non-operative management (NOM) for treatment of penetrating abdominal trauma, in which the failure rate was 7.2% and the authors concluded that NOM is safe for trauma patients, reduced hospital stay and cost nevertheless CT-scan can aid in patient selection⁷.

Another similar study also showed the laparoscopic surgery in abdominal trauma patients has less postoperative pain, lesser wound infection, short hospital stays and comparing to laparotomy neither had missed injuries⁸. Proximal fecal diversion by colostomy is the most conservative management for extraperitoneal rectal trauma due to the difficulty in mobilization and anastomosis. In contrast, intraperitoneal rectal injuries can be repaired primarily with or without diversion depending on the surgeon’s discretion. Distal rectal wounds could be repaired if accessible transanally⁹.

FIGURE 3. Curved End of the Iron Rod Perforated Anterior Wall of Rectum

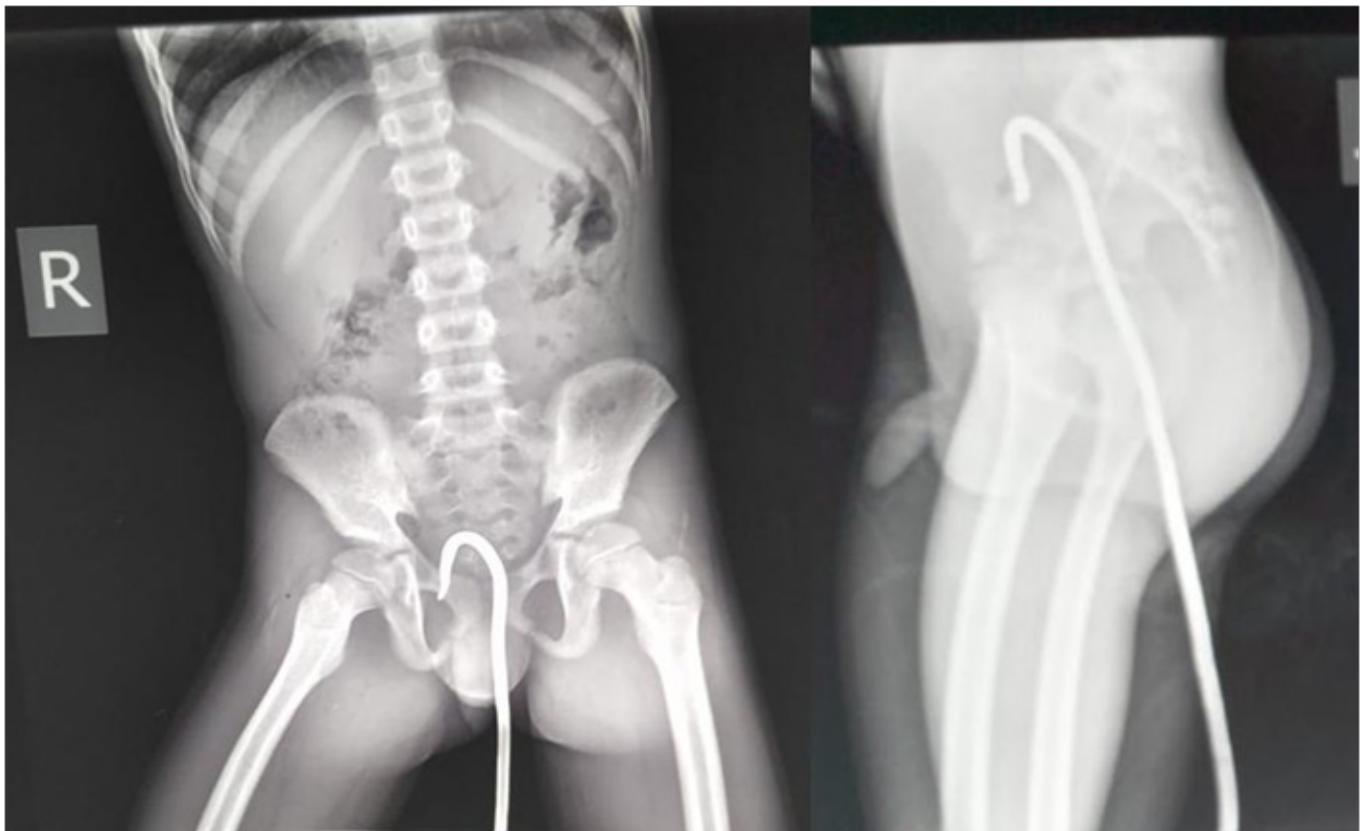


FIGURE 1: Iron Rod Lodged into Rectum through Anal Orifice



FIGURE 4: Iron Rod with Curved End (Approximately 100 Cm Long and 400 Grams)



FIGURE 2: X-Ray Showing Metallic Object with Curved End into Rectum with No Emphysema

A different study showed that those with intraperitoneal injury managed with fecal diversion developed more abdominal complications ($p=0.003$) and concluded that most patients with intraperitoneal injuries underwent direct repair or resection whereas diversion did not improve the outcomes¹⁰. As in the index case, the colon was primarily repaired as the patient did not have a high risk of anastomotic leak and the nature of injury was non-destructive as described by Brown et al¹¹.

Management of penetrating trauma to the rectum is still not clear globally, but key principles are primary closure, fecal diversion or distal rectal washout as there is limited evidence on this area and needs to be further explored for possible international guidelines^{8,11}.

CONCLUSION

Minimal invasive surgery with removal of the foreign body per anus should be the management of choice under sedation or general anesthesia to avoid iatrogenic trauma and also comfort for the surgeon. Rectal examination is equally important in the initial examination along with radiological investigations to know the characteristics of the foreign body and its relation to the surrounding soft tissue of the patient.

The ability to do primary repair of the injured large bowel

depends on the analysis of the operating surgeon, depending on the severity of the tissue injury, amount of contamination and the time of presentation from the initial incident, though controversies do exist as no specific guidelines have been established for removal of rectal foreign body.

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Leech Infestation in the Vulvar Region: Causes of Vaginal Bleeding in a Six years old Child

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ABSTRACT

Background: Leeches are hermaphroditic rare blood-sucking human endoparasites of phylum Annelida and class Hirudinea. Leech infestation is a zoonotic disease acquired by drinking contaminated water, swimming in ponds and streams. ¹Epidemiology of leech bites in literature is limited and the majority of existing data are case reports from the tropics or subtropics. ²⁻⁴

Leech bites can occur on various orifices of the body including internal body cavities and orifices, such as the uterus, rectum, urinary bladder, vulva, nasal cavity, peritoneal cavity, nasopharynx, oropharynx, oesophagus, trachea, bronchi and the vagina. ⁵

Different chemicals for leech removal have been utilized and include anesthetic drugs like lidocaine and topical anesthetic spray. Salt, saline, vinegar, alcohol, and heat are also viable options. Of these, saltwater has been shown to be effective in causing the leech to relax and release. Vaginal bleeding resulting from leech bite is rare, but when it occurs, it may be of severe morbidity. ²⁻⁴

In the present case report that happened at Kabaya district hospital, a six year old child with vaginal bleeding that turned out to be caused by vaginal leech infestation is presented.

Kabaya district hospital is a rural hospital with 144-bed capacity and serves 188,902 inhabitants and is geographically difficult to access due to the lack of reliable roads and bridges, especially in the rainy season.

CASE REPORT

The present case is a six years old female child admitted at Kabaya district hospital, Ngororero district in Northern Province of Rwanda on 19 December 2020 with complaints of pelvic pain and vaginal bleeding for 1 week. The child is 4th child in five including three girls and two boys. She is born from a farming family. Her mother believed that the child was raped by a 10-year-old boy and she was admitted in hospital

On physical examination at admission, she was noted to be with normal anthropometric measures after plotting on the WHO curves weight: 19kg, Height: 107cm. The child was asthenic with the following vital signs: temperature of 36.8°C, heart rate of 112 beats per minute, respiratory rate of 24 cycles per minute, and oxygen saturation of 97% on room air. Capillary refill time was below two seconds, and the extremities were warm. She had conjunctiva and palmo-plantar pallor. There was no lymphadenopathies, no hepatosplenomegaly, no petechiae, no bruises, and no laceration on vulva seen. The rest of the physical exam was unremarkable.

The child was treated with ampicillin IV 300mg three times a day for three days then discharged.

Two days after discharge from the hospital, she was readmitted with profuse vaginal bleeding. Vitamin K5mg IM was prescribed but two days later 26 December 2020, the child was still bleeding and was re-examined during ward round.

Her temperature was 37.4°C, Pulse 104bpm, Saturation: 92% and she had pale conjunctiva. On vagina examination by a general practitioner, a foreign body was seen in the vagina attached on vagina wall and was removed using a forceps. After removal, the foreign body was found to be a live leech of about 5cm in length (Figure 1).

Since then the bleeding subsided. A full blood count done after removing the leech revealed anemia with hemoglobin of 5.9g/dl, hematocrit of 17.8, platelets of 244×10^3 and the child received three Pediatric units of packed red blood cells. On control full blood count after transfusion, she had hemoglobin of 8.6g/dl and she was discharged on iron supplement. Furthermore on retrospective history taking before discharge from the hospital, the mother reported living near a stream of water that never dries up, that contains parasites similar to the one removed from her child's genitalia and that her child usually plays near the stream.

FIGURE 1. Leech Removed from the Vagina of a Six Years Old Child



DISCUSSION

Globally, leech bites is a rare event and morbidities associated with leeches have been less discussed with most cases reported being from the tropics.^{6,7} **Between January 1, 2004 and December 31,** 17 cases of leech infestation through body orifices in children were managed. This is a retrospective study on age, sex, route of leech entry, investigation and treatment, and outcome. Results Age ranged from 4.5 to 11 years (mean 6.4 ± 1.8). Locally only one case report of leech bites in upper gastrointestinal tract has been reported so far, and no gynecological case of leech bite has been reported in Rwanda.⁸ Scarcity of data for abnormal vaginal bleeding resulting from leech bite is usually translated into being ignored among the potential differential diagnosis. This was the case in this child since the diagnosis of leech infestation was missed on the first admission, and found when the child was re-

admitted in hospital. This case report illustrated the need to consider not only sexual abuse but also possibility of vaginal foreign body in particular leech bite.

CONCLUSION

As earlier discussed, this case report alerts clinicians to consider leech bite among differential diagnosis while dealing with patients with vaginal bleeding and living near a stream of water containing parasites. Foreign body should be excluded for any pediatric patient suspected to be a victim of rape.

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Preparedness, Identification and Care of COVID-19 Cases by Front Line Health Workers in Selected Health Facilities in Mbale District Uganda: A Cross-Sectional Study

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ABSTRACT

Introduction: The nature of work of Health care professionals exposes them to high risks of contracting COVID-19 and spreading it among themselves, to their patients and subsequently to the general community. Thus, it is essential that frontline health workers are equipped with both material and knowledge to enable them accurately suspect, detect, isolate, and manage COVID-19 cases. Findings have indicated a high prevalence of COVID-19 infections among frontline health workers. The Current Study assessed preparedness, identification, and care of COVID-19 Cases by frontline health workers in selected health facilities in Mbale District.

Methodology: Across sectional survey was used to collect quantitative data using Google forms, An online platform for data collection. Data was collected from 189 frontline health workers in both government and private Health facilities in Mbale District between April and August 2020. Data was analysed using Statistical Package for the Social Sciences (SPSS) version 20.

Findings: The study found that a good proportion of frontline health workers can identify cases by symptom and case definitions as probable case 113/189(59.8%), suspected case 60/189(36%) and confirmed case 22/189 (11.6%). There were generally low levels of preparedness in terms of initial service care being offered with the highest being 53/189(28.2%) and 50/189(26.4%) for facilities that had places for isolation and those with intravenous fluids respectively and the least was being able to offer oxygen and Intensive Care Services at 43/189(22.0%) and 20/189(10.3%) respectively.

Conclusion and recommendations: There's a need to ensure a continuous supply of PPEs and IPC materials to health facilities. CPD programs are essential in equipping Health workers with up-to-date information on COVID-19 Case Management. Facilities should be supported to setup isolation facilities at all levels, both permanent and temporary. Provision of Face masks to health workers should be prioritised and hand washing facilities should be installed at every serving point.

BACKGROUND

Coronavirus disease (COVID-19) is an infectious respiratory disease caused by the Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2 virus).^{1,2} Evidence has shown that the virus is spread through birds and bats, with humans being particularly vulnerable to infections due to the virus.³ Among humans, it is transmitted through droplets of saliva, discharge from nose coughs, or sneezes from an infected person.^{1,4,5}

COVID-19 infections are characterised by symptoms ranging from mild to severe cough, flu, fever, general body pains, difficulties in breathing, septic shock, multi-organ failure and death respectively. The risk of severity is high among the elderly and people with other comorbidities.⁶⁻⁸

The World Health Organization (WHO) reported cases of Pneumonia Like illness of unknown cause on the 31st December 2019.^{5,9} The Causative Pathogen of this illness was later identified as Severe Acute Respiratory Syndrome Corona Virus -2 (SARS-CoV-2) and was declared a global pandemic known as Corona Virus disease 2019 (COVID-19) on the 11th March 2020 by WHO.^{2,3}

The Pandemic has since spread globally in many countries around the world. As of 2nd June 2021, there are more than 170 million Confirmed cases of COVID-19 globally, about 3.5 million Cases in Africa and 47,761 cases from Uganda. Globally 3.5 Million deaths have been reported as a result of COVID-19 of which 362 are from Uganda as of June 2nd 2021.¹⁰

Front line health workers like; doctors, Clinical offi-

cers, nurses, and other Paramedics are among the most at-risk populations for contracting COVID-19 and as of 20th January 2021, 1,873 health workers had been infected with the COVID-19 Virus with many Deaths being reported Globally. As of June 2021, Uganda's population is approximately 41 million people, and these reside mostly in urban centres and towns. This high population density in towns and urban centres makes it difficult to observe social distancing and practice good hygienic measures like hand washing especially in congested and busy working places like markets, shopping malls and public transport stages.

In response to the Pandemic, the Ugandan Government through the Ministry of Health (MoH) put measures and guidelines. These included; the closure of academic and religious institutions, offices, markets and trading malls, banning of both public and private transport systems as well as instituting a total country lockdown as a way of preventing and controlling the spread of COVID-19.^{11,12} Control measures at an individual personal level were also emphasised. These included; regular hand washing with water and soap, hand sanitisation, avoiding touching of the mouth, nose, and eyes, coughing and sneezing in elbows or paper tissues, wearing face masks and avoiding crowds by staying home.^{4,5,13}

The nature of work of Health care professionals exposes them to high risks of contracting COVID-19 and spreading it among themselves, to their patients and subsequently to the general community. It is therefore essential that frontline health workers can accurately suspect, detect, isolate, and manage COVID-19 cases. This is very crucial in controlling and minimising the spread of the infection among health workers and to their patients. Studies conducted in Mumbai India and southwest Iran indicated high prevalence of COVID-19 infections among the front line health workers.^{14,15} In this study, we assessed the ability to identify a COVID-19 Case, take appropriate actions and the level of preparedness of Health Facilities to handle COVID-19 in Mbale Region, Uganda.

The findings of this study will help authorities in designing appropriate case definition and case management guidelines for all health workers at different levels, help in designing appropriate Continuing Professional Development (CPD) strategies for health workers at various stages

METHODOLOGY

Study Setting and Rationale

The study was carried out in selected health facilities in the Mbale district.

Mbale district is in the Eastern region of Uganda in East Africa, approximately 225km (140miles) North East of the capital Kampala. By 2019, the district's population was estimated at 568,000 people, 52.3% being females.² The main economic activities in Mbale District are farming and trade (business). Mbale district is located along the highway connecting Kenya to South Sudan and the Democratic Republic of Congo through Uganda. The town attracts many people from the neighbouring communities and districts who come in for trade and other office jobs. In addition, there are several social-cultural and religious activities that take place in the dist-

riect. Activities like the region's traditional dance (Kadodi) increase the high risk of spread of communicable diseases like COVID-19 in the community. Mbale District registered the first COVID-19 Deaths in Uganda.^{1,16}

The big community in Mbale seeks medical services in several private, Faith-based, and public/ government health facilities within the district. This puts the frontline health workers at risk of contracting the disease in case they fail to quickly identify probable COVID-19 cases.

The district has 12 Government dispensaries (Level II), 17 sub-county health centres (Level III), and 4 health centres (level IV) at sub-district with 2 hospitals. It also has 4 private/NGO dispensaries, 7 health centres (III), and no private hospital. There is a government Regional Referral Hospital with 332 beds.^{16,17}

Study Design and Rationale

The study design was a descriptive cross-sectional survey employing quantitative methods of data collection.

Study Population

The target population was frontline health workers involved in day to day running of health facilities including private, Private Not-For-Profit (PNFP) and public health facilities in the Mbale district. Frontline health workers included nurses, midwives, laboratory personnel, intern students, doctors, and clinicians among others. This is the team that comes into fast contact with patients seeking health services and thus the first contact with possible COVID-19 cases.

Sample Size Determination

The sample size for this study was calculated using Kish Leslie (1964) formula for single proportion.

$$n = \frac{Z^2 pq}{d^2}$$

Where: n is the sample size

d is the precision., A precision of 5% was used.

z is the Standard Deviation corresponding to 95% and Confidence Interval of 1.96.

p is the Prevalence.

Sampling Procedure

Simple random sampling was used to select health workers in private, private not-for-profit and public facilities in the Mbale district. An online survey questionnaire was shared with staff through emails, WhatsApp, and Facebook messenger. Participants were requested to consent their participation in the study. The questionnaires were filled and submitted online.

Inclusion Criteria

All frontline health workers in private, private not-for-profit and public facilities in the Mbale district involved in day-to-day patient care who had access to the internet via computers or mobile phones and consented to participate in the study were included.

Exclusion Criteria

Health facility staff members who are not directly involved in patient care (including but not limited to administrators, store managers, medical record personnel among others) were excluded. Health workers who did not consented to participate in the study were also exclu-

ded.

Research Instruments

Data was collected using structured Self-administered questionnaires sent via either emails, WhatsApp and/ or Facebook messenger. The questionnaires were filled online, and data was captured automatically. The Questionnaire covered the following parameters: Demographics, Case Definitions and identification, Immediate Actions that were taken, Availability of Emergency service facilities and presence or absence of CPD programs in Health Facilities.

Case Definitions and Management were based on WHO and Ugandan government's through the Ministry of Health Guidelines for COVID-19 Case Management. The Questionnaire was first shared among the health workers of (Islamic University in Uganda (IUIU) Health centre for validation. All concerns raised were corrected.

Data Management

After thorough checking, editing, tallying, and coding of the data from the filled questionnaires, data was entered and stored in Microsoft excel for analysis.

Quantitative Data Analysis

Data was cleaned and analysed using Statistical Package for the Social Sciences (SPSS) (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.)

Ethical Considerations

Anonymity: Participants' identification information was not included anywhere in the data collection tool and thus was not captured.

Confidentiality: The Health Facilities' names where the health workers are working were also not mentioned (for confidentiality issues). These were identified by their level of service (i.e., health centre levels II, III, IV and hospitals) and whether government, private or private not for profit. This was intended to maintain confidentiality of the individual health facilities.

Informed consent: All participants were requested to sign an informed consent before participating in the study. This was done before the filling of the online questionnaire (Google forms). Participants were informed of their right to withdraw from the study without consequences at any stage of the study.

Permission to conduct the study was sought for from the Research Coordination Committee (RCC) of the Islamic University in Uganda. Permission was granted with reference number RCC/FHS/20/003

RESULTS

Demographic Findings

The study consisted of 189 health workers (participants). Of the 189 health workers, 65/189 (34.4%) were females and 123/189 (65.1%) were males. 1 preferred not to say.

86/189 (45.5%) of the respondents were between 20 and 29 years of age, 76 /189 (40.2%) were between 30 and 39 years, 19/189 (10.1%) were between 40 and 49 years, and 8/189 (4.2%) were above 50 years. 79/189 (35.9%) of the participants had Bachelor's degrees, 19 /189 -

(8.6%) had certificates, 58/189 (26.4%) had Diplomas, 29/189 (13.2%) had Master's degree and 4/189 (1.8%) had other Post Graduate qualifications.

33(17.36%) were Nursing and Medical Students, 14(7.37%) were Enrolled Nurses and Midwives, 20(10.52%) were Nursing officers, 36(18.94%) were Clinical officers, 32(16.84%) were Laboratory staff, 29(15.26%) were Medical Doctors, 5(2.7%) were specialists, 18(9.8%) were public health officers and 3(1.57%) were categorised as other Paramedics.

33.9% the participants were from Hospitals, 11.1% were from Health centre IVs and 54% were from Health Centre IIIs and IIs.

Lastly, 43.8% (83) were from Government Health Facilities, 24.9% (47) were from Private Not for Profit Health Facilities, 28.1% (53) were from Private Health Facilities and 3.2% did not mention.

Identification of COVID-19 Suspect or confirmed Case and the appropriate Immediate Action

To assess the ability to suspect and detect COVID-19 cases and the ability to take appropriate response, 5 questions were asked. These included the definitions of suspected probable and confirmed COVID-19 case and identification of COVID-19 respiratory symptoms. The results were as follows:

60/189 (36%) of participants could tell the appropriate definitions of a suspected case, 113/189 (59.8%) a probable case and 165/189 (87.3%) could tell a confirmed case. 22/189 (11.6%) were able to identify respiratory symptoms and signs that define COVID-19. Only 7/189 (3.7%) could take the appropriate immediate actions in case of suspected COVID-19 cases. The results are summarised in [Table 1](#).

Preparedness of The Health Facilities to Handle COVID-19 Disease

Preparedness of health facilities to handle COVID-19 was assessed by asking 4 questions. These included Ability to admit a patient to Intensive Care Unit, presence of an isolation room at the facility, ability to offer oxygen therapy and ability to offer Intravenous (IV) fluids. Results were as follows:

20/189 (10.5%) of participants could admit a patient to Intensive Care Unit (ICU), 53/189 (28.2%) reported having an isolation space, 50/ 189 (26.4 %) could Offer IV fluids (Normal saline/ringers), 43/189 (22%) could offer oxygen of about 10L/minute, 23/189 (12.3%) reported that they could not offer any of the above services. The Summary of the findings is summarised in [table 2](#).

Availability of Personal Protective Gears (PPEs) and other Materials for Infection prevention and Control (IPC)

This study assessed the availability of materials and equipment used for infection prevention and control. The study assessed the availability of hand washing facilities, availability of protective gears like hand gloves, aprons, and facemasks. The study found that 154/189(81.6%) of the respondents' health facilities had hand washing facilities, 117/189(61.9%) had gloves 92/189, (48.9%) had hand sanitisers, 41/189 (21.6%) had aprons and 72/189 (37.9%) had facemasks.

TABLE 1: Identification of COVID-19 Case and the appropriate Immediate Action taken

| Questions for Identification of COVID-19 Case and Responses | N=189 | % |
|--|-------|-------|
| A suspected case of COVID-19 is one with the following signs and symptoms. (tick all that apply) | | |
| A. A patient with acute respiratory illness. | | |
| B. Fever above 37.5 plus at least one symptom/sign of respiratory disease. | | |
| C. History of travel to a or residence of region reporting community transmission of COVID -19 disease during the last 14 days. | 60 | 36% |
| D. A patient with an acute respiratory illness and has been in contact with confirmed or probable COVID-19 case | | |
| E. A patient with respiratory signs and symptoms with history of Asthma with no positive contact history | | |
| F. All the above | | |
| G. None of the above | | |
| The following can be regarded as respiratory signs and symptoms in the definition of COVID-19 | | |
| A. Fever Above 37.5 | | |
| B. Cough | | |
| C. Flue | | |
| D. Shortness of Breath | 22 | 11.6% |
| E. Abnormal Respiratory Sound (Wheezes) | | |
| F. Itching Eyes and Skin | | |
| G. Respiratory symptoms | | |
| A probable cause is. | | |
| A. A suspected case for whom testing for COVID-19 is inconclusive. | | |
| B. A suspected case for whom testing could not be performed for any reason. | 113 | 59.8% |
| C. A patient with respiratory symptoms and fever with no travel history or contact. | | |
| D. All the above | | |
| E. None of the above | | |
| A confirmed case for COVID-19 is | | |
| A. A person with respiratory symptoms and signs plus fever. | | |
| B. Positive travel history to high-risk countries/positive contact history | | |
| C. A person with laboratory confirmation of COVID-19 infection/irrespective of clinical signs and symptoms. | 165 | 87.3% |
| D. All the above | | |
| E. None of the above | | |
| When I get a suspected case of COVID-19 at my facility, my immediate response would be | | |
| A. Screen and isolate immediately | | |
| B. Screen for other possible causes of symptoms like malaria, typhoid, tuberculosis, and other possible causes of fever. | 7 | 3.7% |
| C. Offer first aid and admit to the general ward as I wait for the response team. | | |
| D. Call the response team immediately | | |

The correct answers are in bold. The number represents those who got all the correct answers and their percentages. (The definitions were adopted from the Uganda Ministry of Health Guidelines on the management of COVID-19)

The study also assessed the availability of protective gears given to patients suspected to be infected with COVID-19. Findings from submitted questionnaires were as follows:

58/189(30.5%) of the participants reported that they could offer gloves and facemasks, 28/189 (14.7%) could offer Facemasks, 24/189(12.6%) could offer Gloves and 76/189 (40%) could neither offer facemasks nor gloves in their facilities.

Initial Care of a Suspected or Confirmed COVID-19 Case by Front Line Health Workers

Basing on the Uganda clinical Guidelines on management of COVID-19 (First Edition) provided by the Ministry of Health, respondents were asked about their ability to manage mild and severe cases of COVID-19. Outcome of the responses were as follows:

96/189 (50.8%) of the participants knew how to manage mild COVID-19, 50/189(26.5%) knew how to manage-

TABLE 2: Preparedness of the Health Facilities to Handle Emergency Outbreaks

| Assessment on the readiness of Health Facilities | N = 189 | % |
|--|---------|------|
| I can admit patients in an intensive care unit (Presence of intensive care unit in a facility) | 20 | 10.5 |
| We have an isolation room (space) at our facility | 53 | 28.2 |
| We can offer IV fluids. | 50 | 26.4 |
| Ability to offer oxygen therapy | 43 | 22 |
| I cannot offer any of the above services | 23 | 12.3 |

TABLE 3: Initial Care to Patients with Suspected and Confirmed Case of COVID-19

| | | |
|---|----|-------|
| Regarding management of COVID-19 cases: in mild COVID-19 cases (choose all that apply) | 96 | 50.8% |
| <ul style="list-style-type: none"> A. The patient does not require hospital intervention. B. Can leave the patient to go back home C. Isolation is still necessary to contain the spread of the disease. D. Provide a patient with pain killers. E. Admit patient to the intensive care unit. | | |
| Regarding management of severe COVID-19 (choose all that apply) | 50 | 26.5% |
| <ul style="list-style-type: none"> A. Supplemental oxygen therapy is necessary B. Observe patient and offer supportive management C. knowing the patients' other commodities is not important | | |

mild COVID-19, 50/189(26.5%) knew how to manage severe cases of COVID-19 and the rest 43/189(22.7%) did not know what to do either for mild case or severe case situation.

About COVID-19 Continuous Medical Education (CME)/CPD

The study assessed and determined the proportion of health workers who had attended Continuous Medical Education sessions about COVID-19 at their facilities as a way of preparing and re-equipping staff with skills and knowledge to manage COVID-19 cases. 140/189(74.1%) had attended CME workshops while 45(25.9%) had not Attended any.

DISCUSSION

The ability to detect and identify a probable case of COVID-19 by frontline Health workers is important in ensuring Health workers take immediate appropriate action. This is also important in minimising the spread of the infection and reduction in complications and deaths due to COVID-19.

The current study found that only a small proportion of frontline health workers had good knowledge and understanding of COVID-19 Case management and were able to identify COVID-19 cases by symptom and case definitions as probable case. However, a similar study conducted elsewhere in Uganda reported good knowledge and understanding (80%) of COVID-19 management case.²⁴ This is consistent with other studies

conducted at the University Hospital in Alexandria, Egypt (81.6%), Dessie referral hospital in Ethiopia (86.4%) and wolaitta sodo hospital(84%).¹⁸⁻²¹

The study also found that a small proportion of health workers 7/189(3.7%) could take appropriate action after identifying a suspected or a probable COVID-19 Case. This is a risky situation since it can easily lead to the spread of the infection among Health workers and to their patients. The study revealed that there is generally minimum level of preparedness by the health facilities to combat COVID-19. This is exhibited through; the inadequate isolation spaces, inadequate IV fluids, and the small number of facilities able to offer oxygen therapy.

These findings were consistent with a Study conducted in Northwest Ethiopia where only 1/8 (12.5%) of the facilities inspected were well prepared to Handle COVID-19 Cases.²¹ The findings are also consistent with findings from another study conducted among hospitals in the Eastern Democratic Republic Of Congo and Western Uganda Hospitals.^{22,25}

The study revealed that a good number of health workers had access to Personal Protective Equipment (PPEs) and Infection Prevention and Control (IPC) Measures were put in place at their respective health facilities. That is to say; 154(81.6%) reported having hand washing facilities at their place of work, 92(48.9%) had access to sanitiser and 117(61.9%) had access to gloves However, small percentage 72(37.0%) of health workers reported having face masks. This study finding was consistent with findin-

gs in Brazil, Columbia, and Ecuador were a large number of Frontline Health workers reported having inadequate PPEs, gowns and face masks.²⁶ The findings were however inconsistent with findings from a study conducted in Eastern DRC and Western Uganda were about 60% of health facilities reported availability of PPEs.²² This high level of preparedness is attributed to the fact that the region has experienced multiple outbreaks of Ebola Epidemic and thus the authorities have, with time well equipped its facilities to prepare for any outbreak.

This study has revealed that a good number of health workers can manage mild cases of the pandemic if well facilitated and given support in form of PPEs, IPC materials and provided with the necessary trainings, guidelines, and refresher courses.

CONCLUSIONS AND RECOMMENDATIONS

There's a need by the Ministry of Health (MoH) through the National and the District task forces or response teams for COVID-19 to plan for and organise mentorship programs in health facilities with emphasis on identification and the immediate actions to be taken in case of suspected, probable, or even confirmed cases for COVID-19 and or any other contagious disease outbreak. Hands-on and simulation training/mentorships is recommended since written guidelines are already in place.

Lower-level Health Facilities should be facilitated and supported in setting up low-cost Case isolation facilities like the use of temporary tents

The Ministry of Health (MoH) and other supporting agencies should provide Facemasks to frontline health workers and health facilities as a priority control measure to the spread of COVID-19 to health workers. Free and affordable control measures like having a hand washing facility at every serving point should be highly encouraged.

Provision of supplies, medical information and carrying out of Continuous Professional Development sessions to frontline Health workers can greatly improve initial patient care and management by frontline health workers and hence minimise cases of cross infections between health workers and patients.

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Correlates of Sexual Risky Behaviours, HIV Testing, and HIV Testing Intention among Sexually Active Youths in Northern Tanzania

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ABSTRACT

Background: HIV testing services are important entry-point into the HIV cascade to care and treatment in order to slow down the spread of HIV infection. Over half of all new HIV infections in Sub-Saharan Africa occur among young people under the age of 25, particularly women. The study aimed to determine factors influencing young people's decision to undergo HIV testing services in Northern Tanzania.

Methods: A total of 536 sexually active participants aged 15 to 24 years old completed a semi-structured questionnaire based on the Health Belief Model (HBM) and the Theory of Planned Behaviour (TPB).

Results: Males compared to female participants were significantly younger at first age of sexual intercourse (15.4 vs. 16.7 years; $p = .001$). Out of 536 participants, 418 (78%) reported inconsistent condom use, and 203/303 (67%) were those practicing casual sex. Only, 189/536 (35.3%) of the participants reported to have had an HIV-test. Age, socioeconomic status, perceived HIV severity, attitudes and social approval regarding testing and beliefs about testing procedures and perceived barriers to testing were significant predictors of HIV testing ($R^2 = .22$). Age, unsafe casual sex, perceived severity, HIV-testing attitudes, self-efficacy, social approval, cues for actions and perceived quality of testing procedures were significant and positively related to HIV-testing intentions, while perceived barriers to testing were negatively related ($R^2 = .36$).

Conclusion: The integrated constructs of HBM and TPB provides a framework for identifying correlates of HIV testing behaviours and HIV testing intentions among sexually active youths. Future behaviour change interventions should focus on reduction of sexually risky behaviours, increasing perceived HIV severity, enhance positive attitudes and social approvals on testing, reduce misconceptions about testing procedures, alleviation of perceived barriers to testing and improve testing self-efficacy among sexually active youths in this setting.

BACKGROUND

More than 25% of the world population is made up of adolescents (aged 10 to 19 years) and youth (aged 15 to 24 years).¹ Globally, 50% of HIV transmissions occur among young people aged 15 to 24 and between 5,000 and 6,000 youths are infected with HIV every day. Further, over 50% of all new HIV infections in Sub-Saharan Africa (SSA) occurs in this vulnerable group, with young women disproportionately affected.²

In the United Republic of Tanzania, HIV incidence and prevalence has declined and stabilised. Currently, the HIV incidence is estimated at 0.24% in adults aged 15 years and older (approximately 72,000 new cases of HIV infection). HIV prevalence has declined from 7.0% in 2003/04 to 4.9 % in 2017, and the incidence of HIV infection in the age group of 15 to 24 years is estimated at 0.07%, whereas the overall HIV prevalence is 1.4%.³ However, there exist age

and gender differentials in HIV prevalence, which is 3 times higher among young women aged between 20 and 24 years compared to young men in the same age group (3.4 % vs. 0.9 %).

HIV Testing Services (HTS) are important means of slowing down the spread of HIV infection. These are provided free at both health facilities and community settings. HIV Care and Treatment Centres (CTCs) are established in both public and private health facilities across the country.⁴

In spite of the scale-up of the HTS and the availability of free Antiretroviral Treatment (ART) countrywide, only 49.0% of youths aged 15 to 24 years self-reported having ever taken HIV testing services and received their test results, according to a recent HIV Impact Survey conducted in 2016-2017, with young women (60.0 % vs. 37.9%) more likely to test for HIV compared to their male counterparts. Also, among HIV-positive young adults, 60.9% were unaware of-

their HIV status, with higher proportions among young men (64.9% vs. 59.4%) compared to their female counterparts.³

Comparatively to studies among adult populations in SSA, studies based on behavioural change models among adolescents and youth are rather sparse. Existing literature includes studies among youths⁵ at high-risk populations⁶ in Kenya, young school teachers in Tanzania,⁷ and young women attending antenatal care in Ethiopia.⁸ Significant predictors of HIV testing intentions among 13 to 24 year olds includes; HIV knowledge, substance use, depression and social support.⁵

Several studies on factors associated with HIV testing and intentions among adolescents and youth conducted in Tanzania focused mainly on Knowledge, Attitudes and Practices (KAP), and not behavioural change models such as the Theory of Planned Behaviour (TPB),⁹ and the Health Belief Model (HBM).¹⁰ This study used a theory-based analysis of HTS decision-making among young people in Moshi, northern Tanzania. The conceptual framework for this study was the integrated constructs of the TPB⁹ and the HBM-the Integrated Behaviour Model (IBM).¹⁰ Using the IBM will provide a useful framework to investigate the correlates of HIV testing behaviours and HIV testing intentions among sexually active youths. Also, the study findings will add knowledge to the literature and inform HIV testing interventionist, Adolescent and Youth Sexual and Reproductive Health (AYSRH) policy makers on specific behaviours that may promote HIV testing and HIV testing intentions among out-of-school youths aged 15 to 24 years in northern Tanzania.

Conceptual Framework

Both HBM and TPB models have proven to be appropriate for understanding and predicting people's acceptance and uptake of health-related interventions, such as HTS.⁹⁻¹² The IBM, which integrates constructs from HBM and TPB models posit that, people will take health-related actions if (i) they perceive themselves to be susceptible of contracting a specific illness (e.g., HIV), and if they perceive this specific illness as severe, (ii) they have a positive attitude towards the health behaviour (e.g., HTS), that is, if the perceived benefits of performing HIV testing outweighs the barriers or negative consequences of testing, (iii) they believe that they can successfully undertake HIV testing, (iv) they anticipate that their HIV testing behaviour will be approved by people in their social environment (e.g., parents, relatives, peers, religious leaders, etc.), and (v) they are 'triggered' to act.¹³ Figure 1 below summarises the Integrated Behaviour Model conceptual framework for sexual risky behaviours, HIV testing, and HIV testing intentions.

MATERIALS AND METHODS

Inclusion/Exclusion Criteria

The inclusion criteria were age (15 years or older), out-of-school, those who are willing to provide consent to participate, or from parents or guardian for those below 18 years, and able to coherently communicate in Kiswahili-the local language commonly used in the study settings.

Study Area and Data Collection

The study was conducted in Moshi Urban, in Kilimanjaro

Region, Northern Tanzania. Moshi Municipal Council is among the 7 districts in Kilimanjaro region of Tanzania. Other 6 districts are Rombo, Mwanga, Same, Moshi rural, Hai and Siha District Councils. Moshi Municipal Council has an estimated population of 184,292 mixed Muslim/ or Christians, mainly from Chagaa and Pare tribes, residing in 21 ward administrative units, with an average household size of 4.0.¹⁴ Most of them engage in tourism, trading, and agro-economical activities. Moshi is also home to Mt. Kilimanjaro- the highest snow-capped mountain in Africa, a tourist circuit with tourist hotels and bars and major national parks. At the time of data collection, the HIV prevalence among 15 years old and above in Kilimanjaro region was 2.2 % (male=1.1%; female = 3.1%).³ Also, there were 18 facilities providing HTS. In addition, 21 HIV Care and Treatment Centres (CTC) provide access to Antiretroviral Therapy (ART), in the study setting.¹⁵

A single population proportion sample size formula was used to calculate the sample size. Based on a HIV impact survey of 2016/2017³ which reported that 33.7% of young people aged 15 to 24 years old tested for HIV was used to calculate the sample size. The desired level of Confidence Interval (CI) at 95%, a margin error of 5% and non-response rate of 10 % were included in the formula as follows:

$$N = Z^2 \times P \times (100 - P) / E^2$$

where by N= Estimated Sample Size, Z = Standard Normal Deviation of 1.96² corresponding to 95% CI, P = Proportion of outcome under study, and E = Marginal Error at 5%.¹⁶

The final sample size was derived at using the formula: Final sample size = Effective sample size / (1 - non-response rate anticipated).

The minimum sample size was calculated as 343, and the anticipated non-response rate or dropout was 10% derived. The final minimal sample size = 343 / (1-0.1) = 381 youth.

Measurements

The questionnaire included the following variables. Unless indicated otherwise, we used 5-point Likert-scaled items to index the psychosocial variables.

Demographic Variables: Demographic variables included; sex, age, relationship status, education level, religion, and media use. Participants were asked to report the presence of electronic devices in the household (e.g., radio, television, refrigerator, etc.). This variable served as a proxy measure for socioeconomic status.

Sexual Risk Behaviours: Participants were asked about unprotected sex with their current or most recent steady partner, and/or casual partners, and lifetime condom use. Responses were dichotomised and coded as 'no-condom' or 'condom' depending on whether participants had engaged in unprotected sexual practices.

HIV Tests: Participants were asked whether they had ever received an HIV antibody test. The expected response was 1= Yes; 2= No.

HIV-testing intentions: Participant's intention to obtain an HIV-test in the next 6 months was indexed by 3 items -

(e.g., "I intend to go for an HIV-test in the next 6 months").

The expected response ranged from 1= "most certainly not" to 5= "most certainly". The Cronbach Alpha scale of reliability was = .90.

Perceived severity: Perceived severity of HIV/AIDS was indexed by 3 items (e.g., AIDS is very severe illness), with answering categories varying from 1= "strongly disagree" to 5= "strongly agree". Because of extremely skewed distribution, items were combined to a binary index.

Perceived susceptibility: Perceived susceptibility regarding HIV-infection was indexed by 3 items (e.g., "It is very likely that I will become infected with HIV/AIDS"), with expected response ranging from 1= "strongly disagree" to "5= "strongly agree". This scale was reliable at $\alpha = .79$.

Cues to action: 5 items addressing situations that may motivate people to go for a test; having had unsafe sex, marriage distrust in a partner, health status, and concurrent partners indexed Cues to action. Expected responses ranged from 1= "highly unlikely" to 5= "highly likely". The alpha scale of reliability was =.75.

Attitudes, beliefs, and barriers: Attitudes towards HIV-testing was assessed by means of a general index (e.g., "Having an HIV-test is good/bad, and wise/unwise"; $r = .06$). A belief-based index consisting of 4 items addressing barriers to testing (e.g., expenses, fear of positive test results, losing hope and fear of stigma ($\alpha = .67$), and 2 items addressing the reliability and confidentiality of test results ($r = 0.47$). Answering categories for all belief-items ranged from 1= "highly unlikely" to 5= "highly likely".

Social Approval: Perceived social approval was indexed by means of 6 items addressing the social approval of significant others (e.g., parents, friends, relatives, partner, etc.) and institutions (e.g., church, school, health care, etc.). Expected responses range from 1= "strongly disagree" to 5= "strongly agree". Participants indicating the absence of a social agent (e.g., having no sexual partner) received a score of 0 for the particular social agent. This scale was reliable at $\alpha = .87$.

Self-efficacy: Perceived self-efficacy regarding HIV-testing was assessed by 4 items (e.g., I am able to find out where I can go for an HIV-test), with answering categories ranging from 1= "most certainly not" to 5= most certainly." The alpha scale of reliability was =.81. The Cronbach's alpha coefficient had a reliability index ranging from the lowest = .67 to the highest = .90. All of the reliability alphas were above the cut-off point of = .60, a criterion for internal consistency of new scales.¹⁷

Procedure

The interview guide was developed in English, back-and-forth translated into Kiswahili- a local language commonly used in Tanzania and subjected to a small-scale pilot (N= 10). After the potential participants and their parents (for those below 18 years) were informed of the study objectives. Using a local government register, a list of all out-of-school 15-24-years old was made and stratified by age groups and gender. Proportional sampling was used to select equal numbers of eligible males and females for participation in the study. 4 (2 males; 2 females) trained research assistants, with previous experience in conducti-

ng studies addressing sensitive topics (i.e., sexuality and HIV/AIDS), and members of a local youth organisation concerned with HIV/AIDS, of the same age group (15 to 24 years old) with the study participants administered the interview guide to eligible participants after consenting. To ensure confidentiality, filled questionnaires were put in large brown envelopes after completion; no names of participants were registered, instead coded numbers were used to ensure anonymity. Data was collected between September and November 2016.

Data Analysis

All statistical analysis was conducted using Scientific Package for Social Science (SPSS for Windows; SPSS, Chicago, IL, USA version 20). Reliability test was employed to address the internal reliability of scaled variables. We employed hierarchical logistic regression analysis to identify the psychological and socio-demographic correlates of HIV-testing behaviour. In the first block, we controlled for socio-demographic variables. In the second block, we entered the indexes for unprotected sexual activity. In the third block, we added cognitive variables to the regression equation. For the regression of HIV-testing intentions, we followed a similar procedure, albeit employing linear regression.

Ethical Consideration

The study received ethical approval from Kilimanjaro Christian Medical College Research Ethics Committee (Ref No: 737/2016), and from local administrative officers for study implementation. The data collection procedure was explained to all participants on their voluntary participation and the right to withdraw from the study without any consequences. Data was collected in a private room within the local youth organisation offices to ensure confidentiality, and acquire independent and accurate responses. No names of participants were used on the questionnaire but coded numbers to ensure anonymity.

RESULTS

Characteristic of Respondents

A total of 1,183 participants aged 15 to 24 years old were recruited and 536 (45.3%) reported to have had sexual experiences. These sexually experienced young people are the sample of analysis and reported in this study. Of the 536 sexually experienced participants, 342 (63.8 %) were aged 15 to 19 years old. The mean age was 19.4 (SD=3.14), with women being significantly younger than men (18.9; SD= 2.98; 19.9; SD = 3.35; $p = .000$). More than half, 295 (55%) of participants were single compared with 45% who were married. More than half, 279 (52.1 %) of the participants were able to read, and 303 (56.6 %) reported having a Catholic denomination. The respondents' characteristics are summarised in Table 1.

Sexual Activity, Condom use, and HIV-testing

On average, participants were nearly 16 years old when they had their first sexual intercourse. Males were significantly younger when they had their first sexual experience than their female counterparts (15.4 vs. 16.7 years, respectively; $F_{(1,447)} = 21.6, p = .001$). Male participants reported having had their first sexual intercourse with -

younger partners (mean age of female partner =14.8), whereby female participants indicated to have had their sexual debut with older sexual partners (mean age of male partner = 20.3). Of 227 female participants, 177(77.8%) compared to 200/309(64.7%) male participants reported being in a steady relationship. Out of 309 male participants, 179 (58%) and 124/227(55%) of the female participants indicated to have had casual sex in the past 3 months (i.e., sexually active) prior to the study. Out of 536 participants, 418(78%) reported inconsistent condom use, and 203/303 (67%) who had casual sex reported inconsistent condom use. More than a third, 189/536 (35.3%), of the participants, reported having had an HIV-test (men = 35.8 % vs. women= 34.6 %). There were no significant gender differentials in condom use and HIV testing.

Correlates of HIV-Testing

Multivariate hierarchical logistic regression analysis revealed that age and socioeconomic status (Model 1), accounted for a small proportion of the variance in testing behaviour ($R^2 = .04$). Adding indicators for unsafe sexual activity (Model 2) almost doubled the predictive quality of the model. The results indicate that younger participants with a relatively low economic status, and reporting unsafe sex with casual sex partners are more likely to report having ever been tested for HIV. Inclusion of psychosocial variables (Model 3) increased the proportion of the variance in HIV testing behaviour ($R^2 = .22$). These findings indicate that predictors for engaging in HIV-testing include: younger age, low socio-economical status, higher scores on perceived HIV severity, attitudes and social approval regarding testing and beliefs about testing procedures, and low scores on perceived barriers to testing. (Table 2)

Correlates of HIV-Testing Intentions

In the linear regression analyses of HIV-testing intention on socio-demographic variables, only age was found to significantly account for the variance of HIV testing intention (Model 1). The findings indicated that older participants were more likely to report favourable intentions towards HIV-testing. Inclusion of the previous history of HIV testing and the indicators for unsafe sexual activity to the regression model 2 increased the variance for HIV-testing intentions to 5.2%, indicating that previous history of HIV testing, and unsafe casual sexual as significant predictors. Addition of psychosocial variables to the regression model 3, revealed that attitude towards HIV-testing, testing self-efficacy, social approval, cues to actions, and perceived quality of testing procedures were significant and positively associated with HIV testing intentions. Furthermore, perceived barriers to HIV-testing were negatively associated with testing intentions. Both previous history of HIV-testing and unsafe casual sex which were significant in model 2 were deleted from model 3. The remaining variables (age and psychosocial variables) accounted for 36.3% of the variance in testing intentions. (Table 3)

DISCUSSION

The aim of this study was to determine the correlates of sexual risky behaviours, HIV-testing and HIV testing intentions among sexually active youths aged 15 to 24 -

years old in Moshi, Kilimanjaro region of northern Tanzania. The findings demonstrate that majority of sexually active youth urbanites continue to practice unsafe sex. Many reported to practice unsafe sex in steady relationships, and-more- worrying-when having casual sex. These findings are consistent to those reported by studies in other Sub-Saharan African countries.^{5, 18, 19-21} Also, the study findings indicate that about one-third of sexually active young people have been engaged in HIV testing. This observation concurs with existing evidence that there is an increase of youth participation in HTS, however, the turn up is still low in comparison to the good availability of HTS in the study setting. The observation that both sexual reduction and participation in HTS is still rather uncommon among a large proportion of sexually active young people underlines the strong need for ongoing efforts to motivate youth to engage in HIV-prevention intervention.^{5, 18, 21, 22}

This study suggests that activities aimed at motivating young people to participate in HTS should include; risk reduction communication, attitude change, norm setting and facilitation. This concurs with findings from other settings suggesting that behaviour change interventions to promote HIV-testing should go beyond increasing HIV knowledge and health-related risks, and should address test confidentiality and the fear for positive test results and social exclusion.^{5, 7, 18, 21, 22}

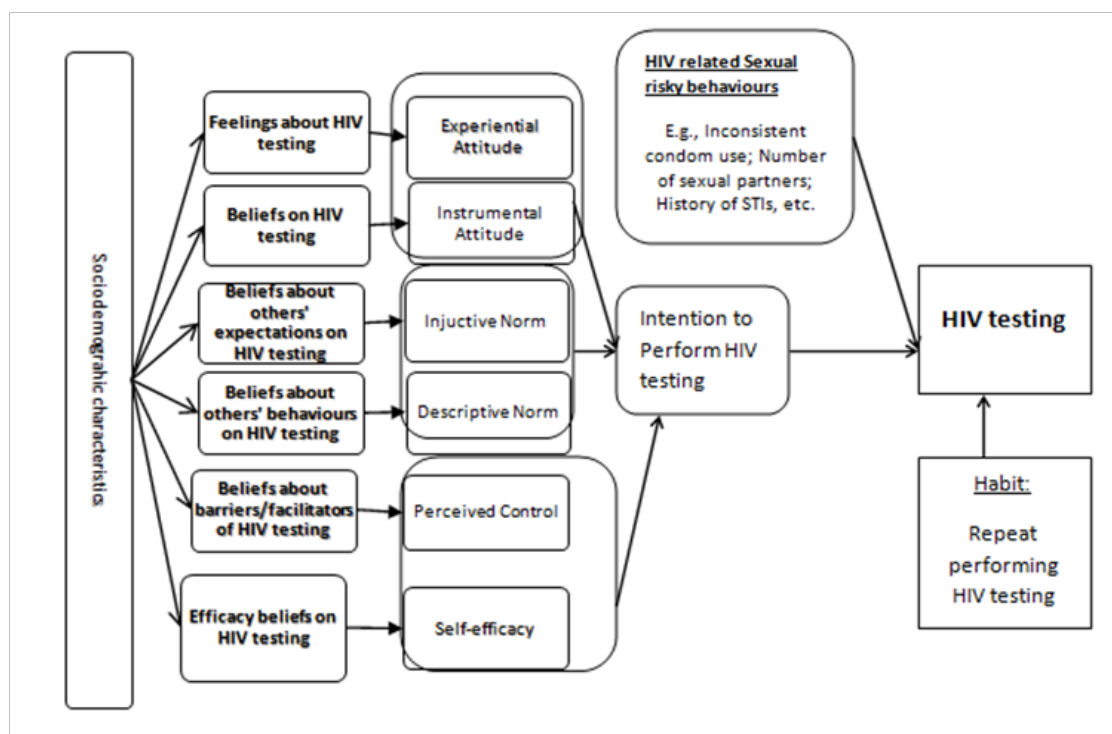
In our study, we have used an integrative conceptual framework to determine the socio-demographic, behavioural and social-cognitive predictors of HIV-testing behaviours and intentions. The findings show that this conceptual framework was not that successful in predicting HIV-testing behaviour; the final model accounted for only 16% of the variance in testing behaviour. Socio-economic status and perceived severity were identified as the most important predictors, but these variables were conceptually not the strongest. HIV-testing behaviour was associated with perceived susceptibility, attitudes and beliefs regarding testing, although odds ratios were rather low. To enhance a deeper understanding of testing uptake, it would be worthwhile when HTS include the identification of predictors that motivate youths to engage in testing by using a standardised interview protocol.^{5-8, 18, 23-28}

Superior experimental study designs such as clinical trials, and/ or Discrete Choice Experiments (DCEs) with a multi-site set-up, would tremendously improve our understanding in HIV-testing behaviours and intentions among young people.

According to Ajzen⁹, the HBM and TPB models are developed to predict future behaviour rather than to understand past behaviours and this is in line with respect to the prediction of uptake of future HIV testing in our study. In this study, the predictive quality of the model was far better with 36% of variance accounting for attitudes, beliefs about testing, social approval, self-efficacy, anticipated barriers, cues to action and age as major predictors.

This study reported conflicting results regarding sexual risk behaviours, HIV-testing and HIV-testing intentions. Participants who reported practicing unsafe casual sex were more likely having been tested, but unsafe casual

FIGURE 1: Summary of the Integrated Behaviour Model conceptual framework for sexual risky behaviours, HIV testing, and HIV testing intentions



Adapted from Glanz et al., 2008

TABLE 1: Sociodemographic of Sexually Experienced Respondents (n=536)

| Variables | Total N= 536(%) | Males n= 309(57.6) | Female n= 227(42.4) |
|---------------------------------|--------------------|-----------------------|------------------------|
| Age group (years) | | | |
| 15-19 | 342(63.8) | 210(61.4) | 132(38.6) |
| 20-24 | 194(36.2) | 99(51.1) | 95(48.9) |
| Mean age (SD) | 19.4(3.14) | 19.4(3.35) | 18.9(2.98) |
| Marital status | | | |
| Single | 295(55) | 177(60) | 118(40) |
| Married | 241(45) | 109(45.2) | 132 (54.8) |
| Ability to read | | | |
| Able to read | 279(52.1) | 148(53.1) | 131(46.9) |
| Read with difficulty/not at all | 257(47.9) | 141(54.8) | 116(45.2) |
| Occupation | | | |
| Employed | 229(42.7) | 146(63.8) | 83(36.2) |
| Unemployed | 307(57.3) | 117(38.2) | 190(61.8) |
| Religion | | | |
| Muslim | 65(12.2) | 44(67.7) | 21(32.3) |
| Protestant | 168(31.2) | 97(57.7) | 71(42.3) |
| Catholic | 303(56.6) | 180(59.4) | 123(40.6) |
| Row percentages | | | |

TABLE 2: Correlates of HIV Testing: Hierarchical Multivariate Logistic Test

| Variable | Model 1 | | Model 2 | | Model 3 | |
|---------------------|---------|-----------|---------|-----------|---------|-----------|
| | OR | 95%CI | OR | 95%CI | OR | 95%CI |
| Age | 1.09 | 1.02-1.16 | 1.09 | 1.02-1.17 | 1.11 | 1.03-1.12 |
| Gender | .91 | .61-1.36 | | | | |
| Religion | | | | | | |
| Catholic | 1.00 | | | | | |
| Muslim | .72 | .42-1.23 | | | | |
| Protestant | 1.15 | .74-1.79 | | | | |
| SES | | | | | | |
| High | 1.00 | | 1.00 | | 1.00 | |
| Mild | .64 | .34-1.21 | .68 | .33-1.38 | .44 | .20-.92 |
| Low | .61 | .38-.96 | .56 | .33-.93 | .51 | .30-.87 |
| Unprotected sex | | | | | | |
| With steady partner | | | 0.68 | 1.14-3.05 | | |
| With casual partner | | | 1.95 | 1.20-3.16 | 1.04 | .65-1.64 |
| Susceptibility | | | | | .99 | .91-1.07 |
| Severity | | | | | 1.96 | 1.10-3.51 |
| Attitude | | | | | 1.22 | .99-1.50 |
| HIV test quality | | | | | 1.23 | 1.05-1.44 |
| Perceived barriers | | | | | .91 | .85-.98 |
| Social Approval | | | | | 1.05 | 1.00-1.10 |
| Self-efficacy | | | | | .99 | .91-1.10 |
| Cues to Action | | | | | 1.01 | .94-1.08 |
| Nagelkerke R2 | .04 | | .07 | | .22 | |
| N | 473 | | 375 | | 428 | |

sex was negatively related to testing intentions. Additionally, whereby perceived HIV severity was positively related to previous testing behaviours, perceived HIV risk was positively related to HIV-testing intentions. Also, additional analyses revealed that perceived susceptibility was unrelated to sexual risk-taking behaviours. The most plausible explanation to this observation regarding the association between risk-taking behaviours, risk perceptions, and screening could be due to reflecting complex psychological processes including risk denial and emotion-based coping.^{18, 22} This warrants for future mixed-methods longitudinal studies to unravel this process.

Regarding HIV-testing intentions, a critical concern is the inability to translate intentions into actual behaviour. Some studies have suggested that for various reasons, individuals may not execute their plan to take HIV test.^{7,8,18} Sheeran²⁹, however, concluded in his meta-analysis of meta-analyses that intentions on average do predict 28% of the variance in future behaviour and that individuals with attitudinal controlled intentions-similar to this study generally have stronger intention-behaviour correlations than individuals with normatively controlled intentions.²⁹ Nevertheless, a longitudinal study is warranted to further identify intention-behaviour gaps regarding HIV-testing among young people. The aim will be to identify the individual and community level predictors which are highly contextual to a complex social setting that need to be targeted to reduce these gaps

and to identify intervention techniques to strengthen intention-behaviours for HIV-testing.²²

Despite these study findings based on a relatively large sample of young people, it is imperative to consider some limitations. As a cross-sectional study design, it is not possible to draw conclusions about causality of any of the identified associations. This study is based upon self-reporting of previous sexual risk behaviours, HIV-testing behaviours, and HIV testing intentions. Reporting bias could be a limitation with over-reporting or under-reporting of the risk-taking behaviours and HIV testing. Longitudinal study designs would be the most ideal approach in studying the correlates of HTS, although it is more expensive and labour intensive. Generalisability of the result to other young people in Tanzania may be another limitation because it was conducted among out-of-school population aged 15 to 24 years, in an urban setting of Moshi and may not be applicable to other settings, or populations. Another limitation could be the use of the HBM, a cognitive-based model, which is limited in assessing the emotional components of behaviour. Also, caution is warranted regarding the reliability and internal validity of the data because some item-level analyses were limited to moderate internal reliability of scales (barriers to testing; $\alpha=0.67$). Finally, this study did not address the impact of structural and environmental factors that may facilitate or impede scaling up of participation in HTS.

While the decision to take an HIV test is usually an individual's choice, future research should determine the

TABLE 3: Correlates of HIV Testing Intentions: Hierarchical Multivariate Linear Test

| Variable | Model 1 | | Model 2 | | Model 3 | |
|---------------------|---------|------|---------|------|---------|------|
| | β | p | β | p | β | p |
| Age | .10 | .023 | .11 | .012 | .11 | .004 |
| Gender | -.07 | .107 | | | | |
| Religion | | | | | | |
| Catholic | | | | | | |
| Muslim | .02 | .602 | | | | |
| Protestant | .04 | .358 | | | | |
| SES | | | | | | |
| High | | | | | | |
| Mild | -.05 | .301 | | | | |
| Low | .05 | .296 | | | | |
| Past HIV testing | | | .18 | .000 | .04 | .338 |
| Unprotected sex | | | | | | |
| With steady partner | | | .03 | .665 | | |
| With casual partner | | | -.13 | .003 | -.04 | .237 |
| Susceptibility | | | | | .11 | .005 |
| Severity | | | | | -.02 | .546 |
| Attitude | | | | | .28 | .000 |
| HIV test quality | | | | | .11 | .007 |
| Perceived barriers | | | | | -.13 | .000 |
| Social Approval | | | | | .12 | .006 |
| Self-efficacy | | | | | .13 | .005 |
| Cues to Action | | | | | .13 | .003 |
| R2 | 1.4% | | 5.4% | | 36.3% | |

influence of other factors, such as, gender differentials and economic inequalities, HIV testing options (e.g., HIV self-testing), client preferences and selectivity of HTS, stigma and discrimination related with HTS.^{5-7, 18, 21, 22, 25, 30-33}

CONCLUSION

The study findings indicate that sexually experienced out-of-school- youths in this study setting practice sexual risky behaviours, including unprotected sex, and multiple sexual partnerships with low uptake of HTS. HIV interventionist and HIV policymakers should focus on designing theory-based behaviour change interventions with focus on motivating and facilitating adolescents and youths regarding sexual risk reduction, increasing perceived HIV severity, enhancing positive attitudes and social approvals on testing, reducing misconceptions about testing procedures, alleviation of perceived barriers to testing and improving testing self-efficacy among sexually active youths.³⁴

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Occurrence of Helicobacter Pylori in Specimens of Chronic Gastritis and Gastric Adenocarcinoma Patients: A Retrospective Study at University Teaching Hospital, Kigali, Rwanda

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ABSTRACT

Introduction: *Helicobacter pylori* (*H. pylori*) infection is the major cause of gastroduodenal diseases in populations of different ages. We conducted a retrospective study using archived tissue samples to determine the prevalence of *H. pylori* infection among patients diagnosed with gastritis and gastric adenocarcinoma by histopathology cases in one hospital in Rwanda.

Materials and methods: Cases of chronic gastritis and gastric adenocarcinoma histologically diagnosed in a tertiary hospital in Rwanda over the period of 2016-2018 were studied for the presence of *H. pylori* using immunohistochemistry. Diagnosis of positive cases considered immunoreactivity as well as bacterial morphology, including spiral, rod-shaped, angulated and coccoid forms.

Results: Three hundred and seven cases were included in this study; chronic gastritis and gastric adenocarcinoma representing 39% and 61%, respectively. The overall frequency of *H. pylori* infection was 77.5% (80% among chronic gastritis cases versus 76% among gastric adenocarcinoma cases). Prevalence of *H. pylori* infection in chronic gastritis and adenocarcinoma did not significantly associate with age and sex.

Conclusion: The prevalence of *H. pylori* was high among chronic gastritis and gastric adenocarcinoma cases in Rwanda. Pathologists should investigate the presence of *H. pylori* in gastric biopsies. Our data shows immunohistochemistry method is feasible and adequate to facilitate detection of *H. pylori*, which may guide timely treatment.

BACKGROUND

Helicobacter pylori (*H. pylori*) is a gram-negative bacterium that causes a spectrum of gastroduodenal diseases in humans including chronic gastritis and gastric cancer.¹⁻³ Approximately 95% of gastric cancers are adenocarcinomas, which are further histologically categorized into diffuse and intestinal subtypes.⁴ The prevalence of *H. pylori* is approximately 50% of the adult population worldwide.⁵⁻⁷ The prevalence is much higher in populations of low socioeconomic status and hygiene level, compared to the developed countries.⁸⁻¹¹ Accordingly, the prevalence of *H. pylori* infection is nearly 30% in the United States of America (USA) adult population, compared to up to 92% in some African regions.^{7, 12-14} This epidemiological trend may explain the over-representation of gastric adenocarcinoma among developing countries (more than 50% of new cases) compared to the developed countries.^{4, 15-18}

Chronic atrophic gastritis is the earliest pathologic change due to *H. pylori* colonization, and it may

eventually lead to gastric cancer.^{2, 13, 19, 20} In *H. pylori*-infected individuals, other factors contributing to chronic atrophic gastritis and cancer include the age at the time of primary infection, as well as the presence of cytotoxin-associated gene A (*cagA*)-positive *H. pylori*.²¹ The prevalence of *H. pylori* infection increases with age, being close to 80% among individuals above 70, whereas it is around 50% in children.^{20, 22, 23}

Several diagnostic tests are used in the detection of *H. pylori* infection. These include blood serum test, stool antigen test, rapid urease test, urea breath test, detection of *H. pylori* in histopathology specimens, and culture.^{5, 8, 11, 12, 24} Histopathology has been shown to have excellent sensitivity and specificity (95% and 99%, respectively), particularly with the use of special and immunohistochemical stains²⁵ and it provides additional information about the morphology of the gastric mucosa.^{12, 22-24} Accordingly, endoscopic biopsies are used for screening of gastric carcinoma.^{8, 16, 22, 26}

The prevalence of gastroduodenal disease in Rwanda is high, and a recent study using modified rapid urea-

se testing during endoscopy showed 75% positivity for *H. pylori*.²⁷ Using immunohistochemistry method, this study was performed to determine the frequency of occurrence of *H. pylori* infection in histopathological specimens of patients with chronic gastritis or gastric adenocarcinoma in a large teaching hospital of Rwanda.

MATERIALS AND METHODS

Study Design and Description

A retrospective descriptive study was conducted in the Anatomical Pathology unit of University Teaching Hospital of Kigali (CHUK). Cases diagnosed as chronic gastritis and gastric adenocarcinoma from 2016 to 2018 were included in this study. Clinical and demographic information and formalin-fixed, paraffin-embedded (FFPE) tissue blocks, and glass slides were retrieved from the archives.

For cases with multiple biopsies from the same patient, the tissue sample with more representative lesion tissue was used. Glass slides were reviewed by 2 independent pathologists to confirm the diagnosis of chronic gastritis or gastric adenocarcinoma. All cases diagnosed as gastric ulcers, gastritis with intestinal metaplasia and/or atrophic gastritis, and chronic gastritis not otherwise specified were included. Sections of tissues with lesion (gastritis or adenocarcinoma) were selected for immunohistochemistry. Patients who met the inclusion criteria, but whose tissue blocks were damaged were excluded.

Helicobacter pylori detection

Sections (4 µm in thickness) were cut and prepared on charged, frosted glass slides. Immunohistochemistry using a rabbit polyclonal anti-*H. pylori* antibody (DAKO) and the Envision (DAKO) polymer detection system, with diaminobenzidine chromogen and immune-peroxidases according to the manufacturer's specifications was performed. Positive and negative controls were evaluated for each immunostaining assay. Two independent pathologists and one trainee reviewed the immunostained slides using light microscopes. In case of discrepancy, cases were reviewed and discussed, and the consensus diagnosis agreed by all pathologists. Positivity was ascertained taking into account the presence of immunoreactivity and morphology including spiral, rod-shaped, angulated, and coccoid forms.

Data management and statistical analysis

Clinical, demographic, and histopathologic diagnosis, including *H. pylori* status, were compiled into a Microsoft Excel sheet. Each patient was assigned an identification code to maintain patients' confidentiality. The data was imported into and analyzed using the Statistical Product and Service Solutions (IBM SPSS). Fisher's exact test was used to compare proportions. A two-tailed *P* value <.05 was considered significant.

Ethical Considerations

This study was approved by the University of Rwanda (UR), College of Medicine and Health Sciences (CMHS) Institutional Review Board (IRB), approval number 455/CMHS IRB/2019. Permission to access the data was provided by the administration of the hospital.

RESULTS

Patients and Disease Characteristics

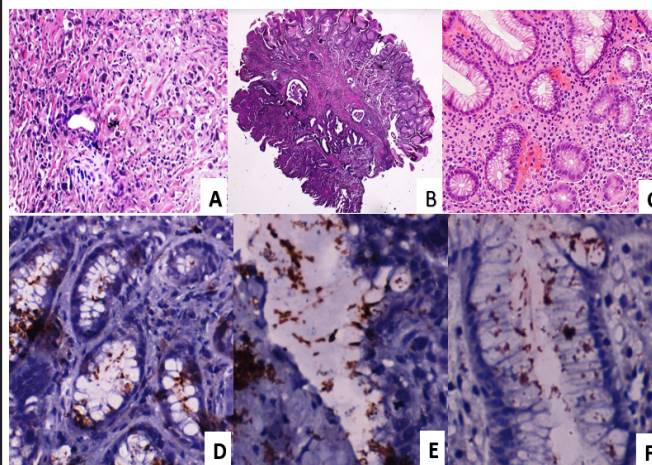
Most 197 (64.2%) patients with chronic gastritis and gastric adenocarcinoma were older than 50 (range=15 to 92, mean=55, median=57) years (Table 1). All the regions of Rwanda are represented, with a slightly higher proportion of patients residing in Kigali City 72 (23.5%). Most 264 (86%) biopsies were endoscopic and almost all (98.4%) were taken from the non-cardial (distal) part of the stomach and 61% of cases were diagnosed with gastric adenocarcinoma, with a predominance of intestinal type gastric adenocarcinoma (Table 1). Figure 1 illustrates the routinely stained sections of gastric adenocarcinoma (Figure 1.A-B) and chronic gastritis (Figure 1.C), as well as the various morphologies of *H. pylori* as detected using immunohistochemistry (Figure 1.D-F).

Biological behavior of chronic gastritis and gastric adenocarcinoma

The prevalence of *H. pylori* infection was 80.2% and 75.8% in chronic gastritis and gastric adenocarcinoma, respectively (Table 2), but there was no significant difference in the number of cases with *H. pylori* infection when comparing chronic gastritis and gastric adenocarcinoma groups of patients (*P*=0.371). Moreover, the type of gastric adenocarcinoma showed no correlation with *H. pylori* infection (*P*=0.732).

The frequency of presence of *H. pylori* in the reviewed biopsies did not vary with the types of studied gastrointestinal diseases (chronic gastritis and adenocarcinoma), age and sex (Table 2).

FIGURE 1. Morphology of gastric adenocarcinoma, chronic gastritis and *H. pylori*



- A:** diffuse type adenocarcinoma (H&E, 200x).
B: intestinal type adenocarcinoma (H&E, 40x).
C: chronic gastritis (H&E, 200x).
D: Coccoid form of *H. pylori* (*H. pylori* immunoperoxidase stain, 400x).
E: Straight rod-shaped form of *H. pylori* (*H. pylori* immunoperoxidase stain, 400x).
F: Spiral and curved form of *H. pylori* (*H. pylori* immunoperoxidase stain, 400x).

TABLE 1: Clinical, Demographic and Pathological Characteristics of 307 Patients with Chronic Gastritis and Gastric Adenocarcinoma

| Characteristics | n | % |
|---------------------------------------|------|------|
| Age (years, n=307) | | |
| ≤ 50 | 110 | 35.8 |
| > 50 | 197 | 64.2 |
| Sex (n=307) | | |
| Male | 153 | 49.8 |
| Female | 154 | 50.2 |
| Residence (n=307) | | |
| Kigali city | 72 | 23.5 |
| East | 64 | 20.4 |
| North | 61 | 19.9 |
| South | 56 | 18.2 |
| West | 50 | 16.3 |
| Foreigners | 2 | 0.7 |
| Anatomical site (n=307) | | |
| Cardia | 5 | 1.6 |
| Non-cardia | 302 | 98.4 |
| Specimen type (n=307) | | |
| Resection specimens | 43 | 14.0 |
| Endoscopic biopsies | 264 | 86.0 |
| Diagnosis (n=307) | | |
| Chronic gastritis | 121 | 39.4 |
| Gastric adenocarcinoma (n=196) | 60.6 | |
| Intestinal type | 104 | 55.9 |
| Diffuse type | 63 | 33.9 |
| Mixed type | 19 | 10.2 |
| H. pylori status (n=307) | | |
| Positive | 238 | 77.5 |
| Negative | 69 | 22.5 |

DISCUSSION

H. pylori plays a major role in gastrointestinal diseases including chronic gastritis, gastroduodenal ulcers, and gastric adenocarcinoma and MALT lymphoma. Previous studies have shown that immunohistochemistry is a sensitive and reliable test for identifying *H. pylori* infection in tissue sections.^{13, 25} In the present study, we analyzed the proportion of *H. pylori* infection among pathology samples of patients diagnosed with chronic gastritis and gastric adenocarcinoma in one of the hospitals in Rwanda.

The high proportion of endoscopic biopsies (86%) in our cohort is in keeping with the fact that endoscopic biopsy is considered a gold standard procedure for the screening and the detection of gastric cancer.^{1, 20} In both patient groups, the majority of cases were older than 50 years of age, while both sexes were almost equally represented. The relatively over-representation of Kigali and the Eastern regions among the cohort may be explained by the geographical accessibility to the study site.

The overall prevalence of *H. pylori* infection among both disease groups was high (77%). A similar proportion (75%) of *H. pylori* infection (using modified rapid urease test) was previously reported in Rwanda, in a study comprising all patients who underwent upper gastrointestinal endoscopy. The proportions, although slightly different, are not significantly different.²⁷ The proportion of *H. pylori* infection among various cohorts of individuals in Africa ranges from 55 to 92%.^{11, 14} In addition, there was no significant difference in the rates of *H. pylori* infection between chronic gastritis and gastric adenocarcinoma ($P= 0.371$). These findings are similar to those previously reported in other settings.¹⁴

In the present study, although there was no significant association between age (using a 50-year cut-off) and *H. pylori* infection, a trend towards a higher proportion of *H. pylori* infection with increasing age among chronic gastritis patients was observed. In contrast, it tends to de-

TABLE 2: Correlation Between H. Pylori and Clinical and Demographic Characteristics Of Patients With Chronic Gastritis and Gastric Adenocarcinoma

| Parameter | Characteristics | H. pylori positive | | Fisher's exact test P value |
|-----------------------------|------------------------|--------------------|----|-----------------------------|
| | | Yes | No | |
| Diagnosis | Chronic gastritis | 97 | 24 | .403 |
| | Gastric adenocarcinoma | 141 | 45 | |
| Age, chronic gastritis | <50 | 42 | 12 | .648 |
| | ≥50 | 55 | 12 | |
| Age, gastric adenocarcinoma | <50 | 45 | 9 | .136 |
| | ≥50 | 96 | 36 | |
| Sex, chronic gastritis | Male | 55 | 14 | >.999 |
| | Female | 42 | 10 | |
| Sex, gastric adenocarcinoma | Male | 65 | 19 | .731 |
| | Female | 76 | 26 | |
| Type of adenocarcinoma | Intestinal | 80 | 24 | .732 |
| | Non-intestinal | 61 | 21 | |

crease with increasing age among gastric adenocarcinoma patients. These findings are consistent with the previous studies which reported that *H. pylori* infection is typically universal in all adulthood age groups^{20, 28}, because it is up taken during youthfulness and generally persists during lifetime except if correctly managed.²⁹

CONCLUSION

This study documents a high prevalence of *H. pylori* infection in pathology specimens at one major hospital in Rwanda. Study findings indicate that all age and both sexes are at risk of getting *H. pylori* infection, and suggest that pathologists should consider using immunohistochemistry in the evaluation of gastric biopsies. This may allow early detection and appropriate treatment, and hence decrease the risk of gastric cancer.

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Cancer in Patients Referred Abroad For Health Care and Related Foreign Currency Expenses

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ABSTRACT

Background: There is limited access to health services in Burundi, as most of the services such as cancer care are unavailable. Burundian citizen who can afford the costs involved in seeking treatment elsewhere are referred abroad. The purpose of this study was to assess the proportion of patients suffering from cancer among patients referred abroad for healthcare and to evaluate the costs incurred by those patients in relation to what the country would save by establishing cancer healthcare facilities.

Methodology: The study was performed retrospectively from January 2016 to December 2018. With approval of Ministry of Public Health and AIDS control, the data was collected from medical reports at the general management of health facilities and AIDS control office. All patients with medical reports containing the reason for referral were included in the study. Medical reports assessing occupational disability were excluded. Data analysis was performed using Statistical Package for the Social Sciences (SPSS).

Results: Male, female and unclear was 45.3%, 39.9% and 14.8% respectively. Average age was 31,82. The main reason for referral was MRI (21.7%). Cancer patients represented 18% of all patients referred abroad for healthcare and the most common type of cancer found was breast (26.5%), genitourinary (15.7%) and digestive (14,2%). If all patients from 2016-2018 were referred to Kenya, Uganda, Rwanda, India or Europe for 30 years, the country would spend in foreign currency US\$3,858,229; US\$638,342.80; US\$21,288,592; US\$10,410,192.90; US\$54,718,329.70 respectively. Also, if all patients estimated by Globocan in 2018 were to be referred to these countries, the cost of foreign currencies would be US\$52,455,122.60; US\$38,264,740.88; US\$129,272,590.40; US\$81,330,325.94; US\$276,601,008.02 respectively.

Conclusion: There is a good number of cancer patients among patients referred abroad for health care. The estimated costs incurred by patients referred abroad for cancer care are far greater than funds needed to setup modern cancer care centres in Burundi.

BACKGROUND

Worldwide, 19.3 million new cancer cases and 10 million deaths from cancer were recorded in the year 2020. In Africa, the incidence was estimated to be 5.7% of worldwide incidence while death from cancer was rated at 7.2% of the total worldwide deaths. Of these, 5.7% deaths due to cancer were estimated to occur in Africa, with breast cancer overtaking lung cancer as the most frequently diagnosed cancer type with approximately 2.3 million new cases (11.7%), followed by lung cancer (11.4%), colorectal (10.0%), prostate (7.3%) and stomach cancers (5.6%).¹

In Burundi, the incidence of cancer was estimated to be 6,743; 8,682 and 7,929 new patients respectively for the year 2012, 2018 and 2020.²⁻⁴ However, this data is estimated using information from neighbouring countries since Burundi does not have a cancer incidence registry.

Cancer care in Burundi remains a challenge. Indeed, accessing pathological diagnosis and chemotherapy

is problematic since there is only one pathologist for every 12 million people, 3 Computed Tomography (CT) scan, no Magnetic Resonance Imaging (MRI) and no chemotherapy in public facilities.

Due to difficulties in accessing advanced healthcare such as MRI or pathologic tests in Burundi, the cancer prevalence could have been underestimated.

According to the World Health Organization, the right to health for all people means that everyone should have access to health facilities they need, when and where they need them without suffering financial hardship.⁵ Unfortunately, most cancer patients in Burundi have to be referred abroad to be able to access advanced healthcare services. However, seeking treatment from abroad comes with huge expenses which only a few can afford. The cancer diagnosis and treatment dilemma requires urgent action so as to help people suffering from cancer.⁶

Study Questions

In the framework of advocating for the population so that health authorities in Burundi realise the amplex of the problem, this study was conducted with the following study questions: (1) What is the proportion of cancer among patients referred abroad for healthcare, (2) Is there any benefit that the country could register if advanced cancer healthcare services were provided within Burundi?

METHODS

Process of Getting Authorisation to be Treated Abroad

For patients whose doctors recommends seeking healthcare abroad or to assess occupational disability, the doctors writes to the Ministry of Public Health and the Fight against AIDS requesting the ministry to appoint a medical commission to assess the need for such a patient to be treated abroad or to assess occupational disability of the patient. The appointed commission studies the patient's situation and makes a report recommending whether the request is founded or not. The report is forwarded to the general manager of public health facilities who, basing on the commission's recommendations authorises or rejects the request for seeking treatment abroad.

Consultation of Medical Reports

The study was conducted at the Ministry of Public Health and AIDS control. Permission to conduct the study was sought for from the Ministry Of Public Health and AIDS by Hope Africa University of Burundi.

Data was collected from the office of the General Manager of public health facilities, a department in charge of nomination of the Medical Committee, a Committee that assesses the need for patients to seek health services abroad.

Inclusion and Exclusion Criteria

The study assessed all submitted medical reports of January 2016 to December 2018. To be included in the study, the report had to be mentioning Cancer as the reason for referral and diagnosis. Medical reports assessing other issues such as occupational disability were excluded.

Data Collection and Analysis

Data was extracted from the medical reports. After extraction, the information was recorded on a structured questionnaire developed for this purpose. This questionnaire contained variables such as; age, gender, hospital producing medical report, diagnosis, reason and year of referral, medical specialty, cancer type and MRI exam. The recorded data was registered, analysed and transferred into SPSS 25.0 (IBM Corp, Armonk, NY). Univariate descriptive analysis was performed.

Online Searching

Extensive search was done on Google scholar, PubMed, and other website to compare different price of oncology facilities, life and travel cost in the countries where most of Burundian travel to seeking cancer healthcare. Results were combined to determine the average of the personal expenses incurred. The average was applied to all the number of patients that were referred abroad to seek treatment for cancer. Results were extrapolated, patients of 3 to 10 years on one hand and all cancer patients esti-

mated by Globocan in 2018 to be referred abroad for treatment on the other hand. The total sums were compared with the amount required to set up a Cancer care centre.

Ethical Approval

Through the Hope Africa University, a letter was sent (Réf:UEA/PPU/216/12/2018) to the Ministry of Public Health and of AIDS requesting for authorisation to consult the medical reports produced by Medical Commissions in charge of assessing the necessity of referral of patients to seek treatment abroad. The request was approved through a letter (N° 633/738/DGSSLS/2018).

RESULTS

From January 2016 to December 2018, 1,172 patients requested medical reports for approval of referral to seek for treatment abroad. During the screening process, 104 of these were excluded because they did not fulfil the criteria of inclusion. 1,068 medical records were analysed (Figure 1).

Socio-Demographic Characteristics and Reason for Referral

Patients were grouped into 3 groups; male, female and not clear (for applications from couples without any precision about who is seeking the health care). Male, female and not clear represented 484(45.3%), 426(39.9%) and 158(14.8%) respectively (Table 1).

The average age of referred patients was 32.8, ranging between 16 to 49 years, 298(27.9%). However, in many medical records, age was not mentioned 412(38.6%). Hospitals which referred most of the patients to the committee were University Teaching Hospital of Kamenge 466(43.6%) and Military hospital of Kamenge 201(18.8%) (Table 1).

Of the referred patients, 197(18.4%) were referred because of cancer. Of these; 52(26.5%), 31(15.7%), 28(14.2%) and 28(14.2%) represented breast, genito-urinary, Oto-rhino-laryngological and hepato-gastroentological cancer respectively (Table 2).

Magnetic Resonance Imaging (MRI) was the main reason for seeking approval to travel abroad 232(21.7%). In general, most of patients were referred abroad to carry out tests 404(37.8%) (Table 2).

Considering the affected organs including cancer and other diseases, neurological 238(22.3%), Genitourinary 233(21.8%) and cardiovascular system 172(16.1%) were the mostly affected among referred patients (Table 3). Many patients were referred in the year 2018, 431(40.4%) (Table 4) and many cancer patients were referred in the year 2018 (40.6%) (Table 5). Although in most cases the patient's age was not mentioned, majority of referred patients were over 50 years old (Table 5).

The Average Cost of Expenses Related to Cancer Care, Travel and Subsistence Expenses in Countries where Burundians are Often Referred to

Extensive online searching was performed. General expenses related to cancer care, living expenses and travel in countries where Burundian patients are often referred to were identified. The countries included; Kenya, Uganda, Rwanda, India and Belgium (Table 5).

Individual average expenses were summarised for each of the country; US\$7,240.30; US\$3,512.84; US\$16,088.20; US\$10,556.17 and US\$33,057.61 in Kenya, Rwanda, Uganda, India and in Europe respectively. (Table 5a).

In this study, we analysed the expenses for all patients referred abroad for cancer healthcare services and facilities during 3 years, 30 years and if all new cases estimated in 2018 where to be referred abroad (Table 6). In this analysis, it is clear that Burundi expends large amounts of foreign currencies to countries where patients are referred. Indeed, if all patients were referred to Kenya, Uganda, Rwanda, India or Europe for a period of 30 years, the country would be spending in foreign currency US\$3,858,229.00; US\$638,342.80; US\$21,288,592.00, US\$10,410,192.90, US\$54,718,329.70 respectively.

If all patients estimated by Globocan in 2018 were referred to Kenya, Uganda, Rwanda, India or Europe, the loss of foreign currencies if Burundi was to establish a cancer centre whose value is estimated at 11 million American dollars is; US\$52,455,122.60; US\$38,264,740.88; US\$129,272,590.40; US\$81,330,325.94 and US\$276,601,008.02 respectively.

TABLE 1: Socio-Demographic Characteristics

| Variables | Frequency (N=370) | Percent (%) |
|---|-------------------|-------------|
| Gender | | |
| Male | 484 | 45.3 |
| Female | 426 | 39.9 |
| Unclear | 158 | 14.8 |
| Age grouping (1068) | | |
| Under 16 years | 208 | 19.5 |
| 16 – 49 | 298 | 27.9 |
| 50 – 76 | 150 | 14.0 |
| Not mentioned | 412 | 38.6 |
| Hospital producing medical report (1068) | | |
| Teaching hospital of Kamenge | 466 | 43.6 |
| Military Hospital of Kamenge | 201 | 18.8 |
| Prince Louis Rwagasore Clinic | 78 | 7.3 |
| Kira Hospital | 69 | 6.5 |
| Prince Regent Rwagasore hospital | 87 | 8 |
| Others hospitals | 129 | 12.2 |
| Not mentioned | 38 | 3.6 |

DISCUSSION

This descriptive study assessed the frequency of cancer among patients referred abroad to seek access to better health services after seeking for government authorisation. In addition, it shows the main reasons for the referrals and the related foreign currency expenses. The results of this study can be used to estimate the rate of cancer among patients referred abroad for healthcare, to estimate the foreign currency expenses that the country could earn if cancer health care services were introduced

in Burundi and can form a key advocacy for improving scope of health services offered in Burundi.

TABLE 2: Place of Tumour and the Main Reasons of Referral

| Variables | Frequency (N=1068) | (%) |
|--|---------------------------|------------|
| Tumours | | |
| Yes | 197 | 18.4 |
| No | 871 | 81.6 |
| Main tumour site | Frequency (N=197) | (%) |
| Breast | 52 | 26.5 |
| Genito-Urinary | 31 | 15.7 |
| Brain and neurological | 21 | 10.7 |
| Oto rhino laryngological | 28 | 14.2 |
| Homeopathy | 6 | 3.0 |
| Hepato-Gastroentology | 28 | 14.2 |
| Lungs Cancer | 4 | 2.0 |
| Others | 27 | 13.7 |
| Magnetic resonance imaging | Frequency (N=1068) | (%) |
| Yes | 232 | 21.7 |
| No | 836 | 79.3 |
| Group of main reasons of transfer | Frequency (N=1068) | (%) |
| Tests | 404 | 37.8 |
| Medical care | 294 | 27.6 |
| MAP (Medical assisted Procreation) | 156 | 14.6 |
| Cardiac surgery | 125 | 11.7 |
| Others | 89 | 8.3 |

Of all patients referred abroad for cancer treatment, about 18% of these patients actually travelled and the rate could be lower given the realities on ground. In fact, many of the patients are unable to afford the costs involved to access health services abroad. Some of the patients will never know that they suffer from cancer due to lack of cancer diagnosis services in Burundi.

There is scanty data about patients who were referred abroad for cancer treatment but did not go. If such data was available, it would help estimate the demand for cancer treatment services among patients that are referred abroad.

Considering data estimates by Globocan in 2018, a good number of cancer patients in Burundi did not access treatment. Indeed, 8,682 new cancer patients were expected to occur in 2018 in Burundi²³ but only 80 patients were referred abroad for diagnosis and treatment. Since there was no cancer care centre in Burundi at that time, it implies that approximately 8,602 patients did not received cancer care.

In other countries within the East African Community, there is also scanty data about patients referred abroad for cancer healthcare. The reason could be that the quality of their healthcare is better than that of Burundi.

Among the patients referred abroad, a big percentage of them were suffering from cancer. This shows that universal healthcare coverage is a challenge in Burundi.

In fact, most of the patients referred abroad were being sent to perform medical tests, medical assisted procreation and cardiac surgery etc. This shows the need for efforts to equip health facilities with necessary machinery and also to train health personnel to meet the health needs of the population.

TABLE 3: Frequency of Patients According to Affected Sites among Referred Patients and Year Of Referral

| Affected sites | Frequency (1068) | % |
|--------------------------|------------------|------|
| Neurological diseases | 238 | 22.3 |
| Cardiovascular diseases | 172 | 16.1 |
| Endocrinology | 23 | 2.2 |
| Rheumatology | 20 | 1.9 |
| Hepato-Gastroenterology | 54 | 5.1 |
| Surgery | 88 | 8.2 |
| Genito-urinary diseases | 233 | 21.8 |
| Oto rhino laryngological | 71 | 6.6 |
| Dermatology | 15 | 1.4 |
| Ophthalmology | 49 | 4.6 |
| Haematology | 19 | 1.8 |
| Lungs diseases | 10 | 0.9 |
| Breast diseases | 52 | 4.9 |
| Nephrology | 15 | 1.4 |
| Others | 9 | 0.8 |
| Year of transfer | | |
| 2016 | 267 | 25,0 |
| 2017 | 370 | 34,6 |
| 2018 | 431 | 40,4 |

TABLE 4: Frequency of Cancer Patients According to Transfer Year, Age and Gender

| Year of transfer | Cancer (197) Number | % |
|---------------------|------------------------|------|
| 2016 | 43 | 21,8 |
| 2017 | 74 | 37,6 |
| 2018 | 80 | 40,6 |
| Age grouping | | |
| < 16 | 22 | 10.6 |
| ≥ 16 – 49 | 83 | 27.9 |
| ≥50 | 45 | 30.0 |
| Not mentioned | 47 | 31,5 |
| Gender | | |
| Male | 78 | 39,6 |
| Female | 119 | 60,4 |

The government of Burundi does not have any strategy in place to follow up on the outcome of patients that are referred abroad to receive healthcare; Did the patients receive the sought for care or not? Such data is missing. Such data would help to evaluate the impact of health services administered abroad and facilitate policymaking. For instance, in Senegal, among 169 children referred abroad for health services especially cardiac surgery, only 48.8% had good results and the quality of life was better in the group of congenital heart disease.⁵

This study showed that cancers were associated with gender and age. In fact, breast cancer is the most type of cancer found in the world and in Africa, cancer is supposed to be a disease of old age.^{4,5} The tendency of world cancer statistics estimated that female victims to cancer were to be around 47.5% of all new cancer incidents in 2018.⁶

This study reports that the cost (treatment, travel and living expenses) of seeking for cancer healthcare in the 5 frequented countries remains high irrespective of the country in which treatment is sought. Therefore, we note that during the 3 years of this study, the country lost more foreign currency by engaging in referral of patients abroad (197 patients) for diagnosis and / or treatment of cancer. Extrapolated on 30 years or considering that all patients estimated by Globocan 2018 were referred abroad for treatment, the total sum of foreign exchange is far greater than the amount needed to establish a Cancer Care Centre in Burundi.

Therefore, a good plan should be put in place aimed at saving foreign currency spent by patients seeking diagnosis and treatment of cancer abroad. This will also make it easier for cancer patients to access treatment locally. Other countries such as Benin and Côte d'Ivoire have discovered this inequality and have already made the decision to equip their health centres instead of referrals abroad.⁷

This study has some limitations, limitations related to retrospective studies. Furthermore, there was no standard format of the medical reports used by the Commission. This limited accessibility to some data. Also, this study did not consider the transfer of samples, this brings about bias in the overall tendency of prevalence of cancer.

CONCLUSION

A good number of patients referred abroad for healthcare between January 2016 and December 2018 were suffering from cancer. Most patients referred abroad for para clinical exams were seeking MRI services. By referring patients abroad for healthcare, the country lose a lot of foreign exchange which would be saved if the government was to equip its medical facilities. The estimated revenue spent by patients referred abroad for treatment is far greater than the funds required to establish a modern Cancer Care Centre. The health authorities could invest in establishing modern Cancer Care Centres in Burundi rather than supporting patient referrals abroad. This is also valid for other missing types of healthcare in Burundi such cardiac surgery. Further studies are required to clarify the situation regarding cancer status among patients requesting health facilities abroad and their follow up.

TABLE 5: Estimated Cost of Cancer Treatment, Transport and Living Expenses for 5 Frequently Visited Countries

| Country | Cost of Cancer Care (US\$) | | Travel fees & references (US\$) | Living Expenses for 4 months & references | Individual Cost (US\$) | Gross domestic Product per Capita & references |
|-------------------------------|----------------------------|-----------------------|---------------------------------|---|------------------------|--|
| Kenya⁷ | 476,5 | Diagnostic fees | 400 ⁸ | 2060 ⁹ | 7240,30 | 3483 ¹⁰ |
| | 1643,4 | Surgery | | | | |
| | 1,364.3 | Chemotherapy | | | | |
| | 1,296.1 | Radiotherapy | | | | |
| | 1,716.4 | Chemo-radiotherapy | | | | |
| Rwanda^{11,12} | 1524,36 | Without radiotherapy | 228,48 ⁸ | 346,94 ¹³ | 3512,84 | 2165 ¹⁰ |
| | 2093 | Radiotherapy | | | | |
| Uganda¹⁴ | 4335 | Surgery | 320 ⁸ | 2076,20 ¹⁵ | 16088,20 | 2183 ¹⁰ |
| | 9360 | Chemo-radiotherapy | | | | |
| India¹⁶ | 502 | Cost of investigation | 825,37 ¹⁷ | 1480,80 ¹⁸ | 10556,17 | 8443 ¹⁹ |
| | 1386 | Chemotherapy | | | | |
| | 6382 | Radiotherapy | | | | |
| Europe | 28624,75 | Surgery | 636,86 ⁸ | 3796 ²⁰ | 33057,61 | 34768.65 ²¹ |
| Burundi | | | | | | |

TABLE 6: Expense for Patients Referred Abroad and Money to be Saved if Cancer Care Facility were Established in Burundi

| Country | Average of individual expenses(US\$) | Expenses incurred by Cancer patient referred abroad | Extrapolation of expenses on 30 yrs (US\$) (2016-2018) (US\$) | Expenses to set up a centre of oncology & reference | Loss of money within 30 yrs | If all patients estimated by Globocan in 2018 where referred abroad (8682) | Difference if all patients estimated by Globocan in 2018 should be referred abroad |
|---------|--------------------------------------|---|---|---|-----------------------------|--|--|
| Kenya | 7,240.30 | 1,426,339.10 | 14,263,391.00 | 10,405,162 ²² | 3,858,229.00 | 62,860,284.60 | 52,455,122.60 |
| Uganda | 5,605.84 | 1,104,350.48 | 11,043,504.80 | | 638,342.80 | 48,669,902.88 | 38,264,740.88 |
| Rwanda | 16,088.20 | 3,169,375.40 | 31,693,754.00 | | 21,288,592.00 | 139,677,752.40 | 129,272,590.40 |
| India | 10,566.17 | 2,081,535.49 | 20,815,354.90 | | 10,410,192.90 | 91,735,487.94 | 81,330,325.94 |
| Europe | 33,057.61 | 6,512,349.17 | 65,123,491.70 | | 54,718,329.70 | 287,006,170.02 | 276,601,008.02 |

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Pathology Characteristics of Lymphomas in Rwanda: A Retrospective Study

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ABSTRACT

Background: Lymphomas have been a global challenge for many decades and despite measures for prevention and management, the incidence continues to increase. There are two main categories, which are Non-Hodgkin's Lymphomas and Hodgkin's Lymphomas and most common etiologies are environmental, genetic alteration, radiation and some viruses.

Objective: To describe pathology characteristics of lymphomas in Rwanda based on Hematoxylin and Eosin stained glass slides and immuno histo chemistry, and classify them according to clinical aggressiveness.

Patients and Methods: We conducted a retrospective observational and descriptive study from January 2013 to December 2019. Lymphoma cases were retrieved together with relevant clinical and pathological information, and reviewed by independent pathologists. Histological diagnosis was classified according to the 2008 World Health Organization system in order to assign clinical aggressiveness of the lymphoma.

Results: Three hundred and six lymphoma cases were enrolled. Males contributed to 57% of all reviewed case, and slightly over 50% were young aged ≤ 35 years. Approximately 191 (62%) of cases were nodal lymphomas. Approximately one fifth (18%) of lymphoma cases were HIV positive. Most 213(70%) cases were Non-Hodgkin's Lymphomas of aggressive forms 164(77%). Among 164 cases of aggressive Non-Hodgkin's Lymphomas, diffuse large B cell lymphoma was the leading subtype 91(55.5%), followed by solid lymphoblastic lymphoma 32(19.5%) and Burkitt lymphoma 17(10.4%). Among all Hodgkin lymphoma cases, 90(97%) were classical Hodgkin lymphoma of nodular sclerosis subtype. Hodgkin lymphoma patients were younger compared to Non-Hodgkin's Lymphomas patients (mean age of 24.78 ± 16.3 years versus 38.6 ± 22.5 years, $p = .000$).

Conclusion: Substantial proportion of Lymphoma patients in Rwanda were also HIV positive. Interestingly, Non-Hodgkin's Lymphomas in Rwanda are predominated by the most aggressive forms, and these mostly affect a younger population. Optimal characterisation of such cases, using advanced methods, is recommended.

BACKGROUND

Cancer is a burden worldwide with 17.5 million cases and more than 8.7 million deaths in 2015.¹ In Africa, between 2012 and 2030, the number of new cancer cases per year is expected to increase by 70%.² In sub-Saharan Africa, more than 456,000 deaths were caused by cancer in 2012 and a double is predicted in 2030.³ Lymphomas are categorised in two main groups, Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL). In 2015, the global incidence of NHL and HL was 666,000 and 231,000 cases, respectively, while deaths were 78,000 and 24,000 cases, respectively.¹

In Rwanda, a survey done for the period of 1979-1987 showed that NHL represented 83.5% of all lymphomas.⁴ The most recent epidemiological study on cancer in Rwanda, covering the period of 2000 to 2004 showed that lymphoma constituted 25.3% of all cancers and was predominated (79.8%) by NHLs.⁵

Thus, available data on the distribution of lymphomas in Rwanda are from 15 years back. Since then, huge changes in the diagnosis, classification and treatment of lymphoma have taken place around the world, thanks to the introduction of immunological and genetic testing among others. More specifically, in Rwanda, immunohistochemistry has recently been introduced for the confirmation and / or sub typing of lymphoma cases.

This study aimed at assessing the current clinical and pathological features of lymphoma in patients diagnosed with lymphoma in Rwanda on the basis of morphology and the newly introduced immunohistochemistry. Trends observed in the data generated will likely inform clinicians, researchers and healthcare administrators of areas to focus on in their interventions.

METHODS

Type and Setting of the Study

We conducted a retrospective descriptive study on lymphomas cases diagnosed in Rwanda during the period of 2013-2019. The main stay of this study was Butaro Cancer Centre of Excellence (BCCOE) which receives the vast majority of lymphomas cases in Rwanda for diagnosis and/or immunohistochemistry, as it is the main centre for cancer chemotherapy in the country.

Data Collection

Data were obtained from BCCOE histopathology archives. Permanent hematoxylin and eosin (H&E) and immunoperoxidase-stained slides were re-evaluated for diagnosis confirmation by 2 independent pathologists. In case of divergent conclusions, the two pathologists made a consensus diagnosis. Cases were categorized into HL and NHL. We used the 2008 WHO classification⁶ to categorize the cases according to their clinical aggressiveness. The current 2016 WHO classification⁷ in which genomic profiling is an important component, couldn't be used in this study because genomic profiling is not yet incorporated in clinical services in Rwanda. Lymphoma staging data was not included as this information was missing from most files consulted.

Data Management and Statistical Analysis

Demographic, clinical, morphology and immunohistochemistry data were entered into data collection sheets, transcribed into an excel sheets. The data were imported into and analyzed using statistical package for social sciences (SPSS) version 25 software (USA-Chicago by Norman H. Nie et al). Independent t- test was used for mean comparison, Fisher's exact test and Chi-square test used to compare proportions. A p-value <0.05 was considered for a significant statistical association between groups.

Ethical consideration

Each and every case was given a code during data collection and matching it with the histopathology case number. No patient's name appeared neither on data collection form nor during data presentation. The study was approved by the University of Rwanda College of Medicine and Health Sciences (UR-CMHS) Institutional Review Board (IRB), ethical approval number "No452/CMHS IRB/2019".

Limitations of the study

We faced a challenge in staging all NHLs cases due to lack of clinico-radiological information in patients' files. Also, a probability of a low rate of detection of lymphomas in Rwanda because of culture and belief of some of the population.

RESULTS

This study included 306 cases of lymphomas. There was a predominance of male patients 174(56.8%), as shown in Table 1. Younger patients were most affected in that 166(54.2%) of patients were aged ≤35 years. The Southern region was more affected 77(25.2%) than other regions of Rwanda. HIV was positive in 25(18.4%) of patients with known HIV status (136 patients). The lymphoma disease was mainly nodal 191(62.4%) versus 3115(7.6%) for extra-nodal lymphoma. Most specimens consisted of excisions 184(60.1%), with fewer incisions

69(22.5%), bone marrow biopsies 13(4.2%) and other core needle biopsies 40(13.1%). Cases were predominated 213(69.6%) by NHLs, while HLs represented 93(30.4%) of cases. Most 164(77.0%) NHLs were of the aggressive form, while indolent NHL was seen in only 46(21.6%) of NHL cases.

The histological typing of lymphomas shows that diffuse large B-cell lymphoma (DLBCL) 91(55.5%), lymphoblastic lymphoma (solid) 32(19.5%) and Burkitt lymphoma 17(10.4%) predominated the aggressive form of NHL, while 23(50%) of indolent NHLs consisted of small cell lymphocytic lymphoma /chronic lymphocytic leukemia (SLL/CLL), as shown in Table 2. On the other hand, nodular sclerosis 40(45.6%) and mixed cellularity 36(40.9%) classical HL comprised the majority of HL cases.

TABLE 1: Clinical and Demographic Characteristics of Patients

| Characteristics | N | % |
|------------------------------|-----|------|
| Sex | | |
| Male | 174 | 56.9 |
| Female | 132 | 43.1 |
| Age (mean=34.4) | | |
| <15 | 79 | 25.8 |
| 16-35 | 87 | 28.4 |
| 36-55 | 75 | 24.5 |
| >55 | 65 | 21.2 |
| Residence | | |
| Kigali | 53 | 17.3 |
| North | 58 | 19.0 |
| South | 77 | 25.2 |
| East | 31 | 10.1 |
| West | 57 | 18.6 |
| Foreigners | 30 | 9.8 |
| HIV Status | | |
| Positive | 25 | 18.4 |
| Negative | 111 | 81.6 |
| Site of biopsy | | |
| Extra nodal | 115 | 37.6 |
| Nodal | 191 | 62.4 |
| Biopsy procedure type | | |
| Bone marrow | 13 | 4.2 |
| Core needle | 40 | 13.1 |
| Excisional | 184 | 60.1 |
| Incisional | 69 | 22.5 |
| Type of lymphoma) | | |
| Non-Hodgkin lymphoma | 213 | 69.6 |
| Hodgkin lymphoma | 93 | 30.4 |

Correlative analysis (Table 3) shows that the neither sex (Fisher's exact test $P=.301$) nor HIV status (Fisher's exact test $P=.143$) influenced the distribution of the major types of lymphomas (HL and NHL). Age distribution between HL and NHL differed in that the proportion of HL cases decreased with age while that of NHL increased with age (Chi-square test $P=.000$). Moreover, there is a male predominance (81%) among aggressive NHLs, most

TABLE 2: Histological Types and Aggressive Forms of Lymphomas

| Subtypes of Hodgkin lymphoma and non-Hodgkin lymphoma | n | % |
|--|------------|-------------|
| Classical Hodgkin lymphoma | 90 | 96.8 |
| Lymphocyte depleted ICHL | 6 | 6.8 |
| Lymphocyte rich CHL | 6 | 6.8 |
| Mixed cellularity CHL | 36 | 40.9 |
| Nodular Sclerosis CHL | 40 | 45.5 |
| Non-classical Hodgkin lymphoma | 3 | 3.2 |
| Nodular lymphocytes predominant | 3 | 3.2 |
| Indolent non-Hodgkin lymphoma | 46 | 21.6 |
| Cutaneous T-cell lymphoma (mycosis fungoides) | 3 | 6.5 |
| Follicular lymphoma grade 1 & 2 | 5 | 10.9 |
| Marginal zone lymphoma/ mucosa-associated lymphoid tissue lymphoma | 15 | 32.6 |
| Small cell lymphocytic lymphoma & chronic lymphocytic leukemia | 23 | 50.0 |
| Aggressive non-Hodgkin lymphoma | 164 | 77 |
| Anaplastic large cell lymphoma | 6 | 3.7 |
| Burkitt lymphoma | 17 | 10.4 |
| Diffuse large B-cell lymphoma | 91 | 55.5 |
| Lymphoblastic lymphoma (solid) | 32 | 19.5 |
| Mantle cell lymphoma | 3 | 1.8 |
| Natural killer T cell lymphoma | 2 | 1.2 |
| Peripheral T-cell lymphoma | 3 | 1.8 |
| Plasmablastic lymphoma | 10 | 6.2 |
| Unclassified non-Hodgkin lymphoma | 3 | 1.4 |

¹Classical Hodgkin's lymphoma

TABLE 3: Clinico-Pathologic Characteristics of Lymphomas

| Parameter | Characteristics | HL (n) | NHL (n) | P-value ^a |
|----------------------------|-----------------|--------|---------|----------------------|
| Sex (n=306) | M | 57 | 117 | 0.301 |
| | F | 36 | 96 | |
| Age group (years), (n=306) | <15 | 32 | 47 | 0.000 |
| | 16-35 | 37 | 50 | |
| | 36-55 | 20 | 55 | |
| | >55 | 4 | 61 | |
| HIV status (n=136) | Positive | 4 | 21 | 0.143 |
| | Negative | 34 | 77 | |
| Anatomical site (n=306) | Nodal | 85 | 106 | 0.000 |
| | Extra-nodal | 8 | 107 | |

^aFisher's exact test (if only 2 groups) or Chi-square test (if more than 2 groups). HIV, human immunodeficiency virus; HL, Hodgkin's lymphoma; NHL, non-Hodgkin's lymphoma

of whom are <15 years of age (data not shown). NHLs shows an approximately equal distribution among nodal-

and extra-nodal sites, while the vast majority of HL affect nodal sites (Fisher's exact test $P=0.000$).

DISCUSSION

This study shows that lymphomas affects predominantly male than female population in Rwanda; that trend is almost similar for both NHL and HL ($P=0.301$). In comparison, these results are similar to those reported from Egypt⁸, Iran⁹ and India.¹⁰ A peak age of HL between 15 to 35 years noticed in this study was also previously reported in other settings.¹¹ However, there is lack of the second HL peak age in Rwanda, most likely due to the fact that there is a small number of the population above 65 years of age in Rwanda.¹² In our cohort, the rate of HIV positivity among lymphoma cases was 18%, which is quite higher than the prevalence (3%) of HIV positivity reported in the general population of Rwanda.¹³ This finding was observed elsewhere.¹⁴

The predominance 213(70%) of NHLs (*versus* HL) observed in this study was also documented in studies done in Iran (64.5%), Iraq (76%) and Southern India (78.7%).¹⁵⁻¹⁷

Aggressive form of NHLs was over-represented in Rwanda compared to other settings. In accordance, while aggressive NHL represents 164(77%) of NHL in Rwanda, it is approximately 53% in Central and Southern America, 37% in Northern America and 36% in Poland.¹⁸ Moreover, the aggressive form of NHL in Rwanda exhibits male predominance (81%) and the most affected age range was <15 years. Similar albeit weaker trend was seen in a study done in Iran with a male to female ratio of 1.8:1.¹⁵

A possible predominance of paediatric forms of lymphoma (Burkitt and Burkitt-like, potentially misclassified) among aggressive NHL in Rwanda should be investigated using advanced methods as put forth in the current WHO classification;¹⁹ such methods merit to be introduced in Rwanda.

CONCLUSIONS

As reported elsewhere, there is a male predominance and high rate of HIV positive cases among lymphoma patients in Rwanda. Lymphoma in Rwanda affects younger patients than in other regions. Interestingly, the most aggressive forms of NHL predominate in childhood, which may imply that these cases are Burkitt or Burkitt-like lymphomas. This assumption is to be verified through the introduction of genomic and other advanced diagnostic methods in Rwanda.

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Healthcare Professional Preferences for Prescribing Artemisinins and Quinine for Malaria in Burundi

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ABSTRACT

Background: Malaria is a significant cause of morbidity and mortality throughout the world and particularly sub-Saharan Africa. The World Health Organization and many national bodies, including Burundi, recommend artemisinin-based therapy as first-line treatment for uncomplicated and severe malaria. Implementing this recommendation requires healthcare professionals' acceptance of this treatment as the optimal choice.

Methods: A survey was conducted among Burundian healthcare professionals from June to September 2017 to assess prescribing preferences regarding artemisinins versus quinine for treating malaria. Healthcare professionals were surveyed from 32 health facilities in 10 provinces. Respondents included both physicians and nurses who provided responses about their antimalarial treatment preferences for a variety of clinical scenarios. Comparisons among healthcare professionals, their level of training, work setting, and length of work experience were examined using a series of stratified analyses, where the Pearson Chi-square statistic and odds ratios with 95% confidence intervals were calculated.

Results: Respondents included 101 doctors and 196 nurses. Seventy-nine percent of respondents worked in hospitals, while 58% had more than 5 years of work experience. Although 94% of respondents correctly identified artemisinin-based treatment as first-line therapy according to the national protocol, 24-40% of respondents preferred the use of quinine in various hypothetical clinical scenarios. Overall, nurses were at greater odds of preferring quinine versus artemisinins compared with physicians. Availability of artemisinins was associated positively with artemisinin preference. These results did not vary by duration of work experience.

Conclusions: Though knowledge of artemisinin-based therapy was recognised by the majority of respondents as the recommended antimalarial treatment, a high proportion of Burundian healthcare professionals, especially nurses, prefer using oral and IV quinine in a number of clinical scenarios. These findings identify a significant barrier to the satisfactory implementation of a life-saving treatment in accordance with national and international recommendations.

BACKGROUND

Malaria is a significant cause of morbidity and mortality throughout the world, and particularly in sub-Saharan Africa.¹ In Burundi, malaria remains the leading cause of morbidity and mortality (see Figure 1).² One of the largest advances in treatment in recent years is the introduction of artemisinin-based therapy. Most countries in Africa have been recommending artemisinin combination therapy (ACT) for first-line treatment of uncomplicated malaria since at least 2005, with Burundi adopting this recommendation in 2003.³ More recently, the South East Asian Quinine Artesunate Malaria Trial (SEAQUAMAT) for adults and the Artesunate versus quinine in the treatment of severe falciparum malaria in African children (AQUAMAT) trial for children demonstrated decreased mortality for intravenous artesunate versus quinine in the treatment of severe falciparum malaria, a finding further supported by a 2012 Cochrane review.^{4,5,6} The World Health

Organization (WHO) Guideline for the Treatment of Malaria has adopted artemisinin-based treatment for both categories since 2010.⁷ An African logistical study showed that artesunate is better, cheaper, and easier to administer than its longstanding forerunner quinine.⁸

Despite the enormous benefit of this evidence-based recommendation, the WHO World Malaria Report 2019 mentions that only 48% of febrile children in the public sector of sub-Saharan Africa who sought care were given an antimalarial drug, and that only 80% of those given an antimalarial were given an ACT.¹ Though progress continues to be made, obstacles to complete implementation merit analysis. Successful implementation depends on a multiplicity of factors, including availability and acceptance by healthcare professionals (HCP).⁹

Regarding uncomplicated malaria in Burundi, sulfadoxine-pyrimethamine (SP) was officially replac-

ed by artesunate-amodiaquine (AS-AQ) in november 2003, though quinine use is still widespread.³ In terms of availability, a Burundian study in 2011 showed that AS-AQ was present in 88% of public sector venues.¹⁰ More recently, a 2019 national guideline changed the first-line ACT to artemether-lumefantrine (A-L), which has recently become widely available in Burundi. Second-line therapy is dihydroartemisinin-piperaquine, with oral quinine moving from second-line therapy to being used only in cases where there are contraindications to ACT (Table 1).¹¹

Acceptability and preference of these antimalarial drugs by health-care professionals and the population has been evaluated in a variety of heterogeneous studies across sub-Saharan Africa. A Rwandan study of non-artemisinin antimalarials found HCP non-compliance to be associated with ignorance of the protocol, doubt of efficacy, and fear of adverse effects.¹² In two Cameroonian studies regarding implementation of AS-AQ, HCPs' hesitancy was due to adverse effects of amodiaquine, lack of availability, and doubt of efficacy.^{13,14} Two Burkina Faso studies also showed poor compliance to ACTs for uncomplicated malaria, despite adequate knowledge of national protocol recommendations, citing as reasons adverse effects and availability.^{15,16} A Kenyan study showed quinine prescription persisting particularly in children over 5 years and adult populations.¹⁷

In regard to severe malaria, since 2012, Burundi's national protocol has recommended IV artesunate as first-line therapy with IV quinine as a second-line alternative when IV artesunate is unavailable. We were not able to find current availability data and IV quinine use remains widespread.¹⁸ Preference for treating severe malaria with IV quinine was elsewhere seen in a 2016 Congolese study where less than 2% received IV artesunate.¹⁹ A 2015 Sudanese study also found overuse of IV quinine instead of oral ACTs for patients that had no criteria for severe malaria.²⁰

In light of the paucity of studies about HCP preferences towards any artemisinin-based therapy in our region of Africa, and in particular of studies that evaluate such preferences for injectable artesunate for severe malaria, our study sought to address these topics in the context of the country of Burundi. If HCP preferences diverge from national and international recommendations, identification of this divergence could highlight an important gap in the pathway from correct knowledge to correct implementation.

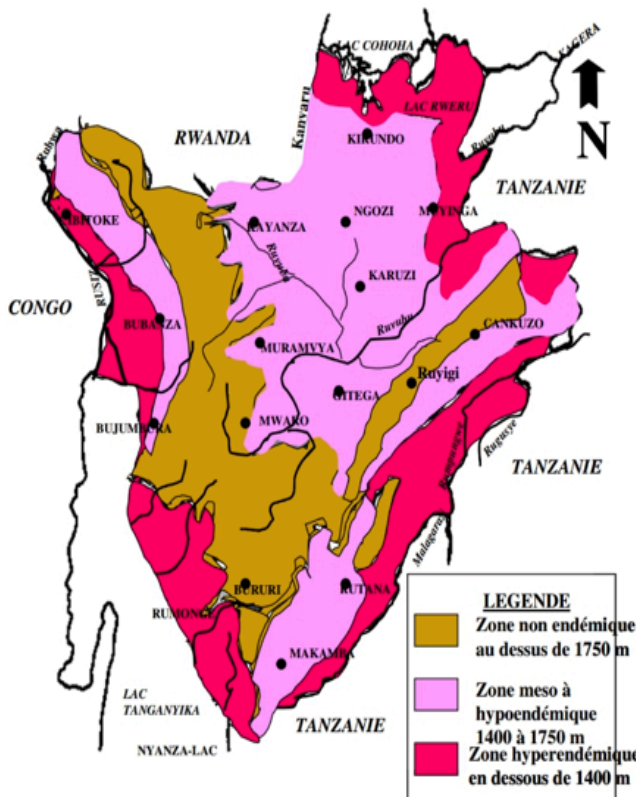
METHODS

Study Area and Period

This cross-sectional study was performed between June and September 2017, roughly 5 years after the 2012 national guideline instituted injectable artesunate for severe malaria. In an effort to approach greater generalizability of our findings across Burundi, we elected to perform convenience sampling of facilities in ten of the eighteen provinces of Burundi, as well as convenience sampling of HCPs at those facilities. Five of the provinces (Bujumbura Mairie, Bubanza, Cibitoke, Bururi, and Rumonge) are in the hyper-endemic zone for malaria, and the other five provinces (Gitega, Kayanza, Ngozi, Mwaro, and Muyinga) are in the hypo-endemic zone, -

which was significantly affected by the malaria epidemic announced in March 2017.²¹ Seventeen hospitals were surveyed (12 public, 1 private, and 4 partnered faith-based). Fifteen nursing-staffed health centers were surveyed (8 public, 6 private, and 1 partnered faith-based).

FIGURE 1. Geographic Zones for Malaria in Burundi



non-endemic, medium to hypo-endemic & hyper-endemic respectively
 Source: Burundi MSPLS (Ministry of Public Health and Fight Against AIDS), 2009

Study Population

Assuming an alpha = 0.5 and a baseline 0.5 acceptance rate given a lack of previous study results in the region, we estimated a sufficient sample size of 98 physicians and 98 nurses to detect a change of 0.17 between the two groups. Given that physicians and nurses form the backbone of malaria diagnosis and treatment in the Burundian health system, this study uses the term healthcare professionals to refer to these two groups, though the general definition includes those trained to work in a broader range of health fields. All physicians and nurses present at a visit by the principal investigator to the above facilities were given the opportunity to complete the survey, including both consultant-level and generalist physicians, as well as nurses of all qualifying professional levels. A convenience

sample of 297 respondents was obtained, including 101 physicians (20 consultants and 81 generalists) and 196 nurses, 43 of which were registered nurses (level A0) and 153 of which were enrolled nurses (level A2 or A3).

FIGURE 2. Healthcare Professionals' Treatment Preferences for Simple and Severe Malaria in Adults and Children

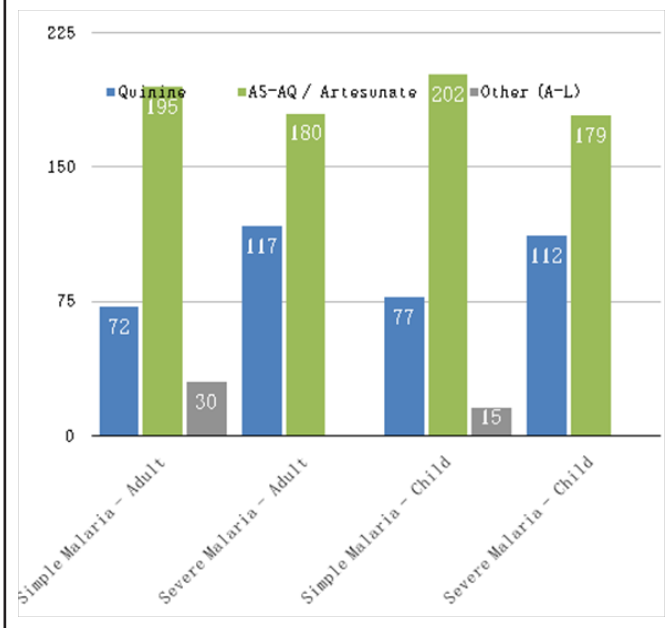
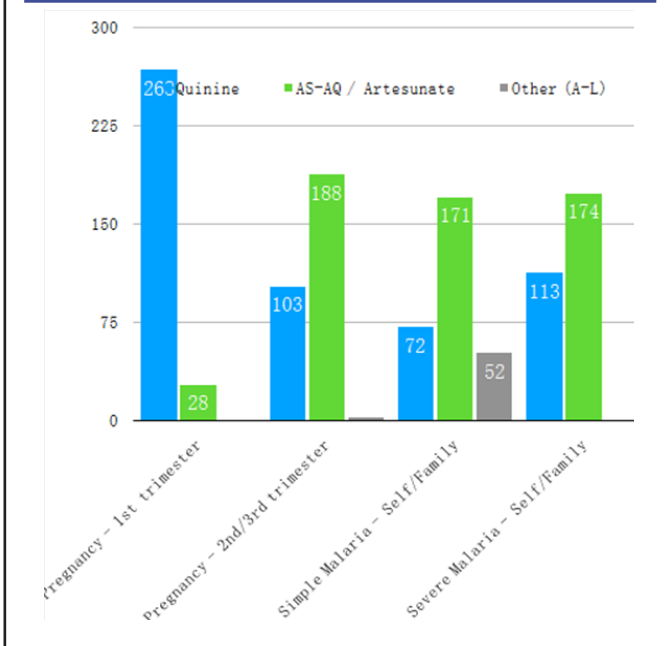


FIGURE 3. Healthcare Professionals' Treatment Preferences for Malaria during Pregnancy and Simple/Severe Malaria for Self/Family Member



Survey Methodology

A written questionnaire designed by the principal investigator was administered in French directly by the principal investigator, with the possibility of asking clarifying questions in Kirundi if desired by the participant.

Respondents first identified their place of work (hospital or health center) followed by their profession (physician or nurse, with corresponding level). They also self-reported their professional experience as greater than or less than 5 years. Each respondent then reported the availability of intravenous (IV) artesunate, IV quinine, oral AS-AQ and oral quinine in their place of work. Next, respondents answered 6 questions about their preferred anti-malarial to prescribe in various scenarios. The 3 categorical response options were artesunate (or AS-AQ in the case of uncomplicated disease), quinine (including oral quinine in the case of uncomplicated disease), and other choice (in the rare cases of this being chosen, it corresponded to oral A-L). Respondents were then asked which antimalarial they would prefer to receive if they or a close member of their family were diagnosed with uncomplicated or severe malaria. These scenarios were followed by a question about which antimalarial causes more side effects, with the same categorical choices. Finally, their knowledge of the current Burundian recommendation was assessed by asking them to identify the first-line antimalarial according to the national protocol.

Data Analysis

All survey responses were transferred into a data spreadsheet with respondents coded by number. The survey responses were then uploaded from the data spreadsheet into SPSS (IBM, Version 25.0) for data analysis. All responses were categorical. Through a series of stratified analyses, specifically stratified by healthcare professionals (i.e. physicians and nurses), years of healthcare service, and availability of artesunate and AS-AQ at the respondent's facility, we examined associations with the scenario outcomes. Measures of association for each of these stratified analyses used the Pearson chi-square test ($p < 0.05$), odds ratios (OR) and 95% confidence intervals (CI).

Ethics and Consent

Analysis of the survey data and study protocol were approved by the University of Tennessee at Chattanooga (USA) Institutional Review Board (IRB #18-167). All respondents provided consent by completing the survey instrument. No personal identifiers were collected.

RESULTS

Of the total 297 HCPs surveyed, 101 (34%) were physicians and 196 (66%) were nurses. Two hundred thirty five (79%) respondents worked in hospitals, and 62 (21%) in nurse-run health centers. One hundred twenty four (42%) respondents had less than 5 years' healthcare work experience (Table 2).

Availability of antimalarials

All healthcare professionals indicated that oral quinine was available at their place of work, with 281 (95%) respondents reporting the availability of IV quinine (Table 3). Artemisinin-based therapy was less available, with

TABLE 1: Burundi National Guideline Recommendations for Treatment of Malaria

| | First-line therapy | Second-line therapy |
|--|-------------------------|----------------------------------|
| 2012 Guideline (at time of study) | | |
| Simple Malaria | Artesunate-Amodiaquine | Quinine + Clindamycin* |
| Severe Malaria | Injectable Artesunate | Injectable Quinine |
| 2019 Guideline (current) | | |
| Simple Malaria | Artemether-Lumefantrine | Dihydroartemisinin-Piperaquine** |
| Severe Malaria | Injectable Artesunate | Injectable Quinine |

*During this period, Clindamycin was not routinely available, and thus quinine monotherapy was common

**Quinine is described as an alternative only in cases of contraindications to ACT

Note: In the 2012 and 2019 guidelines, Quinine + Clindamycin is recommended for the first trimester of pregnancy

TABLE 2: Characteristics of Healthcare Professional Respondents

| Characteristic | All Healthcare Professionals | Physicians | Nurses |
|---------------------------------------|------------------------------|------------|-----------|
| Professional training | 297 (100%) | 101 (34%) | 196 (66%) |
| Consultant Physician | 20 (7%) | 20 (20%) | — |
| Generalist Physician | 81 (27%) | 81 (80%) | — |
| Registered Nurse (A0 level) | 43 (14.5%) | — | 43 (22%) |
| Enrolled Nurse (A2/A3 level) | 153 (51.5%) | — | 153 (78%) |
| Place of work | | | |
| Hospital (79% of total) | 235 (100%) | 101 (43%) | 134 (57%) |
| Public Hospital | 141 (60%) | 61 (60%) | 80 (60%) |
| Private Hospital | 31 (13%) | 16 (16%) | 15 (11%) |
| Partner/Faith-Based | 63 (27%) | 24 (24%) | 39 (29%) |
| Health Centre (21% of total) | 62 (100%) | 0 (0%) | 62 (100%) |
| Public Health Centre | 43 (69%) | 0 (0%) | 43 (69%) |
| Private Health Centre | 14 (23%) | 0 (0%) | 14 (23%) |
| Partner/Faith-Based | 5 (8%) | 0 (0%) | 5 (8%) |
| Years of healthcare experience | | | |
| Less than 5 years (42% of total) | 124 (100%) | 47 (38%) | 77 (62%) |
| 5 years or more (58% of total) | 173 (100%) | 54 (31%) | 119 (69%) |

203 (68%) HCPs reporting the availability of oral AS-AQ, and 187 (63%) reporting access to IV artesunate. These therapies were exclusively available at public or partnered faith-based facilities. Excluding private facilities, 203 of 252 respondents (81%) reported availability of AS-AQ, and 187 (74%) reported availability of IV artesunate.

Professionals’ antimalarial preferences and beliefs about side effects

Two hundred seventy nine (94%) HCPs surveyed correctly identified artemisinin-based therapy as the recommended first-line therapy according to the Burundian national protocol. However, when presented with a variety of clinical scenarios, many of these HCPs still preferred quinine to artemisinin-based therapy (Figures 2 and 3; note that there was a 0 to 3% non-response rate, accounting for slightly varying total

responses). This finding was more consistent for the three scenarios associated with severe malaria than for the clinical scenarios associated with simple malaria. For example, 72 (24%) respondents preferred quinine for simple malaria in adults, compared to 117 (39%) for severe malaria ($P < .01$). Similar results were found for pediatric cases (77 or 26% preferred quinine for simple malaria, and 112 or 38% for severe malaria, $P = .01$) as well as treatment choice if the respondent or their family member had malaria (72 or 24% preferred quinine for simple malaria versus 113 or 38% for severe malaria, $P = .02$).

Additional observations identified 268 (90%) respondents who preferred quinine for the first trimester of pregnancy (in accordance with the national protocol) versus 103 (35%) for the second and third trimesters (contrary to the national protocol but similar to other scenarios

TABLE 3: Availability of Antimalarials

| | Public | Private | Partner/Faith-Based | TOTAL |
|--------------------------------|------------------|--------------|---------------------|-------------------|
| Hospitals (n=235) | | | | |
| AS-AQ (PO) | 107/141 (75.9%) | 0/31 (0.0%) | 48/63 (76.2%) | 155/235 (66.0%) |
| Artesunate (IV) | 107/ 141 (75.9%) | 0/31 (0.0%) | 48/63 (76.2%) | 155/235 (66.0%) |
| Quinine (PO) | 141/141 (100%) | 31/31 (100%) | 63/63 (100%) | 235/235 (100%) |
| Quinine (IV) | 141/141(100%) | 31/31 (100%) | 63/63 (100%) | 235/235 (100%) |
| Health Centres (n=62) | | | | |
| AS-AQ (PO) | 43/43 (100%) | 0/14 (0.0%) | 5 / 5 (100.0%) | 48 / 62 (77.4%) |
| Artesunate (IV) | 32 / 43 (74.4%) | 0/14 (0.0%) | 0 / 5 (0.0%) | 32 / 62 (51.6%) |
| Quinine (PO) | 43 / 43 (100%) | 14/14 (100%) | 5 /5 (100.0%) | 62 / 62 (100%) |
| Quinine (IV) | 32 / 43 (74.4%) | 14/14 (100%) | 0 / 5 (0.0%) | 46 / 62 (74.2%) |
| All Respondents (n=297) | | | | |
| AS-AQ (PO) | 150/184 (81.5%) | 0/45 (0.0%) | 53/68 (77.9%) | 203 / 297 (68.4%) |
| Artesunate (IV) | 139/184 (75.5%) | 0/45 (0.0%) | 48/68 (70.6%) | 187 / 297 (63.0%) |
| Quinine (PO) | 184/184 (100%) | 45/45 (100%) | 68/68 (100%) | 297 / 297 (100%) |
| Quinine (IV) | 173/184 (94.0%) | 45/45(100%) | 63/68 (92.6%) | 281 / 297 (94.6%) |

TABLE 4: Treatment Preference for AS-AQ or Artesunate by Profession (n=297)

| Treatment of Choice | Physicians preferring AS-AQ or Artesunate n=101 | Nurses preferring AS-AQ or Artesunate n=196 | Odds Ratio (95% CI) | Significance |
|------------------------------|---|---|---------------------|--------------|
| Simple malaria - adult | 71 (76%) | 123 (71%) | 1.29 (0.686,2.45) | p=.4242* |
| Severe malaria - adult | 78 (77%) | 101 (52%) | 1.50 (1.26,1.78) | p=.0001 |
| Simple malaria -child | 74 (76%) | 128 (71%) | 1.22 (0.653,2.31) | p=.5251 |
| Severe malaria - child | 77 (78%) | 103 (54%) | 1.45 (1.23, 1.72) | p=.0001 |
| Simple malaria - self/family | 54 (74%) | 117 (69%) | 1.28 (0.688,2.38) | p=.4347 |
| Severe malaria - self/family | 79 (79%) | 95 (51%) | 1.56 (1.31, 1.85) | p=.0001 |

*Except when artesunate is not available – Nurses are at greater odds of indicating Quinine as preferred treatment
 +based on the Pearson Chi Square Statistic+

surveyed). 198 (67%) respondents believed that quinine causes more side effects than AS-AQ/Artesunate.

Stratified subgroup analyses showed significant differences between doctors and nurses in all three scenarios involving severe malaria, with physicians at greater odds than nurses of preferring intravenous artesunate (in accordance with the national protocol) than intravenous quinine for adults (OR 1.50; 95% CI, 1.3 to 1.8), for children (OR 1.45; 95% CI, 1.2 to 1.7), and for self or a family member (OR 1.56; 95% CI, 1.3 to 1.9, see Table 4 for details).

However, there were no significant differences between physicians and nurses for the three scenarios involving simple malaria, which compared oral AS-AQ and oral quinine (P=.4 for adults, P=.5 for children, P=.4 for self or family member). Stratified subgroup analyses of HCPs with more or less than five years’ work experience

showed no statistically significant differences in any antimalarial preferences (P=.99 for simple malaria and P=.37 for severe malaria).

Associations between antimalarial preference and availability

When treatment preferences were analyzed based on availability of AS-AQ in the respondent’s place of work, availability of AS-AQ was associated with respondents’ preference for using it (P=.003). A similar association was found when comparing the availability of IV artesunate and the health-care professionals’ preference for using this medicine (P=.007).

DISCUSSION

Acceptance by the healthcare professionals who will put a national protocol into practice is one of many essential elements of successful implementation. This study shows-

that knowledge of the national protocol in Burundi is excellent, but diverges significantly from the practical preferences in a sizable proportion of Burundian HCPs surveyed. This gap between knowledge and practical preference suggests an acceptance problem of the recommended antimalarials by at least part of the workforce that is responsible for implementing the protocol. As a particular example of this phenomenon, 268 (90%) respondents' preferences were in agreement with the national protocol in the one scenario that recommends quinine therapy (first trimester of pregnancy). However, later in pregnancy, when artemisinin-based therapy is recommended, only 188 (63%) of respondents' preferences agreed with the protocol, a level of agreement very similar to the other non-pregnancy scenarios.

In our study, this gap between knowledge and practical preference was significantly more pronounced in the nursing workforce compared to physicians. This is especially consequential since nurses are prescribing these antimalarials throughout the country's health centers. Years of health care experience does not appear to modify this distinction. Both of these findings were contrary to a Tanzanian study which found longer work experience and non-doctor prescribers associated with increased ACT usage.²²

What are the root causes of this problem of acceptance for a medicine whose efficacy has an excellent evidence base and whose role at the front of the national protocol is nearly universally known? To be sure, further studies are needed to explore this question more directly.

One might posit that the amodiaquine portion of AS-AQ is a primary reason for hesitation in artemisinin-based therapy. This is supported by the HCPs who voluntarily wrote in A-L as "other" when asked their preferences. However, this study clearly shows that the significant differences between nurses and doctors resides in the treatment of severe malaria, where amodiaquine is not implicated. Thus, this problem could persist even with the replacement of AS-AQ by A-L in the 2019 national protocol.

As shown above, the statistically significant correlation between both AS-AQ and artesunate availability and treatment preference for these recommended medicines suggests that unfamiliarity may play a role in HCPs' hesitation, which may decrease over time as seen elsewhere.²³ Whereas quinine is an ancient medicine with which the population is very familiar, AS-AQ and artesunate are less known at certain facilities. In facilities where these antimalarial drugs are available (and thus known), preference for them is increased. In a parallel situation, a 2014 Ghanaian study showed IV quinine having the same problem as artesunate currently has when HCPs persisted in prescribing chloroquine for severe malaria though it had been replaced by quinine in the national protocol, suggesting a simple persistence in old habits.²⁴ Perhaps HCPs are more reluctant to use an unfamiliar medicine especially with sicker patients.

We see here a strong suggestion that consistent knowledge of a national protocol may be accompanied by HCP hesitancy about implementing it. The issue of HCP's acceptance of artemisinin-based therapy needs to be further addressed in order to assure solid implementation-

of this life-saving treatment for the country's number one cause of morbidity and mortality.

Though this study raises an important question, there are several limitations, including an inability to confirm the respondents' reported antimalarial availability, an inability to analyze the cluster effect of different sites, and a lack of a validated survey instrument. Lastly, the convenience sampling and lack of randomization of this study was not designed to be nationally representative, and the varying numbers of respondents from different health facilities may introduce selection bias.

Regarding future avenues of study, a more expanded, randomized and nationally representative sample would be warranted, and this could also investigate to see if there are regional differences (for example, between varying levels of malaria endemicity). It is also necessary to explore HCPs' reasons for preferring another antimalarial drug to artemisinin-based therapy. In regards to artemisinin implementation, HCPs in other studies have cited doubts about efficacy, concerns about cost, and confusion in protocol implementation as reasons for non-compliance, though this reasons seems especially unexplored for IV artesunate.^{12,23,25} Additionally, it would be helpful to examine how these HCPs' preferences influence their actual practice, since practice is influenced by more factors than just preference.²⁶

On the level of practical action, several ways forward are suggested by this data. Simply continuing to increase availability of oral ACTs and IV artesunate may be useful in augmenting exposure and acceptance of these antimalarials. Additional educational interventions may be useful, especially for the nursing workforce. However, this study suggests that knowing the recommendation for artemisinin-based therapy is not sufficient. Thus, educational interventions should include the rationale for the preference of artemisins, both in terms of increased efficacy and less side effects, in order to maximize acceptance and thus implementation. Lastly, the inclusion of HCP's preferences for such important antimalarial drugs could be useful to monitor by national malaria programs in order to continually assess further intervention needs.

It is unclear whether this preference of many HCPs for IV quinine in severe malaria is equally present in other malaria-endemic countries, but this may also warrant further study. Given the magnitude of the mortality benefit of IV artesunate over IV quinine for severe malaria, this could represent an urgent, high-impact area of research and intervention, since rapid improvement of protocol implementation could save numerous lives, as opposed to gradually waiting on the HCP population to become habituated to a newer therapy.^{4,5}

CONCLUSION

This study is the first in Burundi to evaluate HCP preferences towards artemisinin-based therapy versus quinine, which has revealed an important gap between knowledge of a therapeutic recommendation and practical preference, suggesting a problem of acceptance by health care professionals, which must be addressed for successful implementation of current malaria recommendations. In particular, the persistent preference for IV quinine over-

artesunate in severe malaria by many HCPs requires further investigation. This particular question is under-explored in the medical literature, and if present elsewhere, necessitates urgent research and intervention in order to efficiently apply this important life-saving advance in treatment. More comprehensive education about the advantages of artemisinin-based therapy and monitoring of HCP preferences by national malaria programs could also mitigate the effect of this implementation challenge.

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Predictors and Barriers to Post Abortion Family Planning Uptake in Hai District, Northern Tanzania: A Mixed Methods Study

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ABSTRACT

Introduction: Post Abortion Care (PAC) encompassing family planning counselling and contraception provision is a key strategy to reducing maternal morbidity and mortality especially in countries with restrictive abortion laws. Various factors affect the uptake of PAC modern family Planning (FP) in different settings. This study aimed at determining the prevalence, assessment of factors and barriers to PAC modern FP uptake in Hai district, Northern Tanzania

Methods: A mixed-methods study was conducted using an explanatory sequential design. Exit interviews using questionnaires was conducted among 189 women. In-depth interviews were conducted with 26 healthcare providers (HCPs) and 28 women who received PAC in Hai district hospital, Machame hospital and Moshi Specialists health centre in Hai district. Quantitative data was analysed using a Statistical Package for Social Science (IMB SPSS Statistics for Windows version 20.0 (SPSS Inc., Chicago, Ill., USA)). Bivariate and multivariable analyses were applied to estimate the predictors of uptake of PAC modern FP. Thematic content analysis was employed to explore barriers to uptake of post-abortion modern family planning.

Results: The prevalence of uptake of modern family planning following PAC was 59/189(31.2%). 56% of the 189 women who received PAC did not receive counselling services on family planning. Marital status and partner's support were predictors of PAC modern family planning uptake ($p=.007$ vs. $p < .05$, respectively).

Misinformation and misconception about modern contraceptives, lack of knowledge and fear of side effects were reported to be the major barriers to uptake of post-abortion family planning. Most women reported to have not received comprehensive family planning information from the HCPs. On the other hand, HCPs perceived their poor counselling skills as the barrier to post-abortion family planning uptake. This study observed poor coordination of PAC services within each visited facility and this was linked to women leaving the facility without family planning counselling and/or contraceptives provision.

Conclusion: Suboptimal modern family planning counselling during PAC contributes to the low uptake of contraceptives methods in this setting. Strategies are needed to improve PAC modern family planning services uptake. Strategies such as; provision of counselling skills to HCPs with comprehensive information targeting local contextual misconception and promoting PAC provision as a one-stop service.

BACKGROUNDS

Globally, spontaneous and induced abortion remains a major public health concern. Approximately, 25 million unsafe abortions take place worldwide each year, with majority happening in developing countries with restrictive laws against abortion.¹ The complications related to unsafe abortions can be fatal and contribute up to 13% of maternal deaths worldwide^{2,3}, with Africa contributing up to 29% of these abortion-related deaths.¹ In Tanzania, 15% of all pregnancies ended in abortion in 2013⁴ and unsafe abortion accounts for 25% of all maternal deaths.⁵ Post-Abortion Care (PAC) which encompasses emergency treatment of complications due to

incomplete abortion or miscarriages, family planning counselling and services provision as well as linkage to other reproductive health services is a key strategy to reducing abortion-related morbidity and mortality, especially in countries with restrictive laws against abortion where the majority of unsafe abortion occurs. According to Tanzania family planning guidelines, family planning services should be provided at the same time and location where women receive PAC services.⁶

The post-abortion period constitutes a unique opportunity to introduce family planning counselling and optimise chances of family planning uptake and prevent unwanted pregnancy.^{7,8} Thus, family planni-

ing counselling and provision of contraception is one of the elements of comprehensive post-abortion care.^{9,10} Studies conducted in Italy and Nigeria have shown that modern family planning uptake following PAC could be as high as 65% and 79% respectively, whereas, studies conducted in Tanzania and Brazil reported uptake to be 90% and 97% respectively when effective family planning counselling and contraception provision is offered immediately as part of PAC.^{8,11-13} However, even though emergency treatment may be delivered at satisfactory levels in some countries with restrictive abortion laws, the full package of family planning counselling, education and methods provision is often not provided before the women leave the health facility where they received PAC, missing the opportunity to prevent future unwanted pregnancies plus associated morbidities.¹⁴

Several factors influence the provision of family planning methods following PAC for both women and Health Care Providers (HCPs) perspectives. Studies conducted in Uganda, Nepal and Brazil have reported that women's contraceptive decision-making autonomy influences uptake of contraception after PAC.¹⁵⁻¹⁷ Age has also been associated with uptake of modern family planning following PAC, with inconsistent findings. A cohort of 18,688 PAC clients in Tanzania, reported older age (>35) to be less likely to take up contraception following PAC.¹⁸ However, a study was conducted in Ghana plus other studies conducted in 10 countries in Asia and Sub Saharan Africa reported young women of ages 10 to 19 years, to be less likely to accept modern contraceptives following PAC than others.^{19,20} Health system factors also influence post-abortion uptake of contraceptive methods. These include: clinic logistics that impact the provision of standard family planning counselling and provision, limited contraceptive choices, few numbers of trained providers, multiple clinic visits and poor integration with other existing health services.²¹⁻²⁴

Contraceptive uptake and use is said to be high when PAC family planning services are provided. However, there is limited data on the uptake of family planning following PAC from countries with restrictive laws towards induced abortion like Tanzania. In the USA, immediate PAC contraception provision, such as placement of an Intrauterine device (IUD) has shown a significant decrease in unintended pregnancy in the year following abortion as compared to delayed insertion.² In low resource countries, the uptake of immediate PAC modern family planning methods such as IUD and implant might be hampered due to several healthcare system-related challenges such as lack of enough staff with skills to provide these methods. In order to overcome the barriers and improve the quality of PAC, there is need to understand the challenges faced by health care providers and women during the provision of PAC family planning services.

Although Tanzania's family planning agenda is geared to make family planning methods available at all levels of care including during PAC²⁴, its modern contraceptive prevalence rate is still low at 32%²⁵ compared to the national target of 45%.²⁶ Therefore, provision of family planning counselling during PAC provides an opportunity to increase family planning uptake among women receiv-

ing PAC. Challenges faced by both women receiving PAC family planning services and healthcare providers need to be better understood so as to overcome the barriers and improve the quality of family planning services provision during PAC. There are few studies that have assessed the healthcare system factors that affect women's uptake of PAC family planning.^{27,28}

This study aimed at determining prevalence of and predictors to uptake of modern family planning following PAC in Hai district. The study also explored barriers to uptake and provision of modern family planning methods in the rural area of Kilimanjaro, Hai district, Tanzania. The findings of this study will guide the healthcare system to strengthen PAC family planning service provision and design better strategies to overcome the existing challenges.

METHODS

Study Design and Setting

We deployed a mixed-methods study using an explanatory sequential design, whereby quantitative data was collected first; then qualitative data was gathered to interpret the quantitative findings. Health facility-based quantitative data was collected among women receiving PAC, to determine the prevalence of and predictors of uptake to PAC family planning. This was followed by qualitative interviews of Health Care Providers (HCPs) and women who did not take PAC modern family planning to determine barriers to uptake of PAC family planning. This study was conducted in 3 health facilities in Hai district, Northern Tanzania from August 2017 to May 2018.

Hai district is located in rural Kilimanjaro region in Northern Tanzania. According to Tanzania's National Census of 2012, the population of Hai district was estimated to be 210,533 people. The unmet need for family planning among married women in Kilimanjaro region is 17.7%, below the national average which is 22%. The unmet need for family planning among unmarried women in Kilimanjaro stands at 11.1% compared to the national average of 17.7% among young women aged 20 to 24 years of age.²⁹

Tanzania health care system is organised into 4 levels; dispensary, health centre, district hospital and referral hospital in increasing orders of the population served.³⁰ Hai district has a total of 62 health facilities. These include; 2 hospitals, 6 health centres, and 54 dispensaries. This study was conducted in 3 health facilities namely, Hai district Hospital, Machame Hospital and Moshi Specialist Health Centre. These facilities actively provide PAC services in Hai district. They also provide modern family planning counselling and services as part of PAC package. Modern family planning methods offered include; Intrauterine Contraception Device (IUCD), implant, injectable, oral contraceptive pills and condom.

Study Population and Sample Size Estimation

All women residing in Hai district who were seeking PAC at study sites during the study period were eligible to participate in the study. The study population was of women who presented to the health facilities with symptoms and signs of abortion i.e. pregnant women at gestation age less than 28 weeks with vaginal bleeding,

lower abdominal pain, conjunctival pallor, tender lower abdomen and were clinically diagnosed by a physician. Therefore, all women who attended the 3 health facilities for PAC during the study period were included. We excluded all women who were referred to higher health facility due to complications since they did not receive the complete PAC package at the study sites.

In addition, Health Care Providers (HCPs) providing PAC services and those working in family planning clinics in the selected health facilities were purposively selected. The selection of HCPs considered candidates who were present on-duty during the study period, considering the representation of all the cadres i.e. doctors, nurses and midwives. The selection of HCPs also considered candidates with working experience of more than one year at their duty station. The HCPs were recruited from all service units where woman pass during PAC, including female wards, operating theatre, PAC room and family planning clinic. Health care providers who were absent during the study period were excluded.

The sample size for the quantitative interview was estimated based on the prevalence of PAC modern family planning uptake of 79.8% reported in 2016 by Onyegibule et al.⁸ and an acceptable marginal error of 5%. This gives a sample of 248 women. 10% of the sample size was added to take care for non-response rate. The final sample size became 273 women. However, the response rate was 89.5% (222/248).

Purposive sampling was used to select women who did not uptake modern contraceptives during PAC to participate in in-depth interviews. Age and parity guided the selection of these participants, based on the assumption that women aged 20 years and above, and/or women with parity more than two have more contact and exposure to healthcare system hence will have information regarding barriers to uptake of PAC services.

Data Collection Methods and Tools

Women who presented to the 3 facilities with symptoms and signs of abortion were first examined by the local physician. The physician verbally consented to each woman who attended for PAC to allow an interview with the research assistants regarding PAC. On the daily basis, the research assistants were notified of any woman who has attended the health facility for PAC and had agreed to be interviewed. 3 research assistants, nurse and midwives were trained to assist with data collection. The research assistants evaluated each participant to see if they meet the set eligibility criteria. Participants who were eligible were invited into the study upon discharge (before leaving the health facility). Written informed consent was obtained from all participants. Data was collected through an Exit Interview (EI) in a private room face to face using an interviewer-administered questionnaire. The information collected from the participants included socio-demographic characteristics (age, address, religion, occupation, marital status and level of education), parity, gestation age at abortion estimated from the last normal menstrual period, fertility intentions, previous use of contraception, whether contraceptive counselling was offered and the contraceptive method taken.

Following EIs, women who did not uptake modern family

planning methods were invited for an In-Depth Interview (IDI) to explore the barriers. Verbal consent was sought for and IDIs were conducted in a private room within the health facility. The IDIs among women explored their perception on the reason for non-use of PAC modern family planning, their knowledge and belief on modern family planning methods and their experience on the general PAC and family planning services offered at the health facility. These IDIs were conducted by a trained research assistant following a list of guided questions and the interview was audio-recorded. Similarly, HCPs providing PAC and those working in family planning clinics in the 3 facilities were also invited to participate in the study. Informed written consent was obtained before initiation of the IDIs. The IDIs were conducted by research assistants in a private room through a list of guided questions. The IDIs explored HCPs' views on barriers to PAC modern family planning use, HCPs skills, number of staff available, availability of medical supplies and health system-related challenges in the integration of PAC with other reproductive health services. All IDIs were conducted in Kiswahili language and each interview lasted approximately one hour. The sample size was attained after the saturation point was reached, at this point no new emerged themes were generated from the interviews.

Data Analysis

Quantitative data was analysed using a Statistical Package For Social Science (IMB SPSS Statistics for Windows Version 20.0 (SPSS Inc., Chicago, Ill., USA)). For continuous variables, normality was checked using a histogram. Symmetrical variables were summarised using mean and Standard Deviation (SD), while asymmetrical variables were summarised using median and Interquartile Range (IR). Frequencies and proportions were used to summarise the categorical variables. Odds Ratios (OR) with 95% Confidence Interval (CI) for predictors of PAC modern family planning uptake were estimated using bivariate and multivariable logistic regression analysis. A p-value of less than 5% was considered significant.

Qualitative data was transcribed in Kiswahili language and then translated into English. An iterative process was used to analyse the data using thematic coding framework to assess all interviews' transcripts based on the IDI guides. To ensure inter-coder reliability, all the transcripts were coded by at least 2 of the authors and discrepancies were resolved through discussion. Since this part of the study was inductive in nature, quotations from the study participants were used to characterise issues and themes that emerged. The analysis also looked at patterns and associations of these themes. Themes that were illustrative were selected and summarised, focusing on the barriers to post-abortion modern family planning uptake and provision.

Ethical Considerations

Ethical approval was obtained from Kilimanjaro Christian Medical College Research Ethics and Review Committee (CRERC), with clearance certificate number 2027. Permission to conduct the study was sought from the Kilimanjaro Regional Medical Officer, the District Medical Officer for Hai and heads of the facility in the 3 study sites. Before enrolment into the study, detailed inf-

ormation was provided and explained in Kiswahili language to participants. The right to withdraw or refuse participation in the study was made known to individual participants and only those who were willing and signed an informed consent form were included in the study. Anonymity of participants was maintained at all times by using identification numbers as opposed to using participants' names.

RESULTS

Quantitative Findings

Uptake and Characteristics of the Study Participants

A total of 222 women attended PAC in the 3 health facilities studied from August 2017 to May 2018 (Figure 1). 33(14.8%) of these were referred to higher centres due to various conditions such as molar pregnancy (5) and severe infection (28) and these were excluded from the study as they did not receive the complete PAC package at the study sites. The remaining 189 women were eligible and agreed to participate in the study. During exit interviews of the 189 women, 83 (43.9%) reported having been counselled on modern family planning methods during PAC while, overall, 70(37%) of the participants demonstrated their intention for modern family planning use. Only 59 women were provided with their preferred modern family planning method before leaving the health facility on discharge, making the proportion of modern family planning method uptake during PAC to be 59(31.2%). Moreover, of the 70 women who agreed to PAC modern family planning following PAC, only 59(84%) were provided with their chosen method before leaving the health facility.

Of these 59 women who selected a method, implant was the most common method of choice 20(34%), followed by IUCD 17(29%) and Oral contraceptive pills 13(22%). Depo- provera injections and condoms were selected by 7(12%) and 2(3%) of the women respectively.

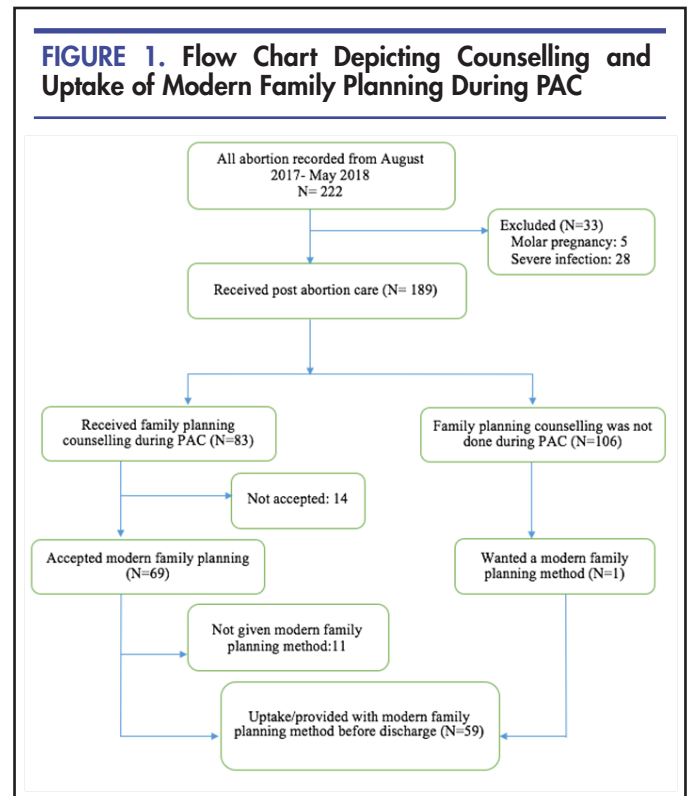
The characteristics of study participants and health facilities are shown in Table 1. The mean (Standard Deviation) age of 189 women was 29.0 (SD 6.5) years. Their age distribution ranged from 16 to 43 years. Majority 148(78.3%) were married/cohabiting, self-employed 144(76.2%) or had ever used family planning methods before the current pregnancy 124(66%). More than half 103(55%) of the participants were enrolled from Hai district hospital. Majority 166(88%) of the 189 women who received PAC reported that it was their first abortion. Majority 150(79.4%) were of second trimester abortions which the median gestation age (calculated from the last normal menstrual period) of the index pregnancy at which abortion occurred was 16 weeks, with the range of 7 to 26 weeks. Half 96(50.8%) of women had 2 or more living children, whereby the median number of living children was 2 (range: 0-8).

Socio-Demographic, Reproductive and Obstetrics Characteristics Associated With Uptake of Modern Family Planning During PAC

Findings from the univariate and multivariable logistic regression models are summarised in Table 2 and Table 3 respectively. In both univariate and multivariable analyses, women who were single or separated were significantly associated with higher odds of utilising post

abortion care compared with married/cohabiting counterparts (OR: 2.33; 95% CI 1.14-1.76), (aOR: 2.80; 95% CI 1.32-5.91). It was also revealed that women who reported that their partners would support their decision to use contraception, were significantly associated with uptake of modern family planning during PAC compared to their counterparts in both univariate and multivariable analyses (OR: 1.87; 95% CI 1.00-3.49), (aOR: 2.22; 95% CI 1.15-4.28). Other socio-demographic characteristics were not significantly associated with uptake of PAC family planning.

FIGURE 1. Flow Chart Depicting Counselling and Uptake of Modern Family Planning During PAC



Qualitative Findings

A total of 130 (68.8%) women did not uptake any modern method of family planning and were eligible to participate in In-Depth Interviews (IDIs) to explore more reasons and barriers to the use of PAC contraceptives. The saturation point was reached after 28(24 %) interviews. Of the 28, 18 women were enrolled from the 2 hospitals and 10 from the health centre. The age of 28 women involved in the IDIs ranged from 20 to 43 years and they were either married, cohabiting or single. All participants reported having heard of different types of contraceptives from Ante-Natal Clinic (ANC), co-workers, peers and family members.

A total of 26 HCPs of different cadres were enrolled for IDI; these included Medical Officers, Assistant medical officers, clinical officers, nurses and midwives providing PAC services at various points such as theatre, female surgical wards, maternity wards and those working at family planning clinics. HCPs were interviewed to explore barriers in provision and uptake of PAC modern family planning based on their individual perception and exper-

ience in the context of healthcare system-related challenges. HCPs interviewed included males and females with age range between 26 to 58 years. Out of the 26 HCPs; 6 were from the health centre and the rest were from the 2 hospitals.

TABLE 1: Characteristics of the Study Participants (N=189)

| Variables | n | % |
|--------------------------------|-----|------|
| Age, years | | |
| <20 | 15 | 7.9 |
| 20-24 | 38 | 20.1 |
| 25-34 | 94 | 49.7 |
| >35 | 42 | 22.2 |
| Marital status | | |
| Single/separated/divorced | 41 | 21.7 |
| Married/cohabit | 148 | 78.3 |
| Level of education | | |
| None | 7 | 3.7 |
| Primary | 113 | 59.8 |
| Secondary | 62 | 32.8 |
| Higher education | 7 | 3.7 |
| Occupation | | |
| House wife | 17 | 9.0 |
| Formal employed | 25 | 13.2 |
| Self-employed | 144 | 76.2 |
| Student | 3 | 1.6 |
| Used FP before | | |
| Yes | 124 | 65.6 |
| No | 65 | 34.4 |
| Length of hospital stay | | |
| 1 day | 90 | 47.6 |
| 2 or more | 99 | 52.4 |
| Facility enrolled | | |
| Hai Hospital | 103 | 54.5 |
| Machame Hospital | 60 | 31.7 |
| Moshi Specialist | 26 | 13.8 |
| GA at abortion | | |
| <12 weeks | 39 | 20.6 |
| 12-28 weeks | 150 | 79.4 |
| Number of children | | |
| None | 32 | 16.9 |
| One | 61 | 32.3 |
| ≥2 | 96 | 50.8 |

Women Perception on Barriers to Uptake of Post-Abortion Modern Family Planning

After engaging individual women after PAC, from the IDIs, a number of themes emerged. These included; Fear of side effects, misconception, myths and misinformation, gender power differences and partner support, and experience with health care providers in seeking family planning.

Fear of Side Effects: Majority of the women participating in the IDIs expressed their fear of use of modern family planning methods. Most of them mentioned a wide range of side effects including; nausea, losing or gaining weight, prolonged menses, swelling of feet and infertility as indi-

cated by these 2 participants:

‘Once used pills and after a while, I was bleeding a lot then I stopped and used injections, and the situation got even worse- I was bleeding from day 1 to day 15, I was getting palpitations, I stopped and used implants for 3 years; it also caused palpitations and I stayed with it for 2 years and a half then I decided to go to the doctor to remove it, and since then I haven’t used any method’ (43 years old, 6 living children).

‘I carried pregnancy without knowing.... but I was using contraceptives before.... I saw bad side effects like swollen lower limbs (...) I decided to stop using them’ (40 years old, 3 living children).

Misconception, Myths and Misinformation: The use of pills as a modern contraceptive was attributed to a range of complications that are not medically known to be side effects or to have an association with abortion. Although some women claimed to be on the pill, they had stopped due to potentially perceived complications. For example, one of the participants associated her nausea and abortion with the use of family planning pills.

‘I do not know because I was using pills.... I didn’t know if I use pills they will cause problems (abortion). When I use pills I get nausea, I feel like vomiting.....I think those pills caused this problem (abortion)’ (29 years old, 1 living child).

Another participant had similar sentiments: *‘I did not know I was pregnant.... am not even expecting to conceive.... I will continue to use the calendar; I do not want any contraceptives.... I think they (modern contraceptives) contributed or they were the cause of this abortion..... I think these contraceptives have some kind of poison’*

Participants cited lay sources of family planning information such as fellow women in the village.

‘I got this information in the village from other women... Some say they used implants and wasn’t good for them, some say injections are bad’ (30 years old with 2 living children)

Gender Power Differences/Partner’s Support: Some participants showed willingness to space out children before the next pregnancy. However, factors such as the desire for children by the spouse/partner and lack of partner support, made it difficult for such participants to uptake any birth control method. The desire to space children despite lack of partner’s support made some participants decide to use modern family planning methods secretly; *‘...He had asked me why am I not getting pregnant. But I couldn’t tell him anything, if I tell him I was using contraceptives he would be so angry at me... he doesn’t even understand what contraceptives mean’* (29 years, 1 living child).

Healthcare Providers’ Perception on Barriers to Uptake of Post-Abortion Modern Family Planning

Many factors were identified as barriers to uptake of PAC modern family planning, including lack of spousal support, misleading beliefs on contraceptives and the desire to get another pregnancy as soon as possible, especially for participants who are married or cohabiting with their partners without any child. In many cultures in the African settings, this helps the woman to establish herself in that relationship/ marriage. Apparently, the re-

TABLE 2: Socio-Demographic, Reproductive and Obstetric Characteristics Associated with uptake of Modern Family Planning during PAC (N=189)

| Variable | N | Modern Family Planning Uptake (n=59) | Unadjusted OR (95%CI) |
|--------------------------------|-----|--------------------------------------|-----------------------|
| Age(years) | | | |
| ≤24 | 53 | 21(39.6) | 1.00 |
| 25+ | 136 | 38(27.9) | 0.59(0.30-1.15) |
| Marital status | | | |
| Married/cohabit | 148 | 40(27.0) | 1.00 |
| Single/divorce/separated | 41 | 19(46.3) | 2.33(1.14-1.76) |
| Level of education | | | |
| None/primary | 120 | 38(31.7) | 1.00 |
| Secondary and above | 69 | 21(30.4) | 0.94(0.50-1.79) |
| Occupation | | | |
| Formal employed | 25 | 5(20.0) | 1.00 |
| Other | 164 | 54(32.9) | 1.96(0.70-5.52) |
| Used FP before | | | |
| Yes | 124 | 43(34.7) | 1.63(0.83-3.19) |
| No | 65 | 16(24.6) | 1.00 |
| Regular partner | | | |
| No | 33 | 49(31.4) | 1.05(0.466-2.381) |
| Yes | 156 | 10(30.3) | 1.00 |
| Partner support | | | |
| No | 97 | 24(24.7) | 1.00 |
| Yes | 92 | 35(38.0) | 1.87(1.00-3.49) |
| Number of Abortion | | | |
| 1 | 166 | 54(32.5) | 1.00 |
| 2+ | 23 | 5(21.7) | 0.58(0.20-1.63) |
| Number of children | | | |
| None | 32 | 13(40.6) | 1.00 |
| One | 61 | 17(27.9) | 0.56(0.23-1.39) |
| ≥2 | 96 | 29(30.2) | 0.63(0.28-1.45) |
| GA at abortion | | | |
| <12 weeks | 39 | 8(20.5) | 1.00 |
| 12-28 weeks | 150 | 51(34.0) | 2.00(0.86-4.66) |
| Length of hospital stay | | | |
| 1 day | 90 | 32(35.6) | 1.00 |
| 2 or more | 99 | 27(27.3) | 0.68(0.37-1.26) |
| Site of enrollment | | | |
| Hai DH | 106 | 37(35.9) | 1.93(0.66-5.62) |
| Machame hospital | 60 | 17(28.3) | 1.42(0.46-4.45) |
| Moshi Specialist | 23 | 5(19.2) | 1.00 |

cOR: Crude Odds Ratio

ported barriers by HCPs matched those reported by women who participated in this study.

'Some of them really need a child so if you don't explain to her, she won't understand why she has to wait for some months. It is not a simple thing to tell a woman not to conceive for a couple of months, especially those who are married and they don't have children' (Nurse, 2 years' experience, family planning clinic).

Seeking HCPs' opinions on what could be done to give better care. All individual providers interviewed agreed to the need for capacity building and provision of regular training opportunities aimed at improving their skills. *'.... more HCPs should be employed..... it is good to have regular update trainings'* (Assistant Medical Officer, 10 years' experience, female ward and theatre).

'I can try to talk to her [patient] on family planning.....but I

TABLE 3: Final Model on Factors Associated with Uptake of Modern Family Planning during PAC (N=189)

| Variable | aOR | (95% CI) | P-value |
|---------------------------|------|-------------|---------|
| Marital status | | | |
| Married/cohabit | 1.00 | | |
| Single/separated/divorced | 2.80 | (1.32-5.91) | .007 |
| Partner support | | | |
| No | 1.00 | | |
| Yes | 2.22 | (1.15-4.28) | .017 |

aOR: adjusted odds ratio
Adjusted for age, marital status, partner support, and previous use of family planning

wish to get proper family planning training to improve myself’ (Nurse, 3 years’ experience, female ward).

Women’s Perception on the Barriers to Provision of Post-Abortion Modern Family Planning Methods Experience with Health Care Providers

There were diverging views on individual women experiences with the HCPs. Majority of the participants reported that the HCPs never discussed or mentioned post-abortion contraception to them during their stay at the facility for PAC. On the other hand, the other group of women described their experience as a piece of advice in favour or against a specific method. In some cases, it was clear that whenever contraceptives were provided, participants were given little information and choices to decide on the methods;

‘I have used them [contraceptives] to prevent pregnancy... Implants, IUCD and pills..... so I decided to stop using any of them. Yes, now I do not know what to do... but I wish before a mother is given any contraceptive method, she should be counselled on available methods and be told if the method chosen is suitable for her or not’ (28 years old, one living child).

A newly married woman who had never used modern family planning method but desired to give space of 4 to 6 months to the next pregnancy shared her experience. She had never heard about modern contraceptives and as well did not receive counselling or given information about family planning methods during this time of receiving PAC;

‘I have never used any family planning method.... I am going to rest for 4 to 6 months..... You [interviewer] are the first one to tell me about it [family planning]’ (23 years old, no child).

Another participant, married with 3 living children and not willing to ever become pregnant again wanted a permanent family planning method, however, HCP did not discuss of any family planning method with her and during her visit for PAC

‘I do not want [pregnancy] at all, I am not ready for that may God help me...my plan now is to go home and rest for a while... I will come for tubal ligation’ (40 years old, 3 living children).

In-depth interviews clearly indicated that there was inadequate information given to patients about modern family planning methods. One of the participant’s response demonstrates that uptake of family planning methods by women can greatly improve if HCPs provides adequate birth control information to patients.

‘She [Nurse] mentioned IUCDand she advised me that it doesn’t have problems and could be there for 12 years. I asked if there are times am supposed to come and see if the position of the IUCD is in the same place..... the nurse said there is no need, it doesn’t have problem’ (43 years old, 6 living children).

Healthcare Providers’ Perception on Barriers to Provision of Post-Abortion Modern Contraceptives

Generally, HCPs reported that there were adequate family planning commodities; hence availability would not have been a barrier to uptake of modern contraception. However, during the in-depth interviews with the HCPs, 2 key themes emerged which posed barrier to uptake, namely; inadequate skills and lack of coordination and integration in the existing routine of family planning and those who had gone through post-abortion care.

When HCPs were asked whether counselling and provision of modern family planning was provided for post abortion mothers, in all the 3 facilities, there were varying responses to this question, i.e. while HCPs at the family planning clinic would say it’s done in the ward, colleagues in the ward would say it is done at the family planning clinic. This showed disjointed and lack of coordination and integration in as far as providing comprehensive care is concerned. In all the 3 facilities, it was clear that the roles of HCPs in theatre, wards and family planning clinic towards PAC modern family planning counselling and methods provision is not well defined and hence there was deficient services and overlapping of duty as indicated by the HCPs response below; *‘Yes, [post abortion] patients are there, ... we get one or two per month at Reproductive Health Clinic (RHC), but not many come here [RHC] because most of them get the service while still in the wards, and only a few come here. They get this information [about family planning] at the ward... That’s why all the equipment is found at the ward’*. (Nurse, 8 years’ experience, family planning clinic).

'After the procedure in theatre, the patient is transferred to the maternity ward for further care, after maternity, she goes to family planning clinics' (Enrolled Nurse, 4 years' experience, theatre).

'No, we don't counsel them here [female ward] After she is discharged by the doctor from here [female ward], we direct them to RHC for family planning counselling and provision' (Nurse, 10 years' experience, female ward).

This sequence of care makes service delivery very complex and confusing to the patients. Hence, despite high numbers of women that are treated for various abortion complications, family planning counselling and methods provision is given only to a few.

The study further explored the perceived knowledge and skills of HCPs to carry out their duties when it comes to caring for PAC patients. Almost all HCPs enrolled in the IDIs had no formal training in the provision of PAC.

Nearly, all the HCPs, college training where PAC was part of the topics taught was the only orientation HCPs considered as skills for PAC. Common sentiments could be summarised by these 2 HCPs;

'I had a short training on family planning at KCMC for a week.... Some of us do go for those trainings, but I have never attended for any workshop meant to upgrade my skills' (Nurse midwife, 8 years' experience, family planning clinic).

'I have never had any training in post-abortion care except general knowledge during my training as a nurse so many years ago' (Nurse, 5 years' experience, female surgical ward).

HCPs further reported that while a few staff members were privileged to attend available training dedicated to PAC once in a while, the difficulty in sharing information/knowledge acquired was quite obvious as expressed by a nurse who was stationed in the theatre;

'... if only a few staff members went for training, it would serve us if they came back and trained the other members about the updates so that we are all well informed' (Nurse, 2 years' experience, theatre).

Some HCPs stated that, training was no longer being offered as regularly as in the past.

'We used to have them [training] in the past, but nowadays they are not there, so if we could have them that would be great' (Nurse Midwife, 12 years' experience, family planning clinic).

Inadequate knowledge and skills on family planning counselling was also realised. HCPs reported recommending specific modern family planning methods for woman instead of providing proper counselling by providing adequate information about all the available methods to give opportunity to the woman to choose what suits her best.

'Yes you select for her and you must explain to her why you chose that method for her'

(Nurse, over 20 years' experience, family planning clinic).

Availability of Modern Family Planning Commodities

When asked whether they ran out of stock for modern family planning commodities, HCP participants from all -

the 3 facilities acknowledged that the units were well supplied with required commodities. However, they reported reduced number of supplies for certain family planning methods. This is what a nurse at reproductive health clinic stated;

'Yes, family planning commodities are available.... we are not completely out of stock before they finish, we order for new ones.... therefore, it has never happened that we are without contraceptive methods' (Nurse, 8 years' experience, family planning clinic).

'There are few times of shortage of some methods but we place an order for new ones and we receive them' (Nurse, over 20 years' experience, family planning clinic).

Involvement of Health Care Providers in Provision of PAC

During the study, inquiries were made to ascertain whether there were adequate number of cadres involved in PAC. It was observed that physicians, nurses and midwives were all involved as a team especially in times of managing abortion complications.

'Both doctors and nurses are involved in PAC.... nurses are enough and normally providing counselling and contraceptive methods, except for permanent method. Yes, but we cooperate in many other things' (Nurse, 8 years' experience, maternity ward).

Very prominent was the lack of doctors' involvement in counselling at all the 3 facilities. Some PAC patients do not receive family planning counselling services, making PAC incomplete for such patients.

'Honestly, I have never seen doctors offering family planning counselling.... maybe he/she tells the woman in short like there are family planning services and if you [patient] need you can go to the clinics for more information' (Nurse, 2 years' experience, theatre).

DISCUSSION

The uptake of post-abortion modern family planning was low as observed in this study, 31.2%. The main factor that contributed to low uptake was inadequate counselling provided during PAC. It was observed that more than half of the participants (56%) were not counselled. The study also observed that women who received counselling had a very high uptake of family planning methods (71%).

Limited provision of family planning counselling during PAC led to missed opportunity of improving contraceptive use in this setting as well as missed opportunity to avert short inter-pregnancy intervals (< 6 months) and associated morbidities. The low uptake of post-abortion modern family planning witnessed in this study is inconsistent with other studies done in Tanzania, Kenya and in other countries in Asia and Sub Saharan Africa where 73-86% of PAC women adopted a modern family planning method.^{18,20,28} Low PAC family planning uptake has been reported in Brazil by where only 8.8% of women received family planning before hospital discharge.¹⁷

The reason for the low uptake of family planning in this study is evident due to the lack of proper family planning counselling provision as more than half (56%) of women did not receive family planning counselling. Other reasons for poor PAC uptake which are also mentioned in studies conducted elsewhere include lack of proper in-

tegration of PAC services with other reproductive health services. In this study, out of 69 women who were counselled and showed intention to use family planning, 11 of them could not be provided with the method of choice upon discharge due to poor coordination among HCPs. Other reasons for these inadequacies were also observed from the emerged themes in the qualitative findings obtained in all the facilities. These included; lack of skills, few providers and lack of proper coordination and organisation in PAC service delivery. In-service training of service providers on general PAC, counselling, skills in the provision of family planning methods and change of attitudes is needed in this setting. In studies where high family planning uptakes was recorded, the common denominator was comprehensive PAC and targeted family planning counselling by a dedicated team.^{8,11}

Quality of family planning counselling provided during provision of PAC family planning services is also lacking. It emerged in the qualitative findings, PAC women reported that they needed more information from their HCPs during counselling. This could also explain the low uptake of modern family planning methods even among those who received counselling, when compared to findings from other studies conducted in other developed and developing countries that have linked proper family planning counselling with increased uptake of family planning up to 97% among women attending for PAC.^{8,11,12}

Nearly 2/3 (63%) of those who accepted a family planning method, selected a long-term one (implant or IUCD).

Further 12% selected injectables, making 75% of them prefer a method that confers long protection with a low probability of failure. This observation is not comparable to the findings in studies in other developing countries where short-term family planning methods dominate during PAC.^{17,18,28} High uptake of long-term reversible family planning methods was observed similar to the observation made in a study conducted in the USA in 2010 by Secura and colleagues.³¹ The current government policy on postpartum and post-abortion use of contraceptives which targets building the capacity of HCPs at all levels to be able to provide long-acting and permanent methods of family planning could be a major contribution to what has been observed in this study.⁶

In contrast to observations made in a study by Prata et al. in 2011, single, divorced or widowed women were more inclined to opt for post-abortion care modern family planning methods compared to married women.³² This is a demonstration of decision-taking power and seeking partners support by married or cohabiting women over their reproductive health issues. On the other hand, non-use of PAC modern family planning by women, especially those who have had previous multiple deliveries is a concern. Studies have reported that higher maternal age, shorter inter-pregnancy intervals and advanced parity are determinants of induced abortion.³³ In countries like Tanzania where abortion is highly restricted by law, women usually resolve into unsafe abortion and are prone to lethal complications. This occurrence of non-use of family planning could be due to fear of side effects and infertility myths and misconception on modern family pl-

anning methods and poor reception by health care providers developed over time.^{34,35}

Many factors were identified among health care providers that negatively affect the provision of PAC modern family planning such as inadequate skills, lack of coordination and integration of PAC with other reproductive health services. According to the HCPs, the availability of modern family planning commodities was not a barrier to the provision of PAC in the present study. These current observations further support Tanzania policy on the family planning agenda, ensuring supplies of commodities in all health facility levels to strengthen provision of family planning services.⁶

The strength of this study is in mixed-methods employed which quantify and qualify the experience of the participants. There is limited recall bias since information of interest was gathered immediately at discharge. The study enrolled both health care providers and patients, therefore experiences of both stakeholders on barriers to PAC modern family planning were equally appreciated. However, the study has to be interpreted in light of some limitations. Since this was a facility-based study and conducted among women in rural area, and in only 3 health facilities, the findings may not be generalisable to the whole population. The study looked at the uptake of family planning methods upon discharge from the facility, therefore it does not necessarily ensure the use of the method after discharge from the facility.

The facilitators to PAC uptake of modern family planning were not investigated on the qualitative arm of the study, this might add to the limitation of the study as it would have contributed to better understanding of PAC modern family planning acceptability.

CONCLUSION

Suboptimal provision of PAC modern family planning counselling in this setting is a major bottleneck contributing to low uptake of PAC modern family planning methods. Marital status and partner's support were important predictors of PAC modern family planning uptake. However, misconception and misinformation from communication and interaction in the community are great barriers to PAC modern family planning uptake. Although the study findings revealed reported adequate supply of modern family planning commodities in all facilities, inadequate skills and lack of coordination in service delivery by the health care providers were among the challenges to the uptake of modern family planning.

There is urgent need to improve PAC family planning services through provision of regular training of health care providers on family planning counselling with comprehensive information targeting the local contextual misconception in order to attribute to reducing unsafe abortion and maternal deaths. Also, couple counselling and provision of PAC as a one-stop service should be encouraged at every facility to improve uptake and use of family planning following PAC. The Ministry of Health should emphasise the integration of reproductive health services in every health facility to avoid missed opportunities to the provision of valuable services such as family planning during PAC.

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