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Towards a Technology-Enabled Framework for Community Healthcare: A Multi-Stakeholder Qualitative Assessment of Uganda's VHT Program

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Abstract: Community Health Worker (CHW) programs, like the VHT-Program in Uganda, play a critical role in bridging community-health system gaps, especially in resource-constrained areas. This study explored its implementation with a focus on data management, technological infrastructure, and governance, guided by the Health Metrix Network (HMN) framework. The aim was to examine the VHT-Program's implementation from a multi-stakeholder perspective in selected districts of Uganda, informing the design of a technology-enabled community health framework. A qualitative, cross-sectional design was used, gathering data through interviews and focus groups with 147 participants, including VHTs, health workers, district health officials, and community members from Kibuku, Bulambuli, and Bugweri districts. The analysis, using Braun & Clarke's thematic method, revealed eight key themes: Health Information System Resources, Data Sources, Data Management, Leadership & Governance, Dissemination and Use, Coordinating Mechanisms, Connectivity, and Challenges & Solutions. While some HMN components were affirmed, gaps in data management, coordination, and infrastructure were identified. This informed the development of the JTM-HMN Framework, which proposes a context-specific, integrated approach to guide policy development and the implementation of technology-driven healthcare interventions.

Keywords: Community-Health System Connectivity, Health Information Systems, Village Health Team, Technology, Framework

1. INTRODUCTION

As digital health increasingly becomes a key strategy for achieving universal health coverage [1], [2], many low-income countries, including Uganda, are involving community members in delivering healthcare services [1], [3], [4], [5], [6], [7], [8]. Community health workers (VHTs) in Uganda serve as a vital link between the community and the formal healthcare system, especially in underserved rural areas. The Village Health Team Program (VHT-Program), Uganda's national community healthcare initiative, relies on VHTs to provide essential services such as first aid, health promotion, and referrals, contributing to improved healthcare access and public health outcomes [9], [10], [11], [12], [13], [14], [15].

However, the VHT-Program is not without challenges. Issues in data management, resource availability, governance, accountability, and community engagement have been identified as major barriers to effective implementation [15], [16]. These challenges often lead to a continued gap between the community and the formal healthcare system, resulting in higher mortality rates for preventable and treatable diseases [10], [17], [18]. Addressing these challenges comprehensively, across all levels of the program, is essential for strengthening the program's impact and sustainability, ensuring it can effectively address healthcare needs in Uganda's rural communities [19], [20].

The Health Metrics Network (HMN) framework, developed by the World Health Organization and the Health Metrics Network [21], offers a model designed to strengthen health information systems and enhance coordination between health systems. This framework categorizes its components into three main dimensions: Inputs, which include health information system resources and coordinating mechanisms; Processes, which focus on indicators, data sources, and data management practices; and Outputs, which are concerned with information products, dissemination, and usage. While this framework has been widely implemented in formal health systems, Uganda's VHT-Program remains largely unstructured, with limited integration of digital tools and technologies to support data management and service delivery [22], [23], [24], [25].

Despite the broad application of the HMN framework in global health systems, limited empirical research exists on how it aligns with the realities of community-based health

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programs in rural Uganda. Furthermore, no contextualized, technology-enabled framework has been proposed to guide the integration of digital health tools into Uganda's VHT-Program. This study aims to fill this gap by applying the second version of the HMN framework [26] to evaluate its relevance and effectiveness in addressing the community health realities of rural Uganda. The study will assess how well the HMN framework accounts for the local context and identify areas where modifications may be necessary to improve the VHT-Program's structure and performance.

The primary goal of this study is to examine the implementation of the VHT-Program in selected districts in Uganda from a multi-stakeholder perspective. By exploring the program's strengths and weaknesses through this lens, the study aims to inform the design of a technology-enabled framework that is better suited to the needs of community health initiatives in rural Uganda. This research will provide valuable insights that can help shape policies, improve program design, and enhance the effectiveness of digital interventions aimed at strengthening community health systems in resource-limited settings.

2. METHODS

This study employed a cross-sectional research design, using a qualitative approach to explore the implementation of Uganda's VHT-Program with the aim of getting an in-depth insight of perspectives from multiple stakeholders, to inform the design of a technology-enabled framework aiding community health service delivery.

2.1. Study Setting

This study was conducted in three of Uganda's districts implementing the VHT-Program: Bugweri, Bulambuli, and Kibuku, all in the Eastern region. These districts were purposively selected to represent: Busoga, Bugisu and Bukedi sub-regions respectively, since they were reported to have the highest mortality rate in Uganda and among the worst performers for the "VHT reports" indicator with 27.9%, 19.4% and 18.1%respectively against the national target of 65% (Ministry of Health, 2020). Within these districts, data was collected from 6 parishes (2 per district), and these were selected following consultations with district health officers with appreciation of the different levels of program

penetration, accessibility and population characteristics. Parishes selects were required to have a government health Center II (HCII).

2.2. Participants and Sampling

A total of 147 participants were purposively selected based on their relevance to the implementation of the VHT-Program, across four stakeholder categories: Professional Health; Village Health Team workers (VHTs); Health Administrators; and Beneficieries who are community memebers that benefit from VHT services. This non-probability sampling technique ensured that perspectives from major categories directly involved or affected by the VHT-Program were captured. Each of these categories contributed defferent percentages to the sample size as illustrated in the **Table 1** below, and sampling continued until thematic data saturation was reached with no new insights emerging.

Table 1. Weights of Participant categories

Categories	Sub-categories	Number	Percentage
Health Workers (83.1%)	Village Health Team workers -VHTs	44	61.97%
	Professional Health workers	8	11.27%
	Health Administrators	7	9.86%
Beneficiaries (16.9%)	Community members - Male	6 FGD groups (Each 7 participants Total =42 participants)	16.9%
	Community members - Female	6 FGD groups (4 = 8 participants 2 = 7 participants Total = 46 participants)	
	Total Number of Sessions	71	100%

2.3. Data Collection

Data was collected over a period of one month (March, 2024) using semi-structured interviews and Focus Group Discussions (FGDs). A total of 59 participants were intereveiwed, including 44 VHTs, 8 Professional health workers, 7 Health Administrators and 12 Focus Group Discussions(FGD) for Beneficieries(each was made of 7-8 members -

community members, 4FGDs for male participants and 4 FGDs for female participants). While the interviews and FGDs were tailored for the different stakeholder categories, they focused on common themes including: Health Information System Resources; Data Sources; Data Management; Leadership & Governance; Dissemination and use; Coordinating mechanisms; Connectivity; and Challenges & Solutions. Interviews and FGDs were conducted in English or the local language based on the participant's preference, and lasted between 30-45 minutes. Data collection sessions were audio recorded and transcribed using intelligent verbatim.

Interview and Focus Group Discussion guides design was guided by the HMN framework [26]. The domains specified by this framework informed the themes developed which included: Health Information System Resources; Data Sources; Data Management; Leadership & Governance; Dissemination and use; Coordinating mechanisms; Connectivity; and Challenges & Solutions, to ensure an inclusive survey of the VHT-Program implementation across multi-stakeholder perspectives.

2.4. Data Analysis

Transcripts were imported into NVivo 10 for qualitative data analysis. This phase employed the thematic approach following the Braun and Clarke's six-step framework[27], which involves familiarization with the data, coding, theme development, review, definition and reporting. Initial codes were generated inductively from the data, then categorization into broader themes which aligned with the study's objectives. The coding was done iteratively, allowing codes to be refined as the analysis went on. The team had physical meetings to agree on actual codes guides by the objectives and the HMN aligned themes which were aligned in the data collection tools.

2.5. Ethics approval and consent to participate

Ethical approval was obtained from Mbarara University of Science and Technology-Research Ethics Committee (MUST-REC) and the National Council of Science and Technology (NCST). Permission to carry out the study was granted by the respective District Chief Administrative Offices (CAOs) in the selected districts. All participants provided informed consent before participation. Data collectors were trained before deployment and throughout the study, anonymity and confidentiality were maintained.

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3.   RESULTS AND DISCUSSION

Findings from this study are organized into key themes following the thematic structure of the study, reporting perspectives of the stakeholders involved in the implementation of the VHT-Program at the district level. The analysis revealed strengths and challenges of the current implementation framework, as well as stakeholder suggestions that inform the design of a technology-enabled framework for community health care systems. Representative quotes from participants are included to support the different themes.

3.1.   Participants Characteristics

The N stakeholders who took part in the study across the three districts varied in age, years of experience and the roles within the VHT-Program. Village Health Team workers had between (1-20) years of experience and were actively involved in delivering primary health services in the villages they are attached to. Health professionals included nurses and clinical officers working at health center II at the parish level and directly involved in supervising the VHT workers. Health administrators comprised of district health officers (DHOs), community health coordinators directly involved in supervising and overseeing the VHT-Program activities at the district level. Beneficiaries, who are community members included individuals who had received services from VHTs at the village level. Effort was made to ensure gender representation and inclusion of participants from all the three districts, to enable the capturing of experiences from both male and female gender. Participants were distributed as represented in **Table 2** below.

Table 2. Distribution of Participants by Stakeholder Categorization

Categories	Sub-categories
Health Workers (60)	Village Health Team workers -VHTs (44)
	Professional Health workers - HP (9)
	Health Administrators - HA (7)
Beneficiaries - BEN (12 [8@ = 96])	Community members - Male (6 = 48)
	Community members - Female (6 = 48)

3.2.   Availability and Utilization of Health Information System Resources

During the study, the different health information system resources were seen to be involved in the VHT-Program were, Personnel (Facility-based, Community-based),

Information and Communication Technology (ICT) technologies and other tools. Personnel included: Facility-based (nurses, in-charge, district health officers, health assistants, bio-statistician), Community-based (VHTs); ICT (HMIS); Other tools (forms, registers, etc.). Across all the three districts, participants spoke to the gaps in the availability and use of essential health information system resources, majorly at the community level. While they stated that they are provided with some hardcopy standardized organizational based forms like Baylor and USAID, the Ministry of Health (MOH), through the health centers provides hardcopy tools such as; referral forms (given to patients to receive treatment from HCII), interview forms (used when doing general family surveys like sanitation), Health Based Care- HBC forms (used to capture patient data), registers (used to capture information of community members in case of, immunized children, malaria cases, sanitation drives, family planning services, mosquito net distribution, ICCM registers to report on VHT activities, VHT data), 097B quarterly report (used to make quarterly reports to the ministry of health). However, the limited supply caused many VHTs to operate with traditional or improvised materials. Several VHTs reported instances where they had to use self-provided exercise books to capture patient data or photocopy standardized forms out of pocket in cases of insufficient supply. One VHT explained that,

> *"Referral forms are given to us occasionally, but when they are not available, I write a note for the caregiver to present to the health facility."* – VHT, Bugweri District

Also supported by a submission from one of the health administrators,

> *"Each village must have an HMI Register but the ministry has not been able to provide enough copies for VHTs to use. There are about 10 copies and they're hard to reproduce or photocopy."* – HA, Bulambuli District

These limitations extend to key tools like training material and these limitations impend the consistency and completeness of the data recorded.

> *"We are trained, but we have no manuals that we can keep referring to."* – VHT, Bulambuli District

> *"- I use my own book in which I collect information. After, I share the data with the VHT parish Coordinator who then takes the information to the Health Centre."* – VHT, Bulambuli District

Much as there is a technology being used (HMIS) in the VHT-Program, the study revealed that this system is only accessed at the district level majorly by the biostatistician.

"Data is submitted to the bio-statistician at the district who enters it into the DHIS system and compiles a report." - HP, Bulambuli District

Despite these limitations, all the stakeholders expressed a very strong commitment to documenting and using community health records as much as possible.

3.3. Diverse and Fragmented Data Sources in the VHT-Program

The study revealed that the data feeding into the VHT-Program is being sourced from various channels including: Population-based (home visits, outreach clinics, reports, registers, forms); Institution-based (HC instructions, district level regulations, MOH policies); Research-based (Action-based community research). It was noted that these data sources are fragmented and poorly harmonized. VHTs mentioned how they often times had to fill various forms for specific aspects and activities even when some clearly overlap.

"We carry out research in cases of disease outbreaks i.e. disease surveillance to know who has been affected, where they are in case there's need for quarantine, and how to address the situation." - HA, Kibuku District

"The ICCM is from RitesE collaborating with MOH. but implemented by IPs for instance the registers are from RitesE." – HA, Kibuku District

Despite the existing framework aiding in the VHT-Program implementation, the lack of uniformity in the structure, source, reporting channel results into a number of data quality issues as mentioned by one VHT,

"I was battling with my boss how is the data handled, I make a report which they submit to ministry. There are very many quality issues in the data." – VHT, Bulambuli District

This indeed hinders timely data analysis resulting in reporting delays which affect timely response planning and implementation.

3.4. Data Management Practices and Gaps

1) Data Collection techniques and tools

Data management in the VHT-Program does not vary much across the different districts and stakeholder perceptions. Data is majorly collected at the VHT level, manually captured in exercise books, hardcopy registers and forms, before being submitted to the supervising nurse at the health center.

> *"We VHTs gives the VHT parish coordinator the books we used for gathering data and the coordinator takes them to the Health Centre. Every Friday VHTs take a report about the medicine they've dispensed and how much medicine is remaining. The In-charge takes the records to the district offices. DHO takes the records compiled to the Ministry where they analyze the data and address the problems..."* – VHT, Kibuku District

Whereas it was noted that data collection forms are provided by the ministry of health, there are various kinds of forms and other data collection tools used, hence the reported inconsistencies in how data is captured, recorded and reported. In addition to this, VHTs reported how limited training and insufficient standard tools made accurate documentation difficult.

> *"... The parameters are bulky, some sections of the tools VHTs are never trained how to use them."* – HA, Bulambuli District

This not only causes delay in data processing but also leaves room for redundancy, miscommunication and gaps in the data.

> *"We give VHTs forms containing sections for capturing children' information. They also have Sanitation registers used for recording information for Households with adequate hygiene facilities like toilets, bathrooms and others. They also use exercise books to capture information of people lacking these facilities and for referral notes. They check the immunization cards from parent' homes to know when next is a child's immunization, and whether or not the children have finished the phases of immunization. In case the children haven't, they take note in their personal exercise books and report to the HA at the health facilities. They also have forms/ registers for mosquito nets distribution."* – HP, Bugweri District

"They collect information about pregnant mothers but sometimes they are repetitive and ask over and over again" – BEN, Bulambuli District

"We give them ICCM village register to use by for capturing bio-data from Household members for example, what's their access to safe water, hygiene and sanitation, Malaria cases in the community among others. We also designed and gave them VHT Referral forms to facilitate the referral of community members to HC." – HP, Kibuku District

"Mother come with other books in which I write, they go with their books. Sometimes I just call at the health facility, and I refer them using phone calls when I call the health assistant or in-charge. What and how they use the data for, I'm not so sure and how it is kept, but that's how I communicate." – VHT, Bulambuli District

2)   Data Storage methods

While findings reveal the presence of HMIS where data is entered by the biostatistician at the district level, the VHTs and health centers store the data using traditional methods like; hardcopy file folders, books, papers. This does not only expose the data to possible risk but also make it complex to access, integrate and report on this data. It was also reported that some of the collected and stored data is not used at the district dues to gaps in the data and lack of necessity issues.

"Data is cleaned and validated by the health inspector and entered into the HMIS, and then sent to Ministry. The info collected is too much to be used by the district. The parameters are bulky, some sections of the tools VHTs are never trained how to use them." – HA, Bulambuli District

"The other data they bring, I keep it in the files. In which we extract the data from time to time and including in the monthly reports. Then the rest, we keep it in our files. Some of the data kept is referred to in the future, but some is not." – HP, Bulambuli District

3)   Data Processing mechanisms

Basic data processing is done at the community, health center and district level for the VHT-Program. Besides using manual techniques to clean and sort for reporting, manual tools are used at the data entry levels (community, health center) and a HMIS only used

at the district level where data is aligned to the needs and indicators set by the ministry of health, majorly for reporting.

"I receive the different forms the VHTs submit at the health facility and we process the data." – HP, Bulambuli District	*"The HA summarizes. If there are 4 parishes, the HA make one summary of the 4 parishes into a sub county report which is given to the health information Assistant who feeds the information into a database."* – HA, Kibuku District	*"All data is received from the VHTs on a monthly basis by the health assistant and we pick out a few indicators at the health center then the rest is taken to the district. The biostatistician at the district processes the data through the HMIS system and reports are shared with the Ministry"* – HP, Bugweri District

4) Quality Assurance and Fow of Data

Data quality issues like cleaning and validation were reported to be done by the health inspector at the district level, signaling a need to have this process integrated at all levels of data management.

> *"Data is cleaned and validated by the health inspector. Add and entered into the HMIS."* – HA, Bulambuli District

The absence of a structured feedback loop was noted, as there majorly existed the down-top flow of data and limited top-down flow where VHTs hardly receiving feedback and updates on the quality of the data they submitted or on how their reports were used apart from meeting sessions. This indeed inhibits limited learning and improvement.

> *"Information collected from the community was returned when there was a meeting or training of VHTs taking place."* – VHT, Bulambuli District

Facilities struggle with safe storage and have limited means for verifying the accuracy of submitted reports. Finding reveal the need for a more structured data verification process, increased training in data quality management, and improved tools for timely digital reporting.

5) Data Compilation and Integration

While other districts left the compilation task solely to health workers at the health center, other districts reported that health workers at the health center met with the VHTs at the end of each quarter to perform to compile the multiple reports from the VHTs, before making a submission to the district. Since the tools and techniques used during this stage are manual, this makes data prone to errors besides consuming a lot of time.

"The information is given to the HCs after VHTs have collected information from the community. The information is then compiled and submitted to the district by the Health In charge of the facility."
- HP, Bugweri District

"At the end of every quarter, VHTs meet together with the HAs to compile a Parish summary of the information so far taken from villages to parish level i.e. 097B forms which capture the information in the ICCM register, in a summarized way."
- HA, Kibuku District

"All data is collected here at the HC and sorted. The information is then compiled and submitted to the district by the Health In-charge of the facility."
- HP, Bulambuli District

6) Data Analysis and Reporting Techniques

It was reported that there is a HMIS at the district level, accessed by the biostatistician to enter data from the health centers then perform analysis, interpretation and reporting to the ministry of health. The findings generally pointed to the need for expansion of the use of HMIS to cover the lower levels too (HCs and VHTs). Manual, paper-based reporting remained dominant at community to health center and health center to district, with the exception of a system transfer from the district to ministry of health. This resulted into delays in compiling, submitting, and reviewing reports before evidence-based planning and response can be done.

"If the Health Information Assistant is not present or in position, the information is submitted to the bio-statistician at district level who analyses the data, enters it into the DHIS system, and submits it to the ministry."
- HA, Kibuku District

"The health assistant is responsible for analyzing the data and sharing with the district officers with our support."
- HP, Bulambuli District

3.5. Leadership & Governance Structures Influencing the VHT-Program Implementation

Leadership and governance were found to be central to the coordination, supervision, and accountability mechanisms within the VHT-Program. Across the three districts, the mechanisms used were almost the same with the reporting hierarchy being: VHTs to in-charge at health center II; in-charge to district health officer at the district. It was noted that some parishes had a VHT coordinator (one of the VHTs) and others did not. The program has various lines of authority and roles as reported by one health administrator;

> "I as the Assistant DHO Environment, I declare a VHT should be selected for replacement and upon my declaration the LCs select. It's also approved at parish level; it is also approved at sub-County under the guidance of the health assistant or in-charge at the health facility. Healthy assistant, and In-charge do the assessment of the VHTs. Then the health facilities and the district do the capacity building depending on the funding available." – HA, Bulambuli District

1) Recruitment of Village Health Team workers

The VHT-Program has a recruitment criterion which is similar across the different districts. The various stakeholders reported that recruitment is majorly a task performed by the community members under the guidance of the local council chairman (LC1). On the issue of who is involved in the process and who must be present when the activity is being performed, there were varying responses with some saying the health professional (nurse) must be involved while others differ from this. The study revealed a number of requirements that have to be met by a community member for them to qualify for the VHT role. These include: The VHTs selected must be far apart in the village and not from the same area; must be above 18 years; The candidate must be having the minimum requirements according to the public health act sanitation rules 2000 under rule 8; have an ideal home; The candidate must be willing to work on a voluntary basis; should be able to read and write.

> "This VHTs are recruited based on residence of villages supposed to be above 18 years. And should be able to read and write. The information about recruiting a VHT is sent out to the health assistant when someone has either died married off to another Village or moved transferred to somewhere else. The health assistant works with the LC1 to identify a suitable candidate. The community gathers and nominates

two or three names, and they select the three top candidates so the community is involved in the process of selecting the final candidates. Out of those that are nominated." – HA, Bugweri District

"We do not participate in the recruitment of VHTs. We only do trainings for particular activities and wait for their work. The LCs are responsible for the recruitment of VHTs." – HP, Bulambuli District

"I was nominated by the community during a meeting led by LC1 and health workers." – VHT, Bugweri District

"HA calls the LC1 to help mobilize the community. Sometimes the turn up is poor. After that, the HA teaches the members about the qualifications of a VHT. The VHTs selected must be far apart in the village i.e. they both can't come from the same area. The participant must be above 18 years. The candidate must be having the minimum requirements according to the public health act sanitation rules 2000 under rule 8, where there are components of an ideal homestead. A VHT must have all those components in their homes to be considered for selection. The candidate must be willing to work on a voluntary basis." – HA, Kibuku District

2)   Selection of Supervising Nurse at the Health Center

While VHTs had to be selected by the community, the nurses at the health center who supervise the VHT activities are automatically guided by the structure of the health system. The in-charge at health center II, automatically becomes the supervisor of the VHTs in that given parish.

3)   Performance Assessment

Participants reported that monitoring and supervision is a responsibility of the health assistant and the health center in-charge. While one health administrator reported the existence of a template for integrated community management (iCCM) which the health assistant uses during a quarterly question-answer interaction with the VHT to supervise and assist them in their roles, other participants did not bring this out and nothing similar was mentioned about the assessment and evaluation of the health center by the district health administrators. This led to a general understanding that the performance assessment structure for the VHT-Program is not clear and there was no specific mechanism for assessing the workers and activities.

"- HA and the health In-charge are responsible for monitoring and supervising the work of VHTs in the community." – HA, Bulambuli District	*"It's done quarterly by the HA. Every quarter, the HA has an activity of VHT support supervision where he invites them and takes them through a refresher training. In those trainings, gaps are identified and addressed. By using a template for integrated community management, he interacts with the VHTs through question-and-answer approach so he is able to supervise and assist them in their roles." – HA, Kibuku District*

4) Information and Communication (format and mediums used)

Responses show that there is no clear communication channel or format specified for the VHT-Program with communication taking on formats like; word of mouth, phone calls, SMS, hardcopy reports, physical meetings, creating a challenge in the follow-up of urgent or important communication content which underplays timely response to raised issues. Despite having no clear guidelines to guide their supervisory VHT-Program work, health professionals and administrators showed the willingness to guide and support the program activities and workers for the good of their communities.

> *"The VHTs pick information they need from the HCs during the monthly meetings - Sometimes we contact them through phone calls and send the necessary information. We often call them for information or wait when they come around for HF activities on Tuesdays, Wednesdays and Fridays, and we give them the information to pass on to the community." – HP, Bugweri District*

"No guidelines or policies that we refer to in our work with the VHTs. We basically discuss and then we assume they know what to do after the training." – HP, Bulambuli District	*"We sometimes call them at the Health Facilities or Sub- County for meetings and there we pass on the information, where they then largely walk door to door while doing their work." – HP, Kibuku District*

3.6. Dissemination and use of Health Data for Decision-Making

1) Information flow channels and regularity among the different stakeholders

While reporting from the district to ministry of health was reported to be done through the HMIS at the district, VHTs' reporting to the health center was noticed to be primarily in paper-based form. The flow of information is noticed to have a scanty loop-back.

VHTs pass on information to the health center during meetings, through reports or phone calls, while trainings, meetings, phone calls, WhatsApp groups are the methods mainly used to pass on information from the district to the health center and from the health center to the VHTs. In cases where information has to be disseminated by VHTs to the community, it is largely by word of mouth, mainly in: prayer sessions, village/SACCO meetings, funerals, open public announcements, phones calls. In these cases, tools used were: microphones and speakers; phones; word of mouth communications. This was not only limited by facilitation like transport and airtime, but also by availability of opportunities in cases where the information bearer had to request for some minutes during a prayer or funeral gathering.

"We move from house to house and also take advantage of public gatherings like church services, mosques, or village meetings. During funerals or weddings, we are often given a few minutes to make announcements about upcoming health activities. Sometimes we are given announcements to make during Friday prayers or Sunday services." – VHT, Kibuku District

"Some VHTs have phones which they use for communicating, while others don't have phones so they have to move from door to door." – VHT, Bulambuli District

"When it comes to training, the people involved in the health activities go to the Health Centre III where the Health Assistant is, and they're trained, or can have meetings about the health programs in the village. VHTs move from house to house. The Assistant Nurse gives the information to VHTs who then take information to members in the community. The information is circulated by word of mouth from VHTs to members in the village." – HP, Bulambuli District

"We conduct meetings with the VHTs, and they give us feedback and also give them information that they need to pass on to the communities. Sometimes they are called and also encouraged to call or use. Their phones for communication." – HA, Bugweri District

Regularity of dissemination and reporting seems to be the same across districts, with a requirement of VHT quarterly reports the (079b), VHTs Quarterly review meetings at the health center, District health meeting twice a year. In addition to these, some districts

reported having monthly meetings with VHTs to discuss findings from the data collected from the community.

"Whenever the people are in their district health meetings which are called regularly, as findings are discussed and shared, where the health center in-charges, health assistants and health personnel, the CAOs, and other department heads attend. These can occur even twice a year and they also include VHTs. The information is then shared back to the health facilities and it's carried back into communities through VHTs." – HA, Kibuku District

"Monthly meetings are held to discuss the findings from the data collected." – VHT, Bulambuli District

2) Use of collected VHT-Program data

Participants' responses showed a general underutilization of data collected at the community level. While some participants expressed uncertainty about how the data they collected was being used, others reported that the collected data is used to inform; designing community health education programs, designing plans for implementation, dissemination of drugs, discovery of disease outbreaks and community sanitation status. The use of collected data is limited by structural and resource-related barriers. Considering that most tools for analysis and presentation are manual, this makes it difficult to translate raw data into actionable insights.

"We also use the data to design community health education programs." – HP, Kibuku District

"Data from VHTs is analyzed by the Health Assistant and the plans are designed for implementation." – HP, Bulambuli District

"Children who were found to be sick are treated. Charts that capture the happenings of new diseases and outbreaks in the village are posted at the health center; new drugs are dispensed at the health facility. Because of sanitation records, facilities like pit latrines are constructed." – VHT, Bugweri District

Despite these barriers, collected data was used to support different actions as reported by some participants. Indeed, this presents a serious need to improve data feedback and dissemination mechanisms in the VHT-Program.

3.7. Coordination mechanisms Among Stakeholders

Coordination across the various VHT-Program stakeholders and levels was generally weak and fragmented. Much as there existed some formal coordination mechanisms which include multi-stakeholder meetings, the regularity of the same was not assured.

1) Financing (source, accountability)

Inadequate financing was frequently cited as a major barrier to coordination. Dues to lack of a dedicated fund for VHT facilitation, transport, airtime, some homes could not be reached in time since the VHTs had to walk or use bicycles and so, paused when they got tired or were sick, a lot of communication was not done as required and health professionals, health administrators or VHTs waiting for the next meeting opportunity to make the communication causing delay in service delivery.

Despite this outcry, it was noted that there are some isolated cases when VHTs are facilitated with some money. These were said to be times when they are involved in particular government or NGO program activities and so, only those involved VHTs would benefit from such an opportunity. Some projects also provided books and gumboots to the VHTs involved in activities of a given program. While this served as a motivation for the VHTs chosen to be part of these special projects, it demotivated those who were not chosen, hence creating an imbalance in treatment and privilege.

"The registers are from the Ministry of Health but the challenge is the forms are inadequate. If you have a copy, you improvise by reproducing the forms. VHTs are not supported i.e. there's no facilitation for them since they are on voluntary basis. Only on health drives like immunization do they receive some

"Facilitation is from 30% PHC funds released by DO that the VHTs are also involved thus some motivation. PHC funds is for health promotion, hygiene and sanitation. Within the 30%, VHTs are given some facilitation. During some meetings, the VHTs are given a facilitation of 30k. They've received T-shirts and some gumboots but

"No clear coordination system unless there's a special program, otherwise, we have our routine program of wake up do some work at home and be alert for any call from the village or prepare for home visits. Most activities are not facilitated so we have got to find a way to do the work but usually we have to facilitate ourselves. It's only when programs like

facilitation for mobilizing the community." – HA, Bulambuli District

they were not enough." – HA, Kibuku District

distributing mosquito nets are happening that we government considers to give some facilitation." – VHT, Kibuku District

2) Logistical tools and support towards the VHT-Program

It was revealed that logistical challenges undermined efforts to coordinate. Much as the ministry of health provides the HMIS, standardized forms/registers for capturing data and drugs, the HMIS is only used at the district level and the forms and registers are many times insufficient. Participants reported cases where they had to move under rain yet lacked gumboots, umbrellas or rain coats yet could not communicate this to the homes that needed their support due to challenges of airtime and phones. Stakeholders cited situations where the VHTs has to be given food by the community members before they can continue with their task, and those when they had to improvise and buy exercise books and pens with their own money in order to record patient data.

"Sometimes they receive a protective gear, and there is an IP which gave a drag box. So, it depends on what is available, but sometimes they can get Pro like gum boots or t-shirts or gloves in the process of doing their work." – HA, Bugweri District

3) Principles, Policies, Rules governing the VHT-program

Apart from operations concerns, participants highlighted issues regarding lack of clear coordination policies and guiding principles. In situations where health personnel or health administrators did not communicate clear expectations, roles and responsibilities, the program operations depended in personal initiative and will. While some VHTs reported having been told the dos and don'ts as they carry out their tasks, many reported not having been taught policies and principles governing their operations.

"No guidelines or policies that we refer to in our work with the VHTs. We basically discuss and then we assume they know what to do after the training." – HP, Bulambuli District

"I have not received any formal policies or rules or guidelines under which I should operate while in the community but the information is sometimes obtained during meetings." – VHT, Bulambuli District

Despite the challenged coordination framework, districts reported use of meetings, ICTs like mobile phones for calls and SMS and the HMIS for data analysis and reporting to ministry of health. This discloses a gap in coordination mechanisms that urgently needs to been closed with structured engagement platforms to improve processes like: referral, feedback, dissemination, reporting.

3.8. Connectivity and Its Influence on Service Delivery and Community Engagement

Connectivity can be looked at as an enabler and limitation in the VHT-Program implementation, more specifically in terms of data flow, community engagement and supervision. In this study, it was noted that there is limited access to HMIS, inadequate digital capacity, restrictive communication channels and methods, limited information access across stakeholder categories. Amidst these shortfalls, the community members noted that VHTs are doing a good job in bridging the gap between the community and the health system as collected in one of the beneficiaries' FGD;

"VHTs have sensitized the community members so that they no longer fear immunizing children against polio. VHTs do check-ups by drawing blood from the community members and they therefore get treatment much earlier when an illness is just getting started. VHTs don't segregate or discriminate. If you're sick, they treat you. If you need counseling, they give you counseling. VHTs have eased the relationship and working between community members and health workers because of the referrals they give. For instance, if a member brings a child for treatment to the VHT, they offer first aid to the child, and then make a referral form for the child such that when the parent reaches the health facility, they can easily receive immediate attention and the health workers know where to start from." – BEN, Bugweri District

This is also emphasized by the submission from one of the health professionals;

"Health Facility services have been extended closer to the community members since members can walk to VHTs and get health care. VHTs have encouraged members of the community to seek health care and make use of the HF. It has reduced on the transport barriers, like where members had to deal with transport difficulties have been addressed since we have VHTs are present in the community. There has been an opportunity of identifying children with malnutrition and other diseases who are then referred to health facilities by VHTs for proper handling." – HP, Kibuku District

In the case of the quality of service the VHT-program brings to the community, there clearly exists a number of; system, digital, structural, infrastructural, communication, governance and logistic gaps. Stakeholders, indicate the need to address these challenges to not only improve the quality-of-service delivery but close the gap between the community and the health system in order to achieve the intended purpose of the VHT-program. This indicates the positive effect the VHT-Program has on the connectivity between the community and the health system which would be made even better if the existing gaps and challenges are addressed.

3.9. Perceived Challenges & Locally Suggested Solutions

Across all districts and stakeholder categories, participants reported various implementation challenges seen to be affecting the effectiveness of the VHT-program. Their nature ranged from; logistical, financial, structural, and system. Participants also proposed a number of solutions. While the concerns expressed by participants were similar across districts and stakeholder categories, representative quotes were selected to best illustrate each challenge (see Table 3) and solution (see Table 4). Where applicable, the quotes were chosen for their clarity and ability to compress common opinions.

Table 3. Summarize Perceived Challenges from the Findings with Representative Quotes

Sn	Category	Perceived Challenges	Representative quotes
1	Community Personnel challenges	1. Very old, inadequately trained VHTs 2. Demotivated and limited number of VHT vs number of villages	*"The selection is not proper, even for those that are too old in which direct involvement might cause conflict."* HA, Kibuku District *"VHTs have not been trained on their roles and responsibilities in the villages."* HA, Bulambuli District *"There are few health workers and the villages are many."* HA, Bugweri District *"VHTs are demoralized because there is no facilitation so some of them have given up."* HA, Bulambuli District

Sn	Category	Perceived Challenges	Representative quotes
2	Data Management	1. Missing data	*"Some parts of ICCM have not properly been taught to the VHTs so you'll find that some sections of the ICCM register are missing information."* HA, Bugweri District
		2. Long gaps between data collection	*"The HMIS 006 is the primary tool that the VHTs use. They are only filled after three months."* HA, Kibuku District
		3. Complicated, bulky data collection tools	*"The info collected is too much to be used by the district. The parameters are bulky, some sections of the tools VHTs are never trained how to use them."* HA, Bulambuli District
		Error and loss prone storage medium used	*"The other data they bring, I keep it in the files. Some of the data kept is referred to in the future, but some is not."* – HP, Bulambuli District
		1. Poor quality data	*"The data quality is not satisfactory. There are some gaps in some reports and correctness is minimal."* – HA, Bugweri District
		2. Delay in reporting	*"There are Delays by the VHTs submission of the data they collect, sometimes they take long before all data is submitted. Delay in the referral process."* HA, Kibuku District
		1. Bulk data, with missing or incorrect information 2. Wrong or delayed reporting	*"The information is bulky so it needs a lot of time to go through the information. Some parts of ICCM have not properly been taught to the VHTs so you'll find that some sections of the ICCM register are missing information."* HA, Bulambuli District
3	Leadership & Governance	1. Lack of transparency 2. Irregular and unregulated recruitment of VHTs 3. Political Interference	*"LCs bringing their own relatives, they are so biased and are not so open or transparent in the process of Replacements."* – HA, Bugweri District *"Selection of the VHTs was done long time ago until now, there has not been any other formal selection."* HP, Bulambuli District

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Sn	Category	Perceived Challenges	Representative quotes
			"Political interference between VHTs and LCs because LCs always think the VHT workers are receiving money and they also want to partake of it." HA, Kibuku District
		Irregularity in performance meetings	*"We are supposed to have quarterly performance review meetings with VHTs but a constrain in funds limits the frequency of the meetings."* HA, Bugweri District
		Inadequacy in access to technology like smart phones	*"They use WhatsApp platforms to teach each other and to coordinate activities and collection of information. But, few of the VHTs have smartphones."* HA, Bulambuli District *"There are communication gaps because of lack of smart phones yet there are some reports we require from them that need the use of smart phones."* – HP, Bugweri District
4	Dissemination and use	1. Collected data is too bulky and under-utilized	*"The info collected is too much to be used by the district. The parameters are bulky. Data is not usually effectively used or consumed as meant to be."* HA, Kibuku District
		2. Un-used collected data and wastage of resources	*"The information is collected but it's stored away and may not be used. So, resources that were spent collecting the information are wasted, and the relevance for collecting the information is destroyed."* HA, Bulambuli District
5	Coordinating mechanisms	1. Lack of facilitation 2. Delay in receiving project-based allowances	*"VHTs complain that they have little motivation i.e. money. The little motivation is also over delayed which frustrates the VHTs' movements and work. They can sign for an activity but it can take months as much as 4 to 6 months before they receive the facilitation."* HA, Kibuku District
		1. Insufficient Data Collection tools	*"Each village must have an HMI Register but the ministry has not been able to provide enough copies for VHTs to use."* HA, Bulambuli District

Sn	Category	Perceived Challenges	Representative quotes
		2. Communication and logistical challenges; umbrellas, bicycles, feeding facilitation, transport, insufficient drugs, Identification issues-no uniforms, airtime	*"Transport is a challenge some of these travel very long distances."* – HA, Kibuku District *"Doctors and other health workers have uniforms but VHTs don't have, which would have made it easier for members in the village to identify them. Community members are not happy with VHTs if they don't have medicine in their boxes."* BEN, Bugweri District
		1. Lack of clear guidelines and policies to support VHT-Program work	*"There are no guidelines which would have helped with orienting VHTs when they take on the roles. There are no clear policies that we can use to help monitor the VHTs performance."* HA, Bulambuli District
6	Connectivity	1. Community's refusal to adhere to VHT recommendations 2. Demand VHTs for wrong medicine or when not sick 3. Exposure of VHTs to harm from the community 4. Rejection and abuse from the community towards VHTs, when drugs are insufficient	*"...for example, in sanitation if VHTs advise members to clean toilets, or construct them, they will rudely ask the VHTs if they are the ones who own the toilets! A lady at one time complained that she was having pain in her leg but the VHT refused to give her Cortem to treat the pain."* - BEN, Bugweri District *"VHTs' lives are in danger because of the information they have to deliver to the community e.g. some have been cut, chased, abused. One time in another village, a child had to be vaccinated by force since the mother had refused to take the child for vaccination and she would aggressively chase away the VHTs."* BEN, Bulambuli District *"Some homes don't want to open for us. Sometimes we are blamed for things beyond our control, like lack of drugs"* - VHT, Bugweri District
		Perception challenges	*"We are mocked by the community since we are not paid for all the work they do, they tell us to*

Sn	Category	Perceived Challenges	Representative quotes
			use our time for something development.” – VHT, Bulambuli District
		Delayed communication	*“The information is given late, yet it's for urgent distribution. Sometimes you are faced with anger, you receive the information very, very late, they want you to distribute it urgently, and yet you're not facilitated.”* – VHT, Bulambuli District

Table 4. Summarized Locally Suggested Solutions with Representative Quotes

Suggested Solutions	Representative quotes
Refresher courses for VHTs	*“We need refresher courses to help us keep up and be effective in our work.”* – VHT, Bugweri District *“There's need to build VHTs' capacity because since they went to UPE schools whose quality of education is low, they face challenges like reading & writing which results in poorly written reports. People who are more educated don't want to work voluntarily”* – HA, Kibuku District
Need to increase the number of VHTs to serve the community	*“Capacity is little to help the people so there's need for more VHTs and resources. There's need for capacity building”* – HP, Bulambuli District
Need to have and communicate clear guidelines and policies on the management of VHTs	*“Maybe government should come up with a policy and guideline to retire old VHTs. This would help in follow-up of cases.”* – HA, Bulambuli District
Require VHTs to have phones to ease coordination	*“VHTs need a mechanism for reporting and receiving information from communities especially because of very long distances. VHTs are supposed to meet weekly to bring data to the health facilities. These can include smart phones and structures through which they can report the information to reduce on the number of times they have to move from their homes to the health facilities.”* – HA, Kibuku District
Require VHTs to have phones to ease coordination	*“VHTs need a mechanism for reporting and receiving information from communities especially because of very long distances. VHTs are supposed to meet weekly to bring data to the health facilities. These can include smart phones and*

Suggested Solutions	Representative quotes
	structures through which they can report the information to reduce on the number of times they have to move from their homes to the health facilities." – HA, Kibuku District
Provide necessary data collection tools	*"There's a lot of sickness in the villages. So VHTs need to be given books in which they can record instances of the sickness among the people so that they are attended to in time." – VHT, Bulambuli District* *"We don't have clear tools VHTs use, for example, the form, and some of the tools. These should be formulated and the distributed to the districts for VHTs to get them." – HA, Bulambuli District*
Improve the supply and availability of logistical equipment like; umbrellas, bicycles, transport, enough drugs, Identification items like T-Shirts	*"We need support like; gumboots, raincoats, umbrellas, transport facilitation for example bicycles to help with movements since homes are not that close to each other. We need identification documents like IDs besides the T-shirts which some got and others missed." – VHT, Bugweri District*
There is need for community sensitization on the role of VHTs and guiding rules on interaction	*"Some people are rude and always say I am paid so I shouldn't disturb them. "You are always registering us, never do come with food". Those are some of the words they tell us, so by the time you go back for another thing, they expect you to take for them something." – VHT, Bulambuli District*

3.10. Discussion

The development of the themes for data collection and analysis in this study was guided by the HMN framework[26]. The HMN framework is relatively a generalized framework and so can support diversity in research for application across different healthcare settings, it is more or less a classification framework. The aim of this study was to explore the way the VHT-Program is currently being implemented across three districts (Bulambuli, Bugweri, Kibuku) in Uganda and assess how community realities align or possibly deviate from this framework. This section discusses findings in alignment to this framework and finally presents a proposed modified version of the framework basing on the data.

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Health Information System Resources: Across the three districts, participants noted critical shortages in: digital tools, trained & able VHT personnel, and reliable reporting systems. While the HMN framework captures components such as: personnel, Information and Communication Technology (ICT) and tools, this study findings highlight the need for: clarification of personnel to include the community-based health workers, localized digital literacy, integrated and standardized digital platforms. *Data Sources and Data Management:* There being a data entry point and reporting at the community level by the VHTs; compilation of received data by the health professionals at the health center and the use of a HMIS by the biostatistician only at the district to analyze the data and make reports to the ministry of health, aligns with the HMN framework attention to: collection, storage, quality-assurance and flow, processing, compilation, and analysis. However, the inconsistencies in the collection tools and formats calls for: integration mechanisms, integrated and standardized digital platforms; accessible and continuously available training modules; localized digital literacy; and central storage of data.

Leadership & Governance: The findings highlight the existence of a clear reporting hierarchy and some basic roles and responsibilities of the different VHT-program implementation stakeholders, which aligns with the leadership & governance element in the HMN framework. However, the study findings emphasize the need for: streamlined information and communication channels and frequency; formation of clear assessment mechanisms to enable continuous monitoring and evaluation of the program to inform timely decisions. *Dissemination and use:* The data revealed that collected data majorly informs the development of health activities and restocking of drugs. Much as this aligns with the "dissemination and use" element in the HMN framework, the clear limited use of this data points to the persistent gap between data collection and action in the community. This speaks to the urgent need to formulate a data sorting and use mechanism and a regular feedback loop. Emerging technologies like Artificial Intelligence (AI) can be integrated to aid the extracting and development of meaningful insights.

Coordination mechanisms: Survey data shows that the coordination among the different implementing stakeholders (Community members, VHTs, Professional health workers, health administrators) is fragmented. While this aligns with the coordinating mechanisms element in the HMN framework elements, this study findings reveal the need to have this as a separate dimension, to allow for deliberate and strategic consideration for this

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important aspect. *Connectivity and linkage:* Challenges related to inter-connectiveness and alignment often came up in the submissions. While these have the potential to affect the effectiveness of the VHT-program, they were hardly considered in the HMN framework. Hence its inclusion in the proposed framework version.

Motivation, Financing and Policy: While the study findings align with the health information system resources elements in the HMN framework, the findings suggest that these would best be considered under the coordination mechanisms as these majorly supported this element. This requires paying attention to these as dimensions under the coordinating mechanisms element, hence the regrouping in the proposed framework version. *Community Perceptions and Engagement:* The study revealed that there is a lot of community misconceptions about the VHTs and the VHT-Program, perceived value of service and responsiveness. This is hardly considered in the HMN framework and therefor calls for clear indicators around assessment and relation-ship building.

While the HMN framework is relatively a generalized framework and so can support diversity in research for application across different healthcare settings, it is more or less a classification framework which misses factors of community-based healthcare management and linkage of communities to the health system. Based on the insights from the field data, we propose a modified version of the HMN framework, which introduces as number of components, separates and regroups some.

Building upon the HMN framework, this study proposes a modified version referred to as the JTM-HMN Framework, named after the author's initials to indicate the context-specific enhancements made to the original model. This version integrates insights from collected field data across three districts in Uganda and reflects the real-world implementation dynamics of community health worker programs like the VHT-program in Uganda. The JTM-HMN Framework has major structural components organized by levels; input, process, output, outcome as expounded as follow;

1) Input: [Health Information System Resources (This specifies requirements for the health information system including: health personnel who will be the professionals and the VHTs; Information and Communication Technologies (ICTs); Tools like the hardware and software needed.); Data sources (Specifies where data is coming from to feed the health processes: Population-based; Institution-based;

and Research)]

2) Process: [Data management (Specifies the actual activities: Storage; Collection; Processing; Integration; Quality assurance; Compilation; and Analysis); Leadership and Governance: (Specifies supportive activities for governance: Monitoring and Evaluation; Information and communication)]

3) Output: [Dissemination and use (Entails what is resulting from the process stage: Dashboard; Reports; Alert generation; Policy beliefs; Assessment reports of health system performance)]

4) Outcome: [Connectivity between communities and the health system (This is the end goal: Availability; Accessibility; Use of health information; Improved health [level and equity]; Responsiveness; Improved Efficiency; Evidence-based decisions)]

5) Support: [Coordinating Mechanisms (These are factors that indirectly contribute to the success of the system: Financing; Logistics and support; Principles and policies; Indicators)]

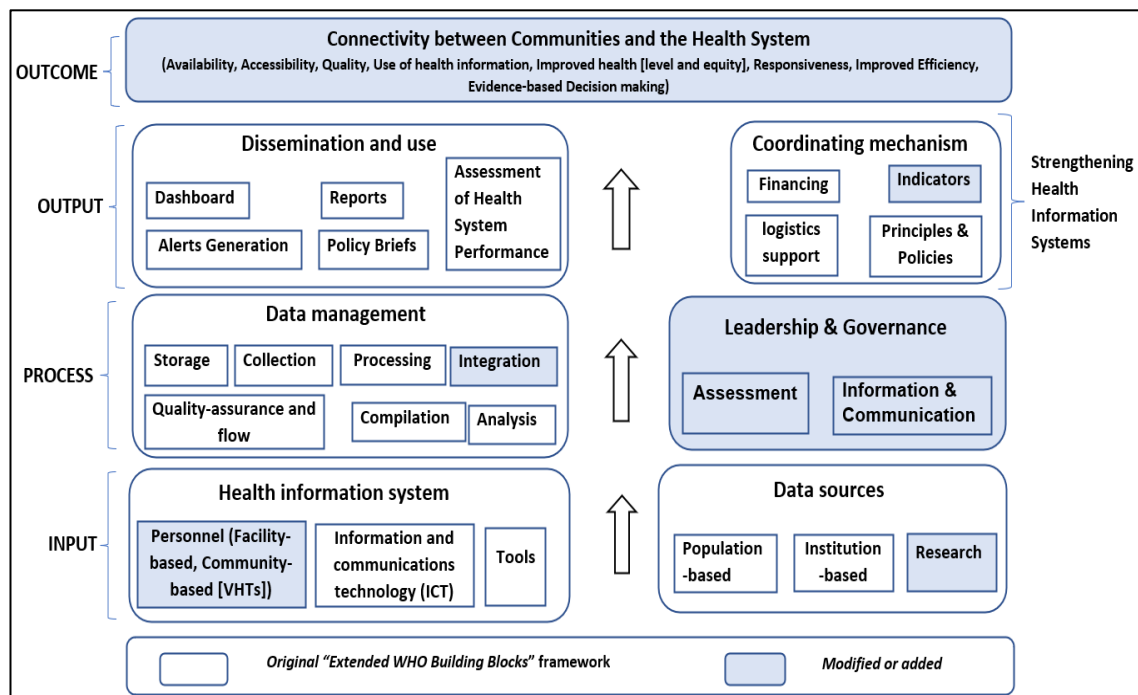These structural components are illustrated in the proposed JTM-HMN Framework diagram in Figure 1.

Figure 1. JTM-HMN Framework

This study highlights the need for strategic improvements in community health information systems. We suggest the following: Digital infrastructure ought to be strengthened to support timely and reliable bi-directional data flow; Harmonizing data tools will go a long way in reducing duplication, inconsistencies and un-necessary bulk while improving effectiveness; It is necessary to create and promote a culture of data use at the community level to enhance decision-making; Clear leadership and coordination structural mechanisms are important to help reduce the fragmentation among the different implementing stakeholders; VHT motivation needs to be addressed by providing incentives and flexible support systems to create a favorable environment for them to deliver services. Finally, the proposed JTM-HMN Framework not only offers a grounded but context-specific guide for ICT-supported community health worker programs like the VHT-program in Uganda, it should therefore be piloted to validate its practicality and impact in real settings and thereafter be adapted across different health settings.

4. CONCLUSION

This study explored a current state of a community health initiative ability to close the gap between the community and the health system. Through perspectives of stakeholders actively involved in the VHT-program implementation in Uganda. Drawing on the HMN framework, the findings reveal strengths worth strengthening like the importance attached to community-based data, however, it also unveils significant challenges in critical areas such as: data management; coordination and infrastructure; governance which need strategic attention.

Whereas this study presents vital insights into the implementation of community healthcare initiatives, it faced some limitations which include: The findings are based on qualitative data from selected rural districts and implementing stakeholders which may limit generalizability to other regions like those in urban settings; the study was based on the HMN framework, which may have influenced the thematic focus and interpretation of findings. Despite these limitations, this study provides a valuable foundation for understanding system-level challenges and opportunities for strengthening the community healthcare data ecosystem in similar context.

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Notably, this study proposes the JTM-HMN Framework as an adopted and context-specific framework that incorporates realities from the community, emphasizing the use of technology, system and data integration and evaluation and monitoring. The study informs policy development, program design and implementation of technology-driven community healthcare interventions. Further research and framework piloting with a digital prototype of the proposed framework are recommended to evaluate its applicability across different settings.

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APPENDIX A: SAMPLE INTERVIEW GUIDE FOR VHTs

INTERVIEW GUIDE FOR VILLAGE HEALTH TEAM WORKERS - VHTs

Study Title: CONNECTING COMMUNITIES TO HEALTH SYSTEMS THROUGH VILLAGE HEALTH TEAMS: A TECHNOLOGY-ENABLED FRAMEWORK. A CASEOF BUGWERI, BULAMBULI, KIBUKU DISTRICTS

This survey is to help us learn more about your experiences, challenges and requirements asa Village Health Team (VHT) worker. Your participation is voluntary and your status in the VHTprogram will not be affected if you do not participate in the survey or not. The information you provide will be **STRICTLY CONFIDENTIAL**. The responses from this survey will be analyzedand only a summary will be reported. Results from this survey will only be used for research purposes to determine how the VHT program works, and the challenges and requirements of VHT workers in Eastern region of Uganda. You are encouraged to provide accurate and honest answer/responses to each of the question.

Thank you for your time and cooperation.

Date: _____

Title: _____

SECTION 1: Introductions and setting ground for free interaction
Exchange greetings; Interviewer introduces self to the participant and explain what the study is about; Affirm to the participant that information collected will be kept safe and confidential; Seek consent of the participant to take part in the interview and be recorded in theprocess.

    a) Please tell me about yourself and your involvement in the VHT program
    If not mentioned, probe for;
- Responsibilities
- Number of number of villages assigned to him/her

SECTION 2: Demographics

    a) Age group:

Below 20 ☐   20 – 29 ☐   30 – 39 ☐   40 – 49 ☐   50 – 59 ☐   60 &Above ☐

    b) Gender:

Male ☐   Female ☐

    c) Education Level

None ☐   Primary ☐   Secondary ☐   Tertiary ☐

    d) Duration as a VHT worker (In years)

Below 1 ☐   1 - 3 ☐   4 - 6 ☐   7 – 10 ☐   11 & Above ☐

SECTION 3: Health Information System Resources

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a) Please tell me about the health information system resources you use / interact with in your role as a VHT worker

If not mentioned, probe for;

- Personnel (Facility-based, Community-based)
- Information and Communication Technology (ICT) technologies used
- Other tools

SECTION 4: Data Sources

a) Please share with me the sources of data/information about the tasks you do? [Trainings, Policies, Regulations].

If not mentioned, probe for;

- Population - based sources
- Institution-based
- Research-based
- Other

SECTION 5: Data Management

a) Please share with me how data/information is managed during your activities?

If not mentioned, probe for;

- Collection
- Storage
- Processing
- Quality assurance and flow
- Compilation
- Analysis
- Integration

SECTION 6: Leadership & Governance

a) Please share with me the management processes and methods you have been exposed to during your time of service as a VHT worker?

If not mentioned, probe for;

- Recruitment of VHT workers
- Assessment (performance)
- Information and Communication (format and mediums used)

SECTION 7: Dissemination and use

a) Please share with me the dissemination processes and methods you have been exposed to during your time of service as a VHT worker?

If not mentioned, probe for;

- Reporting formats and regularity to the supervisor
- Communications from the supervisors
- Communication about the assessments and general VHT activities

SECTION 8: Coordinating mechanisms

a) Please share with me the coordinating mechanisms you use as a VHT worker?

If not mentioned, probe for;

- Financing (source, accountability)
- Logistic support (source of tools needed/used)
- Principles and Policies (Rules which govern their work)

SECTION 9: Connectivity

a) In your opinion, how does the VHT program affect the;
- Community's access to healthcare services? (positive and negative)
- Community's interaction with healthcare services/workers? (positive and negative)
- Quality of Interaction and healthcare services the community receives

SECTION 10: Challenges and Solutions

a) Please share with me the challenges in the VHT program, which are affecting the community's full benefit from the health system
b) Suggest ways in which this can be improved

SECTION 11: Conclusion

a) Ask if participant has any questions or something they need clarity on?
b) Ask about participant's willingness to be part of the next phase of this research
c) Appreciate the participant and close the Interview.