THE PREFERRED COMMUNICATION CHANNELS FOR SCIENCE-BASED HEALTH INNOVATIONS AMONG THE COMMUNITIES OF MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY AND RWENTONDO VILLAGE, UGANDA

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RS20M54/207

A DISSERTATION SUBMITTED TO THE SCHOOL OF JOURNALISM, MEDIA, AND COMMUNICATION IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF MASTER OF STRATEGIC COMMUNICATION OF UGANDA CHRISTIAN UNIVERSITY

January, 2024

UGANDA CHRISTIAN UNIVERSITY

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DECLARATION

I, Nalunga Reginah, affirm that I have submitted this dissertation as my work. As I clearly understand the implications related to plagiarism within Uganda Christian University policy, all authors upon whose work I have drawn on (through paraphrased statements or arguments or by direct quotes), have been duly acknowledged. These resources include publications in the form of scholarly textbooks, journals, research papers, and internet resources as shown in the in-text citations and on the reference list.

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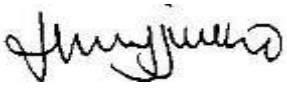
Signature:  **Date: March 18, 2024**

ACKNOWLEDGEMENTS

I give glory to the Almighty God, for granting me this excellent opportunity to further my studies. Through His mercy and a great hand, I have reached this far with my postgraduate academic journey.

My heartfelt appreciation goes to my academic supervisor, Professor Margaret Jjuuko, for her guidance, encouragement, and facilitation of reading materials that further enabled my progress in this academic journey.

I appreciate the Uganda Virus Institute Entomology Department headed by Dr Jonathan Kayondo for the financial support towards my education, research funds and commitment to review this work. Finally, I am grateful for my family, course mates and friends who have supported me throughout this academic journey.

LIST OF ACRONYMS

DRC	Democratic Republic of Congo
F	Female
FGDs	Focus Group Discussions
KIIs	Key Informant Interviews
LC	Local council
M	Male
MRI	Magnetic Resonance Imaging
MUST	Mbarara University of Science and Technology
TV	Television
UVRI	Uganda Virus Research Institute
UCU	Uganda Christian University
VHTs	Village Health Teams

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ABSTRACT

The dissemination of scientific research findings to non-scientists can be challenging, owing to several reasons, including scientific jargon, the framing approaches, and the use of irrelevant communication channels. Thus, there is a need to communicate science to the target audience through the preferred communication channels to support full acceptance of the issues being communicated. Informed by the 'participatory communication theory', this study sought to identify the preferred communication channels for science-based health innovations among the Mbarara University of Science and Technology (MUST) and Rwentondo communities. The study addresses several significant aspects, such as 1) stakeholders' preferred communication channels, 2) stakeholders' motivation for their preferences and 3) the communication challenges that stakeholders meet while seeking out and/or receiving information about science-based health innovations.

It was a case study designed study based on qualitative methods that included eight Key informants' interviews (KIIs) and 12 Focus Group Discussions (FGDs) among 76 participants, including MUST staff, students and Rwentondo village residents within the Mbarara district. Dedoose software was used to analyze and interpret data into themes (See Chapter 4 for a detailed explanation).

The study found that people living in rural areas prefer to get information about new health ideas from their local radio stations and village health teams. These sources are trusted and provide reliable health information to the community. Urban students

and elites prefer websites, conferences, and social media (X formerly Twitter), WhatsApp to access information about science-based health innovations. A preference for a specific communication channel, such as radio, is influenced by the affordability of costs to maintain the channel and credibility. Communication barriers to accessing science-based information include religious and cultural beliefs, gender inequality, the high cost of internet bundles, and illiteracy rates. The study emphasizes the importance of selecting a suitable communication channel to efficiently communicate science-based health innovations.

CHAPTER ONE

1.0 Introduction

This study views communication channel preference as a core value of the successful communication of science-based health innovations. It is premised on the thesis that for communication of science-based health innovations to be successful, there is a need to consider the kind of messages to be communicated, the forms to be used to convey the messages, and how the messages will be packaged, giving allowance for the target audience to provide feedback for the messages they receive (Khanna et al., 2022). As communication of science is crucial for society, there is a need to identify efficient and effective communication channels (Matta, 2020). In most scientific practices, data collection and analysis dominate, leaving little room for scientific communication (Moorhead et al., 2013; Putnick & Bornstein, 2016).

According to Moher (2019), the dissemination of information can only be successful when the audience (ordinary people/the public, scientists, and experts) can provide feedback on the message that has been disseminated. This also means that the identification of the preferred communication channels by the target audience is paramount for successful and effective communication to take place. If the scientific information is communicated through the favourite communication channels of the target audience, then they are likely to respond to the information packaged in the message, hence giving more impetus to the developers of health innovations that can be used to solve emerging health threats.

Strulak-Wójcikiewicz & Bohdan (2021), stresses that science-based health innovations are increasingly being applied to solve emerging health threats, such as those posed by malaria and COVID-19, among others. According to Happer & Philo (2013a), communication channels play a critical role in nurturing communal discourse that enables information exchange among the targeted audience. The channels can be mass, digital media or interpersonal. Various science-based innovative projects are affected by mistrust and rumours among the public, thus a need to consider the preferred communication channels. According to Machingaidze & Wiysonge (2021), insufficient stakeholder involvement in health interventions led to COVID-19 vaccine hesitancy in Uganda. Therefore, this study recognizes the significance of communication channel preference in the communication of science-based health innovations.

1.1 Background to the Study

Modern health organizations claim to be knowledge-intensive but often fail to foster intellectual and structural capital, leading to research-practice translation challenges (Meyer & Rowan 2020; Simon, 2023). Through science, technology and innovations, scientists engage in knowledge capacity building and societal development (Al-Bader et al., 2010). The rise of technology and the internet has made communication easier through various social media platforms such as X (formerly Twitter), Instagram, TikTok, WhatsApp among others. None the less, there are differing opinions on whether these platforms are beneficial in health communication (DeCamp

& Cunningham, 2013). In support of these platforms, Abdelhafiz et al. (2019) argued that such platforms enable professional networking between operational units and promoting the exchange of ideas and knowledge, leading to significant improvements in performance and fostering innovation (Ross et al., 2016a). Networking and interaction between individuals are essential for learning and professional development, as emphasized by modern views on learning (Abdelhafiz et al., 2019).

To effectively communicate scientific research to non-scientists, it is recommended to use emotional and interesting language, while also highlighting practical applications (Mohr et al., 2011). Strategic communication analyzes intentional relationships between organizations and the public (Holtzhausen & Zerfass, 2013). Hence, to communicate strategically, it is essential to have a well-defined plan with clearly established goals in advance.

Abraham (2020) contends that it is crucial to have a two-way interdisciplinary approach between scientists and society, to ensure that science meets the needs of humanity. Communities of practice and connective communities offer robust platforms for individuals to partake in shared learning experiences, exchange valuable knowledge, and new abilities (Ferguson, 2013). Communication mediates organizational connections and external focus (Dearing & Cox, 2018; Rogers, 1983). Individuals who possess a penchant for innovation, and are quick to adopt innovative technologies, products, and ideas, can significantly benefit from having communication channels outside their usual social and professional networks. Such individuals have the potential to access a wealth of latest information, which may not be easily available to others who lack such channels. These communication channels may include online forums,

industry events, or other networking opportunities that allow individuals to connect with others who share their interests, and exchange valuable insights and knowledge. By tapping into these resources, early adopters and innovators can stay ahead of the curve and gain a competitive edge in their respective fields (Ansari & Khan, 2020).

Most social networks within science-based healthcare organizations tend to be homophilous and have strict professional boundaries. As a result, they often exert control over scientific practices (Rolls et al., 2016). Communication is key because it enables the people to whom the message is being directed to understand what is being communicated to them. Over the years, mass and interpersonal communication channels have been fronted as avenues that play a critical role in nurturing communal discourse and enabling information exchange among the targeted audience (Happer & Philo,2013b). For instance, in several health-based innovations, such as the introduction of COVID-19 and Ebola vaccines in Uganda, numerous media platforms were used to disseminate information to the target audience.

Patel et al., (2022), argue that interpersonal communication channels, including body posture and facial expression, can be used to facilitate the exchange of ideas among scientists and the benefitting communities, thereby improving the sustainability of such science-based health innovations. According to Pla Ángel (2022), with the proliferation of Internet-enabled communication technologies, communicating scientific research has become easier, especially given the existence of audio-visual channels, some of which exist on social media. This argument, therefore, buttresses another, that interpersonal, mass, and digital media communication channels facilitate

the understanding and adoption of innovative ideas that are being communicated to the target audience (Greenhalgh et al., 2004a).

According to Holmes (2008), successful communication of various science-based campaigns and interventions has been enabled by channels of mass communication, such as posters, magazines, billboards, and handbills. In their study of some of the health campaigns that are considered to have been successful in HIV/AIDS health communication campaigns in Uganda, Kiwanuka-Tondo et al., (2013), argue that conducting effective and sustainable research correlates with the use of multiple communication channels. Their findings emphasize that the use of numerous communication channels enables organizational researchers to connect to segmented target audiences. Rogers (1983) advances the argument that the information source should be mindful of the use of communication channels that are accessible and appropriate to bridge the knowledge gap, thereby maximizing the rate of adoption of the innovation. Likewise, Ruppel & Burke (2014), maintain that interpersonal communication channels, such as face-to-face meetings, phone calls, texting, and others, facilitate the exchange of ideas between scientists and their target audience.

Likewise, in science-based health innovations that necessitate a change of attitude and behaviour, the suitability of the communication channel must be well-thought-out, to support full acceptance and buy-in of the idea being communicated.

1.2 Statement of the problem

The emerging technological field of science-based health innovations has provided a unique opportunity for addressing the health threats of the contemporary

era (Al-Bader et al., 2010). However, the information on science-based health innovations findings is scarce within the beneficiary communities who are also key potential technology users. According to Navarro & McKinnon (2020), the scarcity of accessible information leads to a disconnect between scientists and the beneficiary communities. This phenomenon breeds continued mistrust, falsehoods, misinformation spread and resistance to scientific research. Such a development raises concerns about which communication channels are preferred by the beneficiaries, who are among the key stakeholders. What motivates the stakeholders to adopt such communication channels? And what are the challenges faced while using such communication channels? These issues justify the need to carry out this study, to respond to such queries by establishing the preferred communication channels for communicating science-based health innovations.

1.3 General Objective of the Study

To identify the preferred communication channels for science-based health innovations among the communities of Mbarara University of Science and Technology and Rwentondo village.

1.3.1 Objectives of the Study

1. To establish the stakeholders' preferred communication channels while seeking and receiving information about science-based health innovations.

2. To examine the stakeholders' motivation for their preferences of the specific communication channels when receiving or seeking information about science-based health innovations.
3. To establish the communication challenges that stakeholders meet while seeking out and/or receiving information about science-based health innovations.

1.3.2 Research questions

1. What are the stakeholders' preferred communication channels while seeking and receiving information about science-based health innovations?
2. What factors motivate the stakeholders' preferences for the specific communication channels when seeking and receiving information about science-based health innovations?
3. What communication challenges do stakeholders meet while seeking and receiving information about science-based health innovations?

1.4 Scope of the Study

1.4.1 Geographical scope

This study was conducted in Uganda and focused on the Mbarara University of Science and Technology (for the urban setting) and the Rwentondo village, Kakoba Ward (for the rural setting) in Mbarara municipality. These study sites were preferred owing to their geographical location. Further, the MUST community is among the scientific communities that have been involved in the invention and consumption of an array of

science-based and health innovations, including, among others, the Covidex drug that assists in the treatment of the Coronavirus disease.

Mbarara is a city in southwestern Uganda, 266 km from the capital Kampala. It's the administrative capital of the region and borders the Ibanda, Kiruhura, Isingiro, Rwampara and Sheema districts.

1.4.2 Context scope

The study centred on the communication channels, with a particular emphasis on science-based health innovations. The investigation also analysed the preferred channels of communication for distinct groups of individuals impacted by these innovations. Science-based health innovation alludes to contemporary health technological breakthroughs, such as gene drive technologies, COVID-19 treatments and vaccines, advanced medical procedures, and medical devices.

1.5 Justification of the Study

Abraham (2020) emphasizes the significance of scientists sharing information about their inventions with all interested parties, particularly the communities that stand to benefit. Effective communication requires presenting information in a manner that is comprehensible to the community. Furthermore, selecting the appropriate communication channel to convey science-based health information is just as vital as the message itself.

Brossard et al., (2019), assert that effective communication of science-based health innovations is crucial for enhancing public understanding of health-related topics,

emerging research breakthroughs, and their societal implications. Nevertheless, end users' preferred communication channels are frequently neglected (Jardine et al., 2015). Consequently, this study sought to address this issue by exploring the perspectives of stakeholders on the most preferred communication channels for accessing or seeking information on science-based health innovations.

1.6 Significance of the Study

The study is expected to provide the necessary information to help the communication teams achieve the desired outcome. The communication teams will be able to exploit all the channels that segmented audiences consider desirable for communicating science-based health innovations, such as gene drive technologies, new drugs, and vaccines. The study findings are also expected to enable stakeholder engagement and the communication teams to improve their communication reach by prioritizing communication channels that suit the context of key stakeholders. By doing so, the researcher will also contribute to the existing literature on the preferred communication channels of science-based health innovations, as well as enable the communication teams in the innovation hubs to adopt the appropriate communication channels for science-based health innovations.

1.7 Theoretical framework

1.7.1 Participatory communication theory

The study is based on the participatory communication theory introduced by Paulo Freire (Freire, 1968/1970). The Freirean liberation theory focuses on people's involvement. This perspective is believed to have emanated from Freire's dialogical communication pedagogy (Kivikuru, 2020) as cited in (Freire, 1970; Freire et al., 2014). The emerging participatory development communication paradigm heavily emphasizes the importance of people's participation in the process of communication design, implementation, and evaluation. It stresses the freedom of expression and sharing of knowledge and information during development projects. Participatory communication is a valuable tool that people use in fostering social change in their society. As seen in the United Nations Food and Agriculture Organization (FAO) and World Bank models, understanding the right needs of society/people may not be achieved if the communication aspect is mishandled (Melkote & Steeves, 2015).

From the outset, participatory communication focused on dialogical communication (which is also the focus of this study), rather than linear communication (Melkote & Singhal, 2021). From the Freirean perspective, the role of communication cannot be underestimated, hence, the use of community media, group media, mass media, or interpersonal interactions is dominant (Usha Sundar Harris, 2020). For instance, community radio, television, print and face-to-face communication channels, have been argued to provide dialogic spaces (Kerrigan & Graham, 2010; Md. Salleh Hassan et al., 2010).

Improper stakeholder engagement has been a significant cause of failure for many development programs and projects to accomplish their objectives (Jjuuko, 2021). The community participation and beneficiaries of development in decision-making have turned down the idea of linear communication that was always promoted in the era of modernization. Jjuuko further contends that participation highlights reciprocal collaborations at all levels. In this approach, all concerned stakeholders vigorously take part in the actualization of development projects rather than the modernisation and dependency approaches where developing countries would just receive the ideas and messages from the developed countries.

With the participatory communication concept, society has been empowered to participate in its development, thereby improving sectors such as health, agriculture, politics, and education (Jjuuko, 2021). According to Disterheft et al., (2012), the approach of participatory development has been seen as a universal cure for the sustainability of projects in the community. The participatory communication concept is a good guide in this study since it recognizes the critical role of communal participation and dialogic communication. This communication theory recognizes that local people/primary consumers ought to be at the heart of development, thereby it is important to seek their views and involve them from the start of a development project.

This also makes a parallel meaning with Freire's (1970) assertion that dialogic communication unearths self-consciousness that ignites human beings in the ecosystem. Through the participatory communication approach, scientists can interact and bond with various stakeholder categories, such as beneficiary communities and policymakers (van Gemert-Pijnen et al., 2011). Collaboration is among the desired communication

objectives of innovation projects; thus, a participatory communication approach will link the stakeholder to the innovation project management. This alludes to Jjuuko's (2021) assertion that all participants in their defined capacities are incredibly significant in proving strategies as opposed to the ideas in the dominant paradigm, where the strategies are from the top to bottom.

Despite the strength of the participatory approach, there have been critiques, with some scholars pointing out some weaknesses, for instance, Yamane (2019), argues that the participatory approach prioritizes the locals over the public, which has also got its challenges. It detaches the locals from the broader economic and political structures, yet the ideal is that the locals ought to be part of the ecosystem which harbours the structure in terms of social, economic, and political aspects (Jjuuko, 2021).

1.8 Chapter Summary

In this chapter, I have presented the introduction to the study, background, problem statement, objectives, and research questions. Additionally, the purpose, significance, scope, assumptions, and theoretical framework have been presented and the key concepts used in the study, defined. In summary, this study seeks to describe and analyse the perspectives of stakeholders on the preferred channels of communicating science-based health innovations.

In the next chapter, I undertake a rigorous review of the relevant literature relating to the study objectives, including the stakeholder's preferred communication channels while seeking and receiving information about science-based health innovations. The

literature also includes the level of motivation for the preferences of the specific communication channels when receiving or seeking information about science-based health innovations and the communication challenges that stakeholders meet while seeking out and/or receiving information about science-based health innovations, thus giving the study the context, and exposing the existing gap it seeks to fill.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter examines the existing literature relating to the study on the preferred communication channels for science-based health innovations among the communities of Mbarara University of Science and Technology and Rwentondo village. Emphasis is placed on the communication process particularly the elements of successful communication, including the channel, the message, the barriers to communication, and the importance of feedback. This is in line with the specific study objectives, research questions and the variables outlined in the preceding chapter. In so doing, I establish the knowledge gaps. The review relied on the works of other scholars, especially those who have written on topics related to the current focus of the study or addressed similar issues about the variables of the study.

The chapter proceeds with an overview of the existing science-based innovations in developing contexts and Uganda, and how they are being communicated. This is followed by an analysis of what motivates stakeholders' channel preferences in the communication process, as well as the challenges underpinning the processes. In the process, the review sought to identify the existing gaps in the literature. As mentioned in the first chapter, this study was informed by the participatory communication theoretical approach, which illuminates the need for the participation of all stakeholders in development projects. Thus, this review is linked to the ideas of this theory.

2.1 An overview of science-based innovations in developing contexts.

In today's rapidly changing environment, innovation is widely recognized as a crucial source of competitive advantage (Karlilar et al., 2023). In the developing world, the advancement of biotechnology and other health technologies has led to significant improvements in health (Elbe & Buckland-Merrett, 2017; Singh & Trivedi, 2017). Investing significantly every year is necessary for developing and commercializing new drugs, vaccines, diagnostics, and other health technologies for developing parts of the world (Hoffman et al., 2010; Volkin et al., 2015; Lillehoj et al., 2018).

Innovation is a process, adopted, assimilated, and exploited in economic and social spheres (Harvie, 2013; Weiskopf, 2016). New products, services, and markets are developed, along with innovative production methods and management systems (Chisholm, 2013).

In contrast, innovation for diseases impacting developing nations has historically been inadequate, despite the significant health and economic burdens associated with these diseases, especially in sub-Saharan Africa (Zhou et al., 2020; Rydland et al., 2022). In Uganda, science-based health product innovation is in its initial stages (Kamunyori et al., 2010). It is worth noting that there has been a notable rise in the drugs and health innovations being created to address deadly diseases such as malaria, HIV/AIDS, and others. Various strategies have been developed to tackle these challenges, such as Advance Market Commitments, product development partnerships, patent pools, prizes to incentivize innovation, New Economic Partnership for African

Development (NEPAD) Consolidated Science and Technology Action Plan (Stevens et al., 2003; Nkengasong & Tessema, 2020).

Sub-Saharan countries, including Uganda, are still fighting against prevalent diseases such as malaria, HIV/AIDS, respiratory infections, and tuberculosis (World Health Organization, 2006). Consequently, the Target Malaria consortium aims to combat malaria in Sub-Saharan Africa through genetically modified mosquitoes (Hartley et al., 2021). Its goal is to make changes to the female Anopheles Gambiae mosquitoes, which are extensively spread and accountable for spreading malaria in Africa (Burt et al., 2018; Scudellari, 2019). In the future, malaria-endemic countries including Uganda, will use this completed and approved malaria vector control technology to suppress malaria vectors (Chemonges Wanyama et al., 2021).

2.2 The communication process

Communication is a process that involves the exchange of ideas, thoughts, feelings, and opinions between two or more individuals to create a shared understanding. In science, communication refers to the transmission of scientific knowledge from its sources to a diverse range of recipients (Kahan, 2015; Dudo et al., 2020). The communication of science-based health research between scientists and the public is crucial. The rise of digital media has allowed for direct Health Science Communication (Fontaine et al., 2018). At its best, communicating science-based health innovations can empower research and innovation to address global challenges (Carayannis & Campbell, 2021). In the realm of Health Science Communication, there

exist several stakeholders, including researchers, scientific societies, organizations, universities, government agencies, news and media outlets, and public information officers (Fischhoff, 2019).

Effective communication of health innovations requires assembling relevant scientists, translating knowledge into useful terms, establishing two-way communication channels, evaluating the process, and refining it as needed (Van Dam et al., 2020). Communication involves the sender transmitting ideas to the receiver through a channel, who then gives feedback. Effective communication occurs when the intended message is understood by the receiver.

The Process of Communication

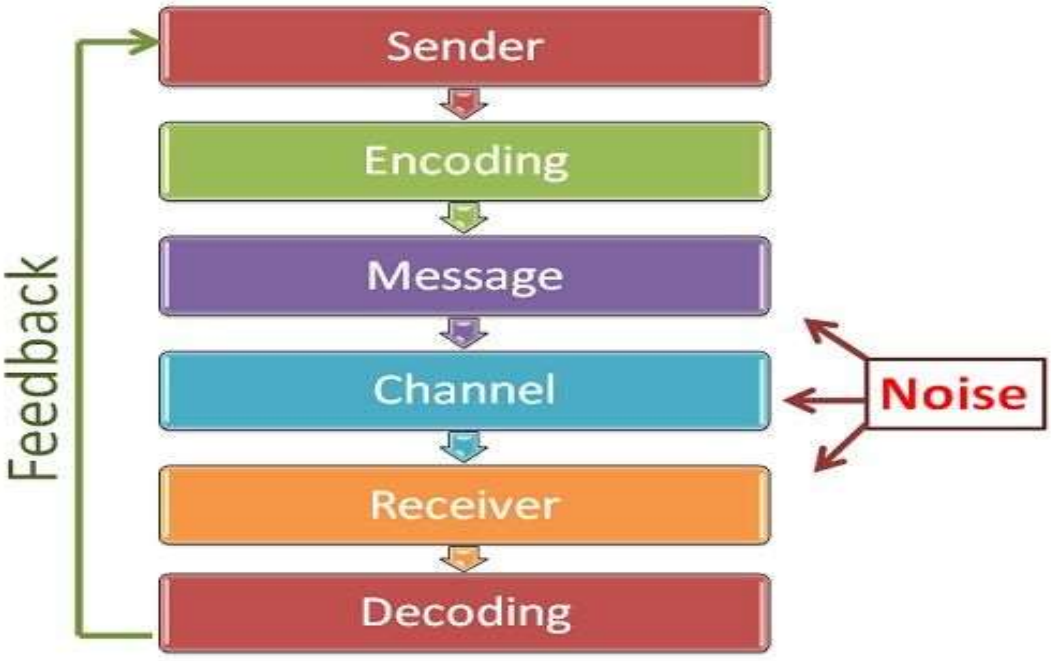

Figure 1: Diagram showing the communication process.

Source: (Akilandeswari et al.,2015)

As noted by Lunenburg (2010), the communication process involves a source who encodes a message, either verbally or non-verbally and sends it through a channel to the receiver. The receiver then decodes the message to facilitate understanding.

2.3 Approaches to communicating science-based innovations in developing contexts.

Social media and internet communication have joined traditional media in the last 20 years (Treem & Leonardi, 2016). According to Jensen (2011), the advent of popular social media platforms such as Facebook, X and WhatsApp, has ushered in a fresh chapter of digital communication. Pla Ángel (2022) highlights the constructive use of social media as a digital communication tool for public interaction and the gathering of valuable crowd-sourced information. Effective communication is crucial for stakeholder agreement and satisfaction. Insufficient communication and lack of stakeholder involvement are the primary causes of a project's unanticipated changes and uncontrolled change effects (Project Management Institute, 2013; Li et al., 2013; Fadil et al., 2016). Communication routines can reveal realistic stakeholder expectations (Butt et al., 2016).

2.4 The stakeholders' preferred communication channels while seeking and receiving information about science-based health innovations.

The significance of communication necessitates the success of development initiatives within organizations and other social systems. Without communication, the

understanding of the knowledge required to help the society transform may not be achieved (Melkote & Singhal, 2021). While communication is a learned skill, it takes effort to become a successful communicator. There are several communication channels including interpersonal, mass, and digital media platforms that an organization can use to pass on messages successfully.

Mesch (2009) states that a preferred communication channel requires a continuous exchange of information between sender and receiver. For that to happen, both communicators need to speak and listen prissily and persuasively and maintain eye contact. For the cases where it is a physical interaction, there's a need to respond correctly. It is important to note that successful communication comprises people listening, thereby creating a conducive environment for understanding and learning from each other's mindset. This alludes to the Aznam et al. (n.d.) study that claims that students prefer online mediums, particularly science websites, Wikipedia, and YouTube to gain knowledge about science-related topics. The stated communication channels enable the receiver and the sender to engage each other, thereby creating room for feedback.

In a public health emergency or disaster, reliable information sources can help people understand the situation, learn precautionary measures, and reduce anxiety (Soroya et al., 2021). Government and innovation hubs have used mass media, including print and broadcast, as well as social media platforms to convey precautionary measures, especially during disease outbreaks and pandemics like in the situation of Covid-19 (Chao et al., 2020).

As Akilandeswari et al., (2015) assert, a communication channel is significant in the success of the communication process and facilitates the audience's understanding of the message being conveyed. Relatedly, Bakkabulindi (2014) emphasizes that communication channels have a meaningful relationship with how successful the passing of messages about science-related research work can be. Furthermore, Slattery (2017) notes that mass communication mediums like newspapers, posters, magazines, billboards, handbills, radio, and digital media (mobile health Apps, podcasts, webinars, Facebook, WhatsApp) act as vehicles for exchanging new ideas, and opinions and the value of research knowledge as deployed in health innovations and other communication interventions.

According to Abroms and Maibach (2018), digital, mass media and interpersonal communication channels play a pivotal role in diffusing innovative ideas. As Rogers (1962/2003) emphasizes, communication channels create knowledge for persuading individuals to change their attitude towards innovation. Communication channels have distinct functions take for instance in Kenya, where Ochieng Jowi's (2018) findings on the study about the responsible fatherhood concept, showed that group discussions and interpersonal communication tools were the most desirable for reaching a wider audience regarding innovation. The study further states that the channel has wider coverage regarding participants' adoption process. It also reveals that although mass media are considered unproductive (apart from radio), they create innovation awareness for the targeted audience.

Furthermore, Sanina et al. (2017) study establishes that an organization should use several types of communication channels to reach different networks of stakeholders.

The paper further recommends that a combination of channels must be deployed to achieve positive communicative results. The paper's findings also maintain that different Russian businesses react in diverse ways to different communication channels. It establishes that telephone calls are the most preferred medium to facilitate communication between the government and all types of businesses. The findings conclude that it is the responsibility of the organization to understand and utilize the most suitable communication channels to maximize the communication results.

As Dimbleby and Burton (1992) note, a communication channel is significant if it is targeted towards fulfilling the target audience's needs and interests. Therefore, they propose that before the communicator conveys the message, they should have a clear knowledge of the needs and interests of the target audience because such a communication medium breeds a conducive environment for solving communal problems, such as health threats. While this offers promising prospects for scientific democratic engagement, it also presents novel obstacles. One such obstacle is the filter bubble phenomenon, where users are repeatedly exposed to content that corroborates their pre-existing beliefs. Individuals must acknowledge such challenges and equip themselves in this evolving communication terrain. Jensen (2011) further asserts that analytical skills are important to recognize fake news and navigate online successfully.

2.5 Motivations of stakeholders' channel preferences in the communication of science-based health innovations

ICT, such as telehealth, e-PROMs, and patient portals for EMRs can improve healthcare delivery (Mamlin & Tierney, 2016). Despite the potential of ICT to enhance communication in healthcare, the full benefits of technology have yet to be realized in practice (Ross et al., 2016b). Information and communication technologies are now ubiquitous in our daily lives. Patient portals can facilitate clinical history documentation, prescribing, and messaging between healthcare staff and patients (Ozavci et al., 2022). The process of stakeholder engagement, which involves incorporating their ideas and input, is crucial towards making informed and effective decisions (Pandi-Perumal et al., 2015). Access to and understanding of science-based health information significantly impact an individual's ability to obtain healthcare, leading to better health outcomes and overall quality of life (Chen et al., 2018).

Access to and the quality of information has a strong impact on the adoption of new health technologies and innovations and as well could be considered a barrier to adopting the innovations and technology (Davis et al., 2005). Therefore, health professionals develop interventions and campaigns to modify attitudes, increase service use, and promote health behaviours (Poínhos et al., 2017). Previous research has indicated that newsletters are a highly preferred method of communication due to their quick, convenient, and non-invasive nature (Dewald et al., 2018).

Studies on patient preferences for discharge communication have only evaluated the provision of discharge information at the time of discharge, such as written or verbal summaries provided by the healthcare provider (Newnham et al., 2017). Healthcare workers have identified several critical factors for technology adoption. These include ease of technology use, integration with workflow, evidence of positive impact on patient outcomes, ability to interact with others, data security, and resourcing (Brunelli et al., 2022).

With the emergence of the COVID-19 pandemic, telehealth remote monitoring and consultation are now commonplace (Smith et al., 2020). Similarly, technologies such as e-PROMs assist in systematically and comprehensively monitoring and improving symptoms, resulting in reduced data entry burden for clinicians (Newnham et al., 2017). Patient portals for EMRs can assist with clinical history documentation, clinician prescribing, and messaging between healthcare staff and patients (Alexander et al., 2021). Telemedicine interventions include remote consultations between the patient and healthcare professionals and such services are often provided alongside face-to-face communication (Labrique & Baker, 2018). They can be considered complementary to face-to-face healthcare services because this new form of care, it is believed, can improve patients' access to care, patient engagement, and treatment adherence (Granström et al., 2020).

2.6 Existing challenges in the communication of science-based health innovations

Various professional fields engage in the development, dissemination, and assessment of communications on behalf of organizations and causes. These disciplines include, but are not limited to, management, marketing, advertising, and public relations (Hallahan et al., 2017). It is important to point out that organizations make strategic decisions about the level and nature of resources they devote to such efforts, modulating their tone and the tenor of communication, depending on the audience they want to appeal to (Ceretti et al., 2022).

According to Kapoor et al. (2018), time-consuming communication channels, such as mailing letters, affect the communication process since even the feedback is delayed. Kapoor et al. (2018), therefore, propose that communicators need to adopt faster communication channels, such as electronic mail, rather than sending information via the post office, unless that is the most preferred channel for the kind of message being sent.

The use of inappropriate communication channels negatively affects the communication outcome. For instance, in the innovation process, if the communication channels are not fit for the targeted stakeholders, they may not be able to accept and actively participate in the generation of innovative ideas. It is for that reason that Roger Ali Bocus (1998) proposes that the communication source must consider using a channel that is accurate, precise, and understandable to the target audience. Interpersonal communication channels are also influential in creating mutual understanding among

members of the public with similar interests (Rogers,1983). For instance, communication on agricultural innovation, such as insecticide use in Brazil, penetrated the target audiences through social networks, such as person-person interactions (Sutcu & Özçatalbaş , 2014). Also, in 2020, the government of Uganda created awareness about the COVID-19 pandemic through television, newspapers, and radio talk shows, among others (Fergus et al., 2021).

Cultural barriers emanating from differences in nationalities, beliefs, races, and ethnicities are other factors that could impede successful communication. Roger Ali Bocus (1998) asserts that participants in the communication process are attached to different cultural backgrounds, many of which influence the meanings and interpretation of the message, thereby creating communication challenges. To Roger Ali Bocus (1998), it is just as important to recognize cultural differences and appreciate another person's culture, to be able to influence them.

Using previously published patient-professional communication frameworks developed for face-to-face consultations as a basis, Hong et al. (2020) developed a framework for digital tool-enabled patient-provider communication based on digital interventions. Although some aspects of face-to-face patient-professional communication can also be identified in digital health care, it is imperative to note that the patient-professional communication framework developed for face-to-face consultations is not always suitable for patient portals, which acts as a setback to the dissemination of patient-related results (Huhtakangas et al., 2021).

The major gap I found in the above studies is that barriers faced while seeking information on health-based innovations are explained in general terms. As such, I am

duty-bound to identify the challenges faced by the beneficiary communities, including the potential technology users, and any other target group of people affected when seeking information about science-based health innovations. The reviewed literature helped to guide the discussion of this study's findings.

2.7 The Participatory Communication Theory: A Review

The study is grounded on dialogical pedagogy, one of the core principles that compose the participatory communication theory (Freire, 1968/1970). There have been several studies done on the participatory communication concept. It has been used in various fields, such as health, education, and development in spreading ideas and enabling problem-solving by creating spaces for dialogue in society (Harris, 2021). It is built on the concept that people must acquire knowledge and develop their ability to be able to develop their communities (Freire, 1968/1970; Darder, 2024). At its core, participatory communication fosters dialogue, empowers people on the margins, gives voice to marginalised narratives, uses horizontal communication and engages in an action-reflection-action cycle (Tufte & Mefalopulos, 2009; Jjuuko, 2021; Louie et al., 2022). Therefore, the participatory theory challenges the dominant perspectives which does not consider diverse voices. For genuine empowerment to take place, the beneficiary communities must be directly involved in the dialogue about their development, thus dialogue is a significant aspect (Freire, 1968/1970).

Participatory media, such as community radio, music-photo-video sharing, video blogs, podcasts and face-to-face interactions provide an important platform for

communities to tell their stories and create awareness about issues from their perspective. For example, in Kwazulu-Natal, an investigation was done focusing about healthcare workers providing treatment, care and support to HIV-positive people (Vaage, 2010). The findings of the study revealed an elevated level of community participation and the use of volunteers and informal groups to provide treatment, care, and support to HIV- patients.

Also, the process of dialogue engages diverse networks in finding innovative solutions to old problems and enables transformative thinking through their active engagement in media production. Community participation in media production empowers ordinary people and creates new networks for power-sharing between disparate groups. For instance, in his doctoral dissertation, Harris's (2022) findings revealed that dialogue enables capacity building and knowledge creation on specific issues relevant to the community.

Mefalopulos (2008), argues that participatory communication has the potential to support "another development," capable of addressing specific needs and priorities relevant to people and, at the same time, assisting in their empowerment. For example, in South Africa, the United Nations, through the Food and Agriculture Organization (FAO), used the participatory communication theory to fight hunger in the country. The study concluded that a participatory communication approach has the potential to increase project sustainability and ensure genuine ownership by the project beneficiaries. Several studies have used the participatory communication theory to explain how development projects can be sustained and spread to others, with the view of bringing about change, for instance in a study carried out to examine the relevance

of participatory communication in the distribution of insecticide-treated nets in Luweero district, Uganda. As Nanfuma (2019) recommends, the stakeholder involvement aspect is a key strategy for promoting Insecticide-Treated Mosquito Nets (ITNs) communication in Uganda. The findings further propose a community media' model to allow for community access and participation, coupled with relevant information on malaria control to meet the audience's information needs to achieve the desired policy goals. Locating the participatory communication theory in my study, it provides insight into the impact of innovator's communication by using the communication channels that emphasize the participation of the beneficiary communities. This happens through dialogue the focus of this study. By applying participatory communication theory and utilizing preferred communication channels, scientists can foster more effective communication channels that prioritize the target audience's needs thus, promoting better health outcomes and empowerment.

2.7.1 A Critique of the Participatory Communication Theory

This section of the study on participatory communication theory reviews some of the critiques advanced by scholars against participatory theory and seeks to point to a direction of further enhancement of the current weaknesses identified in participatory studies. The field of participatory communication is quite new and impressive as the results of the theory are being applied to agriculture, education, health, and development (Harris, 2021). Although the participatory communication theory has made numerous significant contributions to our understanding of the role of

dialogue among different stakeholders, its potential would have been even greater had it not been characterised by its shortfalls.

As Servaes & Malikhao (2005) argue, Freire's theory of dialogical communication is based on group dialogue rather than such amplifying media as radio, print and television. Another challenge with the Freirean perspective is that it gives little attention to the language or form of communication, devoting most of his discussion to the intentions of communication actions. These arguments buttress Jjuuko's (2021) that the experiences that people have had in their lives can impact how they respond to social and ecological issues, such as problems related to climate change. Disseminated messages can easily get 'lost in translation' when findings are communicated through conventional research outputs alone, as stressed by Cornish and Dunn (2009). Lay people, also known as beneficiary communities, prefer accessing information through appropriate and accessible channels.

2.8 Chapter summary and conclusion

As described above, the literature shows that several communication channels have been used to communicate the innovations. However, it does not indicate the preferred communication channels specifically for science-based health innovations, which creates a communication gap. This is the gap that this study sought to fill as it adds to the existing literature by establishing the preferred communication channels for communicating science-based health innovations.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

In this chapter, I present the methodological approaches used in data collection that were deemed suitable for this study, as well as a justification for the choice of the methods used. The chapter further comprises the research design, the study population, the sample size, inclusion and exclusion criteria, the sampling techniques and procedure, the data collection methods, the reliability, and validity testing procedures, the data analysis procedure, the ethical consideration, and the challenges faced during data collection.

3.1 Research design

The study employed a case study design. According to Yin (2009), a case study is a research design that involves an in-depth analysis of a specific instance or phenomenon within its real-life context, often used when the relationships between the issue and its surrounding context are complex or ambiguous. This method allows for an exploration of the unique interactions, nuances, and dynamics that exist within a particular situation, providing valuable insights into the broader implications and potential solutions for similar occurrences. Therefore, the assumption was that this design would help me in getting a wealth of information about the topic. Punch and Oancea (2014) add that case studies are relevant as they bring to light the embedded knowledge that can be applied to practice routines. Based on a case study research

design, I used MUST and the Rwentondo communities as cases for case analysis and an in-depth understanding of stakeholders' perspectives on the preferred communication channels for receiving and seeking science-based information.

3.2 Location of the study

The areas of focus were the MUST community for the urban setting, being a science-based institution, the assumption was that they have engaged in innovations of which the results are communicated to the potential users, which include the university staff and students. MUST is in Mbarara City's south division, 266km away from Kampala, the capital city of Uganda along Kabale Road in the south-western region of Uganda. South division is one of the two divisions that make up Mbarara City. Mbarara city South Division was formed in 2020, comprising the former divisions of Kakoba, Nyamitanga, and Nyakayojo after Mbarara municipality was elevated to city status. Mbarara city's south division covers about 17.8km out of the 45.5 square kilometres of Mbarara.

Also, I conducted the study from Rwentondo village which is a rural setting within Ankole region in Mbarara county, Rwentondo parish in Mbarara district. It is situated approximately 10 km northwest of Mbarara town. It is accessible via murram roads from Mbarara town. The site accommodates so many of my primary and secondary respondents, including the village residents, religious leaders, and the chairperson LC1. This makes the two sites appropriate study area (s) to establish the preferred communication channels while seeking information on science-based health innovations.

3.3 Study population

Dawson (2002) notes that the population of the study includes the whole group from which the study conclusion is drawn. Mbarara is among the largest urban centres, with a population of 195,160 people (Uganda Bureau of Statistics, 2016). The population of the city has been steadily on the rise as individuals have been relocating to the urban area for a multitude of reasons. These include socio-economic factors such as the pursuit of formal and informal employment opportunities, engaging in business ventures, and seeking a preferred lifestyle. The study population comprised different subgroups of respondents, targeting key stakeholders that were 18 years and above (old enough) to understand and had knowledge about the concepts around the communication of science-based health innovations:

- Opinion leaders (e. g. religious leaders)
- Village residents (both men and women, literate and illiterate)
- Academic, administration and support staff (i.e., lecturers and support personnel)
- University students (both male and female)
- Chairperson LC1
- District health officer
- City communication officer

These selected respondents were significant items of study in both key informant interviews and FGDs that I conducted. The interviewees were important in establishing the perceptions of stakeholders towards the preferred

communication channels; 2) the motivations for the stakeholders' preference for specific communication channels; and 3) the communication challenges that stakeholders meet while seeking or receiving information about the science-based health innovations. The study identified the key areas and themes as listed above.

3.3.1 Sample size

As Sandelowski (1995) contends, the sample sizes in qualitative research should neither be too small to attain saturation nor too large to interfere with the data analysis process. The FGD sample size was 64 and the 12 participants in the Key Informant Interviews, were determined by the data saturation principle as summarized in the tables below (Glaser & Strauss, 2009; Omona, 2013; Hennink & Kaiser, 2022).

Table 1: Showing sample size selections for FGD respondents.

Category of the study sample	**Educational background**	**Gender**		**Maximum Sample sizes**	**Age**	**Sampling Technique (Non-random)**	**Interviews for data saturation point**
University students	Undergraduates	M	F	32	Below 25 years	Stratified purposive sampling	3-5
		8	8				
	Graduates	8	8		Above 25 years		
Village residents	Literates	8	8	32		Purposive sampling	4-8
	Illiterates	8	8				
Total				64			

Source: Researcher and informed by (Morgan, 1997; Glaser & Strauss, 2009; Omona,2013; Hennink & Kaiser, 2022).

3.3.2 Sampling technique and selection

Mugenda and Mugenda (2003), state that sampling is critical in research development. I used a non-probability purposive sampling technique to choose the specified study respondents (Kelly et al., 2010). The characteristics of respondents included educational background, gender, age, and years of experience. Therefore, this technique enabled me to collect valuable views to enrich the study. This being a qualitative study, purposive sampling was appropriate in the identification of the study respondents knowledgeable about science-based health innovations. Focus group discussions were conducted among purposefully selected university students, including those above 25 years, undergraduates, and postgraduates with both genders from four faculties (Faculty of Science, Faculty of Computing and Informatics, Faculty of Applied Sciences and Technology and Faculty of Business and Management Sciences). Like students, village residents (men, women literates, and illiterates) were purposefully selected to participate in FGDs. These subgroups communicate with different skills based on the dimensions such as understanding, listening, and speaking abilities.

Key informant interviews were conducted to purposefully select university staff based on their years of experience as a profound factor, considering a range of above five years of service. These were grouped into strata, inclusive of both male and female professors, academic, administration and support staff. Community leaders were clustered into religious affiliations, i.e., Muslims and Christians, local council chairpersons, district health and city communication officers were also key informants. The respondents were deemed significant because their opinions and behaviors are highly respected in the community.

Table 2: The sample size selections of respondents for key informant interviews

Category of the study sample	Years of experience	Gender		Maximum Sample sizes	Sampling Technique (Non-random)	Interviews for data saturation point
Academic, administration and supporting staff.		M	F	7	Stratified purposive sampling	7-10
		2	2			
	Above 5 years	2	1			
Community leaders	Religious leaders	1	1	5	Purposive sampling	4-8
	District Health Officer	1				
	City communication officer	1				
	LC1	1				
Total				12		

Source: Researcher and informed by (Glaser & Strauss, 2009; Omona, 2013; Hennink & Kaiser, 2022).

3.4 Inclusion and exclusion criteria

3.4.1 Inclusion criteria

The main involvement yardstick for selecting the above interviewees was being affiliated with MUST or being a resident of Rwentondo village in the Mbarara district and willing to participate in the study.

3.4.2 Exclusion criteria

The study excluded respondents who were not residents of Rwentondo or the MUST communities or who were unwilling to participate after the study agenda was clearly explained.

3.5 Data collection method and instrument

This study relied on the qualitative research methods, mainly in-depth interviews and FGDs. The need to get personal insights, views, beliefs, experiences, and opinions makes the qualitative approach the appropriate method (Punch, 2013). Qualitative research involves non-statistical findings, not arrived at by quantification (Corbin & Strauss,1990). I conducted stakeholder interviews to determine preferred communication channels for science-based health innovations. Based on this approach, I used the interview guide for the eight (8) FGDs and 12 in-depth interviews to collect first-hand data from respondents about the study objectives and research questions. For the case of FGDs women and men were engaged independently whereas in four separate groups, 8 women and men were involved in one FGD respectively. This was done to avoid gender dynamics that may arise during the discussions and to have women express themselves which might not be realized if men and women were put in one FGD group. Furthermore, two FGDs were carried out amongst the undergraduate students of 8 members per group were carried however these were mixed boys and girls. Concerning that, the researcher further carried out two FGDs among the postgraduate students with each group consisting of 8 members and these were not separated as well. Therefore, a total of 64 members were involved in the FGDs.

A total of 12 key informants were interviewed in this study as shown. Amongst the respondents considered in this study included the academic staff with four informants of which 2 were male and two females, and 3 supporting staff inclusive of 2 males and 1 female. More of the key informants included one religious' leader (1 male and the

other one female), a city communication officer (1), a district health officer (1) and one chairperson LC1.

The data collection tools (FGD and in-depth interview guides) included the social demographic characteristics made up of age, gender, level of education and interconnected questions about the research problem that is under investigation. The research instruments also comprised open-ended questions that enabled study respondents to fill in their experiences. This enabled me to capture varying perspectives about the preferred communication channels for receiving and seeking information about science-based health innovations.

3.6 Sources of data

Data was collected from primary and secondary sources.

3.6.1 Primary sources

I gathered primary data from the field using in-depth interviews and focus group discussions to gather information on the preferred communication channels to communicate science-based health innovations.

3.6.2 Secondary data sources

The literature review was the main source of secondary data. I reviewed literature from journal articles, reports, presentations, magazines, textbooks, and websites including published and a limited number of unpublished sources. For this study, I sourced additional information from the national census data, and the Ministry of Science and Technology website (published reports) to identify the documented technology and innovation trends.

3.6.3 Data collection procedures

After getting the research approval from the Uganda Christian University Research Ethics Committee, I pre-tested the specified data collection tools, I carried out a pilot study of the actual study area, sought permission from relevant authorities that is (Mbarara City Town Clerk and Office of the dean of students (MUST), and, thereafter, trained research assistants on how to collect the data. We then administered the stated research tools. We conducted in-depth interviews until we reached the saturation point when we felt we could not get any new information regarding the study from the respondents. After the data collection process, the study findings have informed this dissertation that I have submitted to the School of Journalism, Media, and Communication in partial fulfilment of the requirements for the award of Master of Arts in Strategic Communication. I also intend to write and publish a manuscript in a reputable communication journal, and the study findings will be presented to my sponsor Target Malaria Uganda, Uganda Virus Research Institute.

3.7 Data processing and analysis

The data processing and analysis process began after collecting raw data. According to Bryman (2016); Clark et al. (2021), the process ends at the step of interpreting and processing data. I used the Dedoose qualitative software to code and thematically analyze the respondents' views. Utilizing relevant codes to identify themes, qualitative studies can greatly benefit from this approach (Jones et al., 2023). Dedoose is a web-based research tool that offers a unique feature of accessibility from any device with a

web browser. This feature makes it an ideal choice for team-based research projects where the researchers are in different geographical locations. By using Dedoose, teams can collaborate seamlessly and work together on research projects in real-time, without the need for any additional software or hardware (Hart & Achterman, 2017). The software was used for transcribing and analyzing interviews. I noted the beliefs, opinions, ideas, observations, statements, and attitudes expressed for each interview topic during the analysis. The objectives were identified using a code book to arrange the statements. The statements were then categorized to develop new themes based on the results and subsequent analyses. Finally, responses from different participants were compared to determine their relationship with the study objectives. I identified the most frequent responses associated with multiple codes to interpret the data. The findings of the study were presented in Chapter Five in a narrative form, and the most important quotes were used to illustrate the key results. Additionally, relevant literature was reviewed and used to discuss the study's findings. The above aligns with Jankowski and Jensen's (2002) assertion emphasizing the crucial role of researchers in analyzing and interpreting data. The researcher's contribution is critical in ensuring that the data is accurately analyzed and interpreted and that the conclusions drawn are reliable and valid. This underscores the importance of having skilled and knowledgeable researchers who can carry out this vital task with precision and accuracy.

3.8 Reliability and validity

According to Golafshani (2003), reliability is a degree of consistency of research instruments in producing reliable outcomes. On the other hand, validity can be looked at as issues to do with the integrity of the conclusions that are generated by a piece of research (Bryman, 2016). To ensure that the interview guide is dependable, I made a conscious effort to steer clear of technical jargon and instead opted for language that was easily comprehensible to all participants. This was done to ensure that the research questions were communicated, and participants were able to provide answers that were accurate and reflective of their experiences. To ensure the accuracy and reliability of the research findings, a pre-testing phase was carried out. The primary objective of this phase was to evaluate whether the questions designed for the research study were effective in eliciting meaningful responses from the participants. Additionally, the pre-testing phase aimed to determine whether the questions had any inherent biases that could potentially affect the outcome of the research. Through this process, the research team was able to fine-tune the questions and ensure that they were clear, concise, and unbiased.

3.9 Ethical consideration

First, I took the research proposal to Uganda Christian University's Research Ethics Committee (REC) for approval before conducting the study. Consent of respondents was sought beforehand, and participation in the study was voluntary. Confidentiality of information that was collected was respected and the identity of the interviewees has

not been revealed in this report, rather, labels have been used to distinguish the responses of interviewees.

3.10 Methodological challenges and delimitations of the study

Having commercialized most of the research studies by different research organizations and individuals, the community often expects money or any other financial or material gain for their participation. I overcame this by building rapport and giving the clear benefits of the study to their community, which they based on to give consent and willingly participated in the study.

Additionally, I informed the participants that the study was solely for academic purposes to encourage volunteering. Those who felt unable to participate were excluded.

3.11 Summary

This chapter has created an understanding of the methodological concerns of the study. The study was largely qualitative, relying on FGDs and KIIs. I used a case study research design. In this section, I have discussed the population of the study, sample size, sampling method, inclusion and exclusion criteria, data collection instruments, data analysis techniques, and methodological challenges.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, AND INTERPRETATION OF FINDINGS

4.0 Introduction

This study set out to examine the preferred communication channels for science-based health innovations among the communities of Mbarara University of Science and Technology and Rwentondo village. In this chapter, I will analyze and interpret the study findings in line with the objectives stated in the first chapter and informed by the theoretical considerations and literature review in the second chapter. The findings presented here are from the KIIs, FGDs and documentary reviews. The following respondents participated in the in-depth interviews from which the conclusions are presented, illustrated, and supported with quotations.

- Opinion leaders (eg., religious leaders and LC1 chairperson, Rwentondo village)
- Village residents (both men and women, literate and illiterate)
- Academic, administration and support staff (i.e., Lecturers and supporting personnel)
- The director of the CamTech innovation hub, Mbarara University of Science and Technology
- The innovator, innovation village, Mbarara University of Science and Technology
- The city communications officer, Mbarara city council
- District health officer

- University students (both male and female)

Since the study used a qualitative methodology, the findings are presented in the form of narrations, instead of statistics. The findings are presented based on the developed themes. The following are the major themes derived from the findings:

1) The science-based health innovations
2) Preferred communication channels
3) Motivations for the use of specific communication channels
4) Impact of science-based innovations on the community
5) Barriers to the use of specific preferred communication channels
6) Means to effective communication of science-based health innovations.

4.1 The science-based health innovations identified.

In this section, I present a summary of the findings concerning the communication channels preferred while communicating science-based health innovations. These innovations, identified during KIIs and FGDs, are discussed under this theme. They include drugs, applications, systems, equipment and so much more, as discussed below.

Covidex supportive drug

This was one of the most known innovations among the people interviewed during the individual interviews and the focus group discussions. The covidex was an innovation by Prof. Ogwang Patrick, from the Department of Pharmacy at Mbarara University of Science and Technology. The supportive drug was famous at the height of the COVID-19 pandemic when most people used it for treatment. Due to its high demand and the

timeliness of its production, most respondents knew about Covidex and testified to having used it. From one of the FGDs, one of the respondents asserted:

> Covidex is an innovation from Mbarara University of Science and Technology, we are known as an excellent university because of this breakthrough innovation; people used this local medicinal herb and it worked. (FGD-M1, Student, Mbarara University, 2023)

This innovation was further acknowledged during the individual interview with one of the staff working with an innovation hub at the Mbarara University of Science and Technology who equally pointed out Covidex as the innovation that was timely and important as it helped to save lives during the COVID-19 health crisis. From the key informant interviews, one female responded emphasized:

> It was timely; there was a health crisis where people could give a try on anything that could save a life; Covidex was very crucial during the COVID-19 health crisis, and it was the best innovation. (KII-F7, Mbarara University, 2023)

The dominance of Covidex as a health innovation is both a factor of the time it was produced and the relief it gave to people who had contracted the coronavirus.

Kanga care jacket

This is a carrier of premature babies or neonates; it stores oxygen in case of power shortages. It keeps a continuous oxygen supply to the neonates and requires warmth for 4 hours, which is enough for a plan to restore power in case of outages. This equipment is charged and can be used in case of emergencies. During FDGs, students who participated in this innovation narrated thus:

> We used to lose neonates, especially during power outages due to lack of oxygen and warmth; we had to devise a solution to this problem and that's how we came up with this Kanga care innovation… (FGD-M5, Mbarara University, 2023)

Another FGD respondent added that,

> Neonatal sepsis is high among premature babies, especially when there is not enough material to use when handling them in hospitals. Because neonates are dependent on oxygen and require frequent monitoring, there is a need for a frequent supply of medical equipment, which is not the case, especially in public hospitals. Therefore, kanga care as an innovation ensures a continuous supply. (FGD-M2, Mbarara University, 2023)

The kanga care jacket is an innovation from the students and the innovation village at Mbarara University of Science and Technology and has been tested and used in public hospitals in sub-Saharan Africa. This shows the extent to which science-based health innovations are taking shape in tertiary institutions and innovation hubs in Uganda.

Magnetic resonance imaging (MRI)

This helps to detect veins in neonates, as well as early stroke detection. Because it proves hard for most health workers to identify veins in neonates due to their young and small veins, the MRI became important as it eases work, especially when administering drugs to the premature. During an interview with a health worker who is also a student, revealed:

> Hmmm, you don't know what it takes to get drugs into the veins of the neonates, it is very hard to identify and get the right spot, the development of MRI was very important, it makes work easier, and more lives are saved... (FGD-M4, Mbarara University, 2023)

The development of MRI is a testament to the strides made in the world of health-based innovations, with such innovations making a tremendous contribution to the development of the health sector.

Med-care application

This application is for receiving and providing health information from health workers. It also helps in ordering drugs based on the description of how you feel and describing the signs and symptoms of a certain illness; the application is also used to order medicine and get it delivered to your doorstep. During the FDGs, one of the female respondents gave an experience with the use of this application:

> I don't have to go to the pharmacies anymore, I use the med-care app to order any drugs I want, and it's delivered to me; it has made life easier… (FGD-F3, Rwentondo Village, 2023)

This quote depicts another major issue of self-medication finds the med-care app helpful. She no longer must worry about going to the pharmacy since she could now easily order any medication she needs through the app. Also, with the added convenience of having her medication delivered straight to her doorstep, it's no wonder why the app has made such a positive impact on her life.

Ebola and Covid-19 vaccines

Vaccines have been introduced as a long-term solution to several contagious diseases and infections. However, the innovation of the Ebola and COVID-19 vaccines has had a huge positive impact on the health sector and the population. During a focus group discussion, one of the male respondents narrated:

> I couldn't believe we would ever move freely, it seemed too far from reach, the innovation of vaccines has been so important to us, it's the best innovation. (FGD-M4, Rwentondo village, 2023)

As a science-based health innovation, most of the people in the community acknowledge the importance of vaccines, especially the Covid-19 vaccine as it restored hope and life worldwide. During the Focus group discussion, one male respondent explained,

> I also heard that the Ebola vaccine was introduced as well, the referral hospital had patients who contracted Ebola from Kasese, and ever since the vaccination of people against Ebola in Democratic Republic of Congo (DRC), the disease has disappeared**. (**FGD-M5, Rwentondo village, 2023)

From this quote, it is worth noting that the successful implementation of Ebola vaccinations among the population of the DRC has resulted in the complete disappearance of the disease. This serves as a testament to the effectiveness of vaccination innovations in combatting infectious diseases.

Development of locally made sanitisers.

During a focus group discussion, participants reported the making of sanitisers from local gin (waragi) mixed with liquid soap as it helped to kill germs. This was commonly used at the height of the Covid-19 crisis as sanitising and the washing of hands were among the measures emphasised to reduce the risks of getting infected with the Coronavirus disease and other related germs. Members of the community reported

having participated in the making of hand sanitisers, especially for commercial purposes.

From the list of innovations presented by the respondents, the public is aware of the science-based health innovations. The next question, then, would be how they get to know such innovations.

4.1.1 Communication channels used to seek science-based health innovations.

Under this theme, I present the channels mostly preferred in the communication of science-based health innovations. Trends in technology advancements have affected the communication process and the channels to be used for passing on messages to the intended group of people. The results from the FGDs and individual interviews indicate a transition from the traditional methods of communication to the modern ones while communicating science-based health innovations. Some of those identified include websites and social media channels like X (formerly Twitter), Facebook and much more.

Interpersonal communication through Village Health Teams (VHTs)

Village Health Teams (VHTs) have been used as far back as the Second World War when they cared for wounded soldiers. Since then, this communication channel has been adopted by many countries worldwide, including Uganda. VHTs play a crucial role in relaying health-related information in rural areas, delivering medical equipment such as drugs, and enforcing government policies aimed at reducing infections. Informants in the FGD emphasised that the VHTs played a crucial role in informing people in their villages of the need and the importance of acquiring a COVID-19 vaccine:

> VHTs know us by name and household; they always inform us about anything new from the Ministry of Health, and the government; we get to know new family planning methods available, disease outbreaks and the immunisation schedule through them, they are our informants. (FGD-F12, Rwentondo village, 2023)

Another FGD participant reported a similar relevancy of VHTs in relation to the communication of science-based health innovations: “They get to know us because they engage in meetings. I can’t be worried since I know the VHT will inform me of any new health developments…” (FGD-F8, Rwentondo village, 2023).

The above quotes demonstrate that Village Health Teams (VHTs) serve as valuable sources of information for their communities, providing updates on health innovations, government communications, and any news from the Ministry of Health.

Annual research dissemination conferences

These are occasions where the innovators display their innovations to the public and other key stakeholders. This is done once annually at Mbarara University of Science and Technology, where students and the staff involved in innovations are given a platform to communicate their innovations to the public. This has enabled students and the entire community to learn about the innovations and how they can be used to foster social change in the community.

Figure 2: A banner advertising a health & research dissemination workshop at Mbarara University of Science and Technology.

During a KII with the head of the department of the co-creation lab at Mbarara University of Science and Technology about the workshop, she explained:

> It is an open function where those interested in attending and showcasing their innovations apply and are given a platform, community members are always invited, students and other stakeholders… **(**KII-F12**,** Mbarara University, 2023)

This quote highlights that everyone is welcome, including community members, students, and other stakeholders apply to showcase your innovations at an open function.

Social media use

The use of social media platforms was found to be the leading platform used to seek science-based health innovation. However, it was found to be more common among the youth and the elites. The preferable social media channels include X (formerly Twitter), WhatsApp, TikTok, and Facebook. From the focus group discussions that were conducted, social media was the most used platform, where the stakeholders get to know about science-based health innovations. They explained that the platforms are easy to use and accessible. During focus group discussions, one respondent shared:

> We get most of the news on social media, which we access using our phones. We used to get all the information about the COVID-19 pandemic and vaccine campaign via Twitter. It's convenient for young people like us. (FGD-M13, Rwentondo Village, 2023)

From the KIIs, the head of the department of one of the innovation hubs — CamTech — at Mbarara University further acknowledged the role of social media platforms in advertising new science innovations and getting feedback from the online community and other concerned stakeholders. She explained,

> We have an X (formerly Twitter) handle as an innovation hub, we use it to inform people about innovations and advancements. Also, through it, we get feedback; I may say it's informative and interactive. (KII-F5, Mbarara University, 2023)

Use of television

From both FGDs and in-depth interviews, respondents agreed that television has played a key role in informing people about novel health innovations. They reported

that such innovations are broadcast through news bulletins and other organised television programmes such as Sayansi ne tekinologiya. During a focus group discussion, one of the respondents reported,

> There is a programme on Bukedde TV known as 'Sayansi ne Tekinologiya', it shows the new scientific innovations, and that is where we get to know about them. (FGD-M12, Rwentondo village, 2023)

Radio as a communication channel

Radio was also highlighted as a communication channel through which the stakeholders get to know about science-based health innovations. One of FGD participant explained.

> Sometimes we are hosted on Radio West here in Mbarara on a youth program called 'Omunyeeto'. It's where we get to talk about the innovations as students, and, I guess, it's how the community gets to know about them. (FGD-M11, Mbarara University, 2023)

The respondent further expounded that the *Omunyeeto* programme is meant for the youth to discuss their life and the means they use for developing their communities. It's a platform for the youth voice and it's from this programme that people get to know about science-based innovations.

Websites

This was more common with the literate people who knew how to use browsers and the internet to seek and get to know about science-based health innovations. This channel was more common with students and researchers who sought literature from

such sources. Because most of the students must have research projects at the end of their academic years at the university or other institutions, they seek information to inform their research. It is through this channel that they get to know about new research projects and other science-based innovations in the field of health.

Health camps and exhibitions

From the FGDs, respondents revealed that from such exhibitions, people get to know about innovations in the field of health. This arrangement involves all the innovators showcasing their new technology, as well as innovations they have come up with and how they will impact the community. It's from such events that different stakeholders get to know about such innovations. She explained:

> At the faculty of engineering, we hold exhibitions monthly; it is from these exhibitions that other people get to know about our innovations, and it's also another way of getting funding grants. (FGD-F10, Mbarara University, 2023)

Figure 3: Students of Mbarara University of Science and Technology demonstrating how their innovation works during an innovation week.

4.2 Why stakeholders prefer certain communication channels over others.

Under this theme, I present the reasons or motivations for the choice of channels to communicate science-based health innovation to the intended group of people. The interviews conducted identified the motivations for the use of the specific communication channels, which included the age group of the recipients, place of

residence — whether remote or urban, the kind of message you intend to communicate and much more. One of the female FGD respondents revealed,

> Radio is cheap, and I can move with it anywhere; radios are even on mobile phones and during the Covid-19 period, we used them to get information about vaccinations and other government programmes. (FGD-F32, Rwentondo village, 2023)

Some communication channels, for example, radios, are cheap. Radio was reported to be the favourite communication channel, especially among the population in Rwentondo village. From the focus group discussions conducted in Rwentondo, participants mentioned radio as one of their most preferred communication channels for receiving science-based health information.

Furthermore, the research findings from the FGDs established that Village Health Teams (VHTs) as a communication channel, were preferred to televisions in rural areas. Respondents agreed that VHTs were their main informants about any latest information, be it concerning health programmes or other government initiatives. Because the VHTs are within their proximity and living in the same community, the local people trust them more as their reliable source of information. During the FGDs, a female respondent explained,

> VHTs know us by household, it is easier and cheaper to reach out to them in case there is any information I need, they are the ones who inform us about the new and effective family planning methods, as well as government health-related programmes. (FGD-F17, Rwentondo village, 2023)

From this narrative, it is evident that the local community highly values the Village Health Teams (VHTs) as their primary source of information on science-based health innovations. Another male FGD participant emphasised,

> Village Health Teams (VHTs) provide us with explanations, immediate feedback on innovations, and information about government health programs. We trust them and they are always available." (FGD-M10, Rwentondo village, 2023)

Also, respondents reasoned that VHTs provide them with explanations, immediate feedback on innovations, and information about government health programs and most importantly, they trust them because they are always available.

Furthermore, the study findings explicated that social media was preferred to seek information about science-based health innovation. The social media platforms commonly used included X (formerly Twitter), WhatsApp, Facebook and TikTok. The young people and the elites universally used the mentioned communication channels. The digital media platforms were highly preferred because they reach a bigger group of people at the same time and offer opportunities for timely feedback. One of the FGD female participant revealed,

> We have an X (formerly Twitter) handle as engineering students, where we post our innovations and then engage different people in discussions so we can get timely feedback. Also, from the posts, people get to know about our products and through that, we can get sponsors. (FGD-F40, Mbarara University, 2023)

The above quote emphasizes the significance of digital communication specifically social media as a preferred communication channel for science-based health innovations, given its quick accessibility.

Credibility of the communication channel

Based on the results of data analysis, it has been found that the credibility of the communication channel plays a significant role in determining the credibility of the information being disseminated and the category of people who seek information from it. Professionals tend to take information from credible sources more seriously and act accordingly. Communication channels, such as mail, websites, and research dissemination conferences are preferred by most people in this category.

Target group you intend to communicate to

During an interview with the Mbarara City Communications Officer, she noted that people in the community have diverse channels that they use to obtain information about scientific innovations, such as radios, as quoted below:

> If we intend to communicate with the youth, we identify their favourite radio stations or other channels they use most, and we do the same to the older people. This means that we shall have to always use our favourite stations depending on the age groups of people we intend to deliver our communication to. (KII-F10, Mbarara city, 2023)

It has been discovered that various groups of people in a community have their preferred communication channels. Thus, senders of information must identify the preferred channel for the intended target population.

4.2.1 Impact of science-based innovations on the community

Lifestyle changes because of communication of science-based health innovations

Results from the data analysed indicate changes in lifestyle and ways of living because of communication of health innovations. There has been a reduction in the death of new-borns at the neonatal clinic as mothers know where to find the kanga care equipment used to warm neonates born prematurely. From the focus group discussion with the innovators at Mbarara University of Science and Technology, the Kanga care jacket is being used in sub-Saharan Africa and at different referral hospitals. One of the male respondents revealed,

> We aim to reduce the death of premature babies; our kit has been tested and it is effective. We are registering a reduction in the death rates of neonates. (FGD-M30, Mbarara University, 2023)

The number of antimicrobial resistance cases has decreased, and digital health systems allow patients to describe their symptoms and medical history, without having to physically visit a health worker. This system has been widely adopted in many urban areas, making it easier for patients to receive the necessary medical attention.

Furthermore, from the focus group discussions, it was reported that there has been adherence to government health programmes like vaccinations, and disease prevention due to communications of science-based health innovation. This was common at the height of the Covid-19 pandemic, where different communication channels were used to reach out to people about the infections and how they could be prevented. Such

communications changed the perception of people towards their way of living, and association. This means communication of health-based innovation and informing the population is key as it changes people's lifestyles.

Nutrition advocacy and changes in ways of feeding

During the FGDs with students at the Mbarara University of Science and Technology, it was reported that they have engaged in the manufacture of herbal medicine and the use of local foods to prevent or treat non-communicable diseases. From the FGDs, one male respondent reported,

> We receive feedback about our research on the use of local foods to manage non-communicable diseases; people have adopted the foods and taken the advice we give them, and when people change in their lifestyles, it means our communication has an impact. We are doing more studies about local food and nutrition changes. (FGD-M29, Mbarara University, 2023)

People are increasingly turning to medicinal herbs and utilizing food as a means of treating ailments. By incorporating these practices into their lives, individuals hope to achieve optimal health and well-being.

Throughout my analysis of the theme, I have presented the positive effects of health-based innovations on people's behaviour. The research findings, obtained through the KIIs and the FGDs, demonstrate that people have made changes in their eating habits, have been able to access health care services on time using mobile applications, and more.

4.3 Barriers to seeking/receiving information about science-based health innovations.

Some factors could affect the effective communication of science-based health innovations. These include semantic, cultural, psychological, environmental, and physical barriers. During the interviews, many challenges were identified, which the respondents said affected them while seeking information about science-based health innovations. However, the barriers identified varied, based on the community settings — the urban or rural areas, as well as the professions or careers.

Religious beliefs

It is a significant challenge for science-based health innovation communications to persuade people who do not believe in science. I discovered that some individuals prefer praying to their gods as a cure rather than relying on scientific methods to prevent and treat diseases. In addition, some people associate scientific discoveries with Satan, which results in a low uptake of scientific knowledge and innovation, especially among people in rural areas and those who are illiterate. One male key informant said,

> They pray than get immunised, this was common during the COVID-19 vaccination exercise, where people shunned the exercise. It required a lot of convincing and the use of law enforcement personnel, many related vaccines to Satan and the Illuminati. (KII-M5, Mbarara City, 2023)

From this quote, many people chose to pray instead of getting immunised against Coronavirus. This response revealed that it was a common occurrence where people

avoided taking the vaccine as many individuals associated the vaccines with Satan and the Illuminati.

Illiteracy

This was also one of the identified barriers to seeking information about science-based health innovation. There are still many people who are unable to read and write yet most of the science communications are in English. This has remained a barrier to message interpretation and comprehension, hence affecting the uptake of innovations. During an interview with one of the key informants, it was revealed that illiteracy is a barrier to successful communication as quoted below. One of the respondents in a KII explained,

> Even when the information is written in the local language, people will still fail to read and understand the message, which frustrates our efforts to communicate and seek health-based innovations. Even when there is a mass vaccination exercise, not many turn up, yet we put the communication over different media platforms. (KII-F10, Mbarara city, 2023)

However, other respondents from the FGD emphasized,

> The information that is put on the noticeboards in hospitals is in English, and not our local language, I cannot read, and so it has become hard for us to get the information. At least let it be written in our local languages and the communication enhanced with images, which will help us get the communication that is being passed. (FGD-M9, Rwentondo village, 2023)

From the study findings, the information posted on hospital noticeboards is only in foreign languages such as English, which has made it difficult for the local audience to

read and understand. The respondents claimed that it would be helpful if the notices were also written in their local language or accompanied by relevant images to improve communication.

Low technology uptake

This was also identified by the community as a barrier to seeking and communicating science-based health innovations. The study found that rural communities rely more on their Village Health Teams (VHTs) when seeking science-based health information while others depend on radios and transit media. It was found that those with smartphones and the ability to get timely information do not know where and how to get the information. This was acknowledged as quoted by one of the male respondents during the FGDs:

> We trust the VHTs because they know us by household, which means they can update us on any latest information; they inform us of all government programmes especially those from the Ministry of Health. **(**FGD-M23, Rwentondo village, 2023)

The above community response reveals the degree to which the local people trust the VHTs as their main source of information. This low uptake of technology and initiative to seek and find health information as people cannot use their smartphones and other means to get informed is a major barrier to innovations.

Message packaging.

The research findings indicated that the way information is packaged in a message plays a crucial role in determining whether people will seek and find its meaning. The

study revealed that messages presented with cartoons, videos, and images tend to attract viewers' attention, making it more likely for them to engage with the content and comprehend its message. The instant attention given to the audio-visual attracts people to get more details about the message, which is lacking in most of the science-based health innovation adverts and other forms of marketing of such products.

Gender roles and control over the communication channel

Respondents in FGDs proposed that women need more control over their devices to access scientific information without any hindrance. One female respondent narrated, “It’s my husband who pays TV subscriptions, he bought the TV, and how do you decide on what he should watch?” (FGD-F60, Mbarara city, 2023). The research findings revealed that women have limited control over televisions, radios, and smartphones in the presence of their husbands. Men often dictate the kind of programmes to be watched in their households since many of them pay for the television subscription fees in cases where the family does not only depend on the free-to-air channels. As a result, women are unable to watch programmes that inform them of the latest news and innovations in health and other sectors. Their information-seeking behaviour is affected by their lack of control, especially when it comes to seeking out the latest science-based health innovations.

High Internet/Data costs

Accessing information about science-based innovations usually involves using the internet to browse and access media websites. However, one of the respondents in a female focus discussion explained,

> Most of the innovations are posted in the form of videos, which require a lot of data to access. It becomes expensive for us to access the internet to get such information. (FGD-F17, Mbarara University, 2023)

According to research findings, the inflated cost of internet access has impacted the frequency at which people use it to obtain information about science-based health innovations. The internet is a powerful tool for sharing information and promoting community interconnectedness. When internet access is expensive, it becomes a barrier to information access for members of the community.

4.3.1 Means to effective communication of science-based health innovations.

Craft the message in the form of videos.

The study respondents highlighted the importance of video content in effectively conveying a message to viewers. They stressed that video content is more likely to capture viewers' attention due to its audio-visual nature. During the FDS, one of the respondents passionately argued in favour of using videos to communicate with the audience. He expressed thus,

> People tend to get more attracted to videos than text or any other means used to communicate, this can also work for scientific innovations, and people will get interested in them. **(**FGD-34M, Mbarara University, 2023)

Based on this response, videos draw the attention of the viewers due to their dynamic and interactive nature. This trend is also evident when it comes to scientific health innovations. With the help of videos, people can easily understand and appreciate the features and benefits of a new product or technology.

Use of public figures to communicate novel science-based health innovations.

Public figures and celebrities can be valuable assets in marketing innovations. One of the female kII said, “Yes, we can use celebrities like musicians, they have a bigger following and have a big influence over their followers” (KII-8F, Mbarara University, 2023).

This quote highlights the powerful impact that celebrities, particularly musicians, can have on marketing campaigns. Their large following and influence can generate more interest and engagement than other marketing methods. Other celebrities, including film stars, influential leaders and athletes are well-known and can help spread communication throughout the community. With a significant following, people are more likely to adopt a new product because of their involvement in the advertisement.

In this chapter, I have presented and analyzed the findings of a study on the preferred communication channels for science-based health innovations. This includes the communication channels that are used to seek out these innovations, the reasons why stakeholders prefer certain channels over others, the impact of these innovations, the barriers to receiving information about them, and effective means of communication.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0 Discussion of Findings

In this chapter, I discuss the findings as presented in Chapter Four following the order of the objectives and the literature reviewed in Chapter Two. The discussion explains the key findings using previous studies that have been done in the same field of study. The study focused on three objectives, namely: to establish the stakeholders' preferred communication channels while seeking and receiving information about science-based health innovations; to examine what motivates the stakeholders to their preferences of the specific communication channels when receiving or seeking information about science-based health innovations and to establish the communication challenges that stakeholders meet while seeking out and receiving information about science-based health innovations. The findings are discussed following the order of objectives to draw conclusions and make recommendations.

5.1 Preferred communication channels to communicate science-based innovations.

Objective one of the study sought to establish preferred communication channels for receiving information about science-based health innovations. The study has found a slight difference between the communication channels preferable in urban areas and those preferable in rural settings. The study findings show that interpersonal channels such as science websites, research dissemination conferences, and the digital channels

like social media platforms; X (formerly Twitter) and WhatsApp are the top four communication channels preferred by students and elites to seek information about science-based health innovations. People who can read and comprehend messages prefer these communication channels. These findings are consistent with those of a study conducted by Chao et al. (2020). These researchers found that governments and innovation hubs have utilized various mass and digital media channels, (print media and the Internet) to mobilize communities, convey precautionary measures, and provide information about supportive measures and channels during the COVID-19 outbreak. According to Aznam et al. (n.d.), students prefer using online media platforms, especially science websites, Wikipedia, and YouTube to acquire knowledge about science-related topics. Communication channels such as X (formerly Twitter) and WhatsApp, allow for the sender-receiver engagement and instant feedback. This emphasizes the significance of dialogic communication, a core principle of participatory communication theory on which this study was grounded.

The study findings further claim that residents of Rwentondo Village prefer Village Health Teams (VHTs) as a communication channel for exchanging information on science-based health innovations. VHTs are appreciated for their information richness, they inform them about new health programmes, any innovations and campaigns like vaccination, new disease outbreaks, and any other government programmes. VHTs inform people in Rwentondo about new health programmes and innovations like vaccination campaigns, new disease outbreaks, and other government programmes. These findings agree with some previous studies, such as the research conducted in Kenya by Ochieng Jowi, (2018), which states that group discussions and interpersonal

communication tools are the most desirable for reaching a wider audience regarding innovation.

The study findings generated from the FGDs further revealed that interpersonal channels such as village health teams through meetings was a preferred communication means, especially in the local community. Likewise, the elites and students in the urban preferred annual dissemination conferences a form of interpersonal channel. These involve use of meetings or any other form of gathering that brings people together to pass the science-based health information. The three groups of respondents (local community, elites, and students) preferred interpersonal channels due to their feedback mechanism through dialogue, the core focus of this study and the participatory communication theory. This finding contrasts with Ochieng Jowi, (2018), whose study found that group discussions and interpersonal communication channels are the most beneficial for reaching a wider audience regarding innovation.

The study results also acknowledged the preference of radios over other communication tools to receive health innovation information. This was however common in the rural parts of Mbarara city and during the FGDs, the residents highly appreciated the use and efficiency and portability of radios over other channels. They further alleged that radios are cheaper to maintain and portable to carry to any place which may not be the case for televisions or other communication channels. Notably, the high multiplicity of cues such as the verbal disproves the claim from the current perceptions that in Africa, traditional mass communication channels such as radios are redundant and no longer relevant.

5.2 Motivation for preferences of the specific communication channels

The second objective of the study was to examine the stakeholders' motivation for their preferences of the specific communication channels when receiving or seeking information about science-based health innovations. As such, affordability in terms of expenses to maintain the preferred communication channel was cited as a significant factor.

In rural areas, the messaging format of radio and VHT communication channels is highly appreciated and considered a practical and cost-effective option. VHTs make access to information easier because the recipients of the information do not have to pay them before they share whatever information they have. Participating in meetings discussing health-related issues makes VHTs the most preferred means of receiving science-based health information in rural areas. This finding is coordinated with the participatory communication theory used in this study. The theory identifies dialogue as the superlative method to foster effective communication. During development projects, participatory communication theory emphasizes freedom of expression and knowledge sharing, strongly echoing Freire's (1968/1970) argument. According to previous research, participatory communication has the potential to empower individuals to initiate and drive social change in their local communities. By providing a platform for active engagement and collaboration, participatory communication can

help individuals identify and address key issues affecting their community, develop collective solutions, and bring about positive change.

According to this study, people are more likely to prefer communication channels that provide reliable information most of the time, as credibility is found to be one of the key motivational factors. Dewald (2016) conducted a study which establishes that the accessibility and quality of information can significantly impact the adoption of new health technologies and innovations. It is important to note that this could indeed hinder the adoption of such advancements.

The study results revealed that the ability of the digital media channel to cover a wider area in a timely manner is a big motivation towards its preference. A focus group discussion with students at Mbarara University preferred the use of X formerly Twitter due to its wide coverage and the ability to reach their target audience in a timely manner. The ability to have a timely interaction between the sender and receiver makes X a preferred communication channel especially to literate populations and those who share common characteristics.

Furthermore, community-based channels such as VHTs were preferred most in the rural parts of Mbarara district because the local people consider direct communication as effective and interactive where they can engage with the communicators. During an FGD, the local people reported that their direct interaction with the health workers or the innovators enables them to ask whatever they need to know about the message being passed to them. The study findings concur with Granström et al. (2020) whose study found out that face-to-face healthcare services are believed to improve patients' access to care, patient engagement, and treatment adherence.

5.3 Communication challenges stakeholders face while seeking out and/or receiving information about science-based health innovations.

Religious and cultural beliefs have hindered access to science-based health information. According to the study, people tend to rely more on prayers and miracles than on seeking knowledge and utilizing science to improve their health. This was particularly evident when some individuals in a community refused to take their children for vaccination against killer diseases, such as polio and measles. Roger Ali Bocus (1998) notes that cultural barriers, including differences in nationality, beliefs, race, and ethnicity, can impede communication. At times, cultural beliefs and races are associated with misinformation, which can distort the intended message.

The study found that low adoption of technology in the community hinders the utilization and communication of science-based health innovations. A comprehensive search for scientific information and access to health-based innovations like telemedicine is made possible through ICT-enabled gadgets, such as smartphones and the Internet. This explains the increased calls for the use of applications and online platforms that have been put in place to enable the user communities to access information at any time, and at their convenience.

The study also found that illiteracy levels within the population are a barrier to effective communication of science-based health innovations as the intended receivers may fail to comprehend and interpret the messages. The written type of message is the most affected one as people cannot read and then interpret the meaning of the written texts. This argument is well-supported by the Uganda Bureau of Statistics (2017) census

report which revealed that up to 12% of persons aged above 18 years in Mbarara city are illiterate.

5.4 Conclusions

It is worth noting that there are numerous mass, digital and interpersonal communication channels utilized in delivering scientific information. However, the study found that people in rural areas prefer the use of Village Health Teams (VHTs) and radio over other platforms, such as social media platforms, which is more preferred among the youth and the elite in the urban setting. The reason for the preference for VHTs is the trust that local people have in health workers, particularly the value of prompt feedback and the messaging format. The study found that the participants (both elites and residents) have a uniform preference for interpersonal communication channels specifically VTHs and science dissemination conferences respectively. The study concludes that different stakeholders use diverse communication channels based on their ability and status.

The study found that there are some communication challenges associated with using the preferred communication channels that were identified. Such challenges included the high costs incurred in buying internet data to access current science-based health information, limited accessibility to communication channels such as Twitter and television, gender inequality, and various gender-related roles.

5.5 Recommendations

Scientists/Innovators

The study findings now remind scientists to concentrate on the key stakeholders preferred communication channels and challenge the new narratives that social media platforms have taken over.

Stakeholder engagement and communication teams

The involvement of different key stakeholders is key in identifying the preferred communication channels to register success in the communication of science-based health innovations. This can be achieved through carrying out surveys and opinion polls. From these views, the preferred communication channels can be identified as a holistic communication approach for the effective communication of science-based new tools, such as the upcoming gene drive technology and malaria vaccines, among others.

The involvement of all the stakeholders at all levels is paramount because it leads to the spread of information to a bigger population. Direct engagement is crucial for community involvement in science-based health innovations, as it can spark interest and encourage people to relate innovative ideas to their daily lives. This is important because the stakeholders will feel part of the innovation and own it so that it becomes easier to spread information about the innovation with less disinformation and misinformation.

Empowering the Village Health Teams with information and involving them in innovations since they have been identified as rich media communication channel, especially in rural areas. When the VHTs are empowered, it makes the spread of information to the target groups easier since they are the most preferred means of receiving science-based health innovation information in the communities, especially in rural areas. Health communication professionals and scientists should create

campaigns to modify attitudes, increase service use and promote health-living behaviours.

5.6 Areas for further research

There is a need to research the credibility of science-based information across various scientific communities in Uganda. During this study, inconsistent beliefs and misinformation were identified as impediments to conveying science-based health information to non-science audiences. Science-based health innovations should be marketed effectively by researching the most effective communication channels, among other key issues in the communication chain.

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APPENDICES

Appendix (I): Focus Group Discussion interview guide with village residents and university students

Introduction

I am Reginah Nalunga, a student at Uganda Christian University doing a Master of Arts degree in strategic communication. My research study is about **"the preferred communication channels for science-based health innovations among the communities of Mbarara University of Science and Technology and Rwentondo village, Uganda"** You're requested to enhance this study by responding to the questions below. Kindly note that your responses are strictly for academic purposes and will be treated with high confidentiality. Choosing to be part of this study is not mandatory and you can withdraw your membership at leisure without any penalty.

Section A: The stakeholders' preferred communication channels while seeking and receiving information about science-based health innovations.

Knowledge about the science-based health innovations

1. Do you know science-based health innovations? a) yes (b) No

2. If yes what are some of the innovations you know? Probe for any innovations they have heard of.

3. Do you receive information about science-based health innovations? a. Yes, b. No

Commonly used and preferred communication channels

4. If yes, which communication channels do you use while seeking information about science-based health innovations? Probe for the communication channels commonly used to get health information.

5. Which one of the above-mentioned communication channels you used is/are the most suitable for receiving health-based innovations? Probe for the familiar communication channels.

Section B: The stakeholders' motivation for their preferences of the specific communication channels when receiving or seeking information about science-based health innovations.

6. Why do you use the identified communication channels more often than any other means of communication? Probe why people prefer such communication channels.

7. What have you done or changed because of the information about science-based health innovations? Probe for any positive lifestyle changes because of communications from health-based innovations.

8. What are your views about the channels defined and utilized to communicate science-based health innovations?

Section C: The communication challenges that stakeholders meet while seeking out and/or receiving information about science-based health innovations.

9. Are you satisfied with the communication channels used to communicate science-based health innovations? A) Yes b) No

10. Give reasons for the choice above.

11. Do you experience any communication challenges while using the mentioned channels? Yes, No

12. If yes mention the challenges faced while seeking information about health-based innovations.

13. How best can science-based health innovations be communicated to all stakeholders?

Appendix (II): Interview guide for the Key informant in-depth interview

Introduction

I am Reginah Nalunga, a student at Uganda Christian University doing a Master of Arts degree in strategic communication. My research study is about "the **preferred communication channels for science-based health innovations among the communities of Mbarara University of Science and Technology and Rwentondo village,Uganda"** You're requested to enhance this study by responding to the questions below. Kindly note that your responses are strictly for academic purposes and will be treated with a high confidentiality. Choosing to be part of this study is not mandatory and you can withdraw your membership at leisure without penalty.

Section A: Personal information

Gender: .....

Age: .....

Marital status: .....

Position held in the community: .....

1. Which communication channels do you use to seek/receive information about science-based health innovations?

2. How do you perceive the approaches and channels that are defined and utilized in communicating science-based health innovations?

3. What factors do you think affect the success of the preferred communication channels in the communication of science-based health innovations?

4. What suggestions or solutions would you give that may lead to the success of communications about science-based health innovations?

5. What are the changes brought about by the communication of science-based health innovations?

Appendix (iii): Runyankore-Rukiga Translated Focus Group Discussion interview guide.

OKWEYANJURA

Amaziina gangye ni Reginah Nalunga, omwegyi aha eitendekyero rikura erya Uganda Christian university, ninshoma degree ya kabiri omu byempurizana y'obukugu. Ninkora aha kukyondoza "aha miriingo y'empurizana erikukirayo kukundwa kukoresibwa omu miringo ensya ejumbirwe omu bya sayansi ebikwatiraine n'obuhereza by'amagara omu kyanga ky'eitendekyero rikuru erya Mbarara Univasite".

Noshabwa kuteeka omuganda aha kukyondoza oku obwo orikugarukamu ebibuuzo ebi. Oine kumanya ngu ebyoragambe byona nibiza kukozesibwa omubyobwegyese byonka, kandi nibiza kurindwa omukihama. Okwikiriza kwetaba omukucondoza oku n'ekyobwanyekundiire, kandi tihariho kifubiro nawagarukira rwagati.

Ekicweka A: Emiriingo y'empurizana erikukirayo kukundwa kukoresibwa abeebembezi abaine akakwate n'omwete, omu kuronda kandi n'okutunga okumanyisibwa aha miringo ensya ejumbirwe omu bya sayansi ebikwatiraine n'obuhereza by'amagara

1. Nomanya emiringo ensya ejumbirwe omu bya sayansi ebikwatiraine n'obuhereza by'amagara? **(a)** eego **(b)** ingaaha

2. Waaba nogimanya, nimiringo ki egyo eyorikumanya? (Yongyera kubururiza eibahuriire)

3. Notuunga okumanya aha miringo ensya erikujumburwa omu bya sayansi ekwatiraine n'obuhereza by'amagara?

Emiringo erikukirayo kolozezibwa kandi n'okukundwa omumpurizana

4. Nimumiringo ki ey'empurizana eyorikukozesa obwo waaba noroonda okumanyisibwa aha miringo ensya eya sayansi ejumbirwe ey'ebyamagara? (Buririza aha miringo ya ebyempurizana erikukirayo kukozesibwa kuntunga okumanyisibwa aha bikwatiraine n'amagara

5. Nimiringo ki eyiwagaamba aharuguru ey'empurizana eyiwakozeise erikukirayo kubonerera omukutunga emiringo ensya eya sayansi ejumbirwe ey'ebyamagara? (Buririza aha miringo erikukirayo kumanywa ey'empurizana)

Ekicweka B: Ebikusikiriza abeebembezi abaine akakwate n'omwete omukukozesa emiringo eyempurizana erikukirayo kukundwa kukoresibwa omukuronda okumanyisibwa aha emiringo ensya eya sayansi ejumbirwe ey'ebyamagara.

6. Ahabwaki orikukozesa emiringo ei wagaamba kukira emiringo endiijo ey'empurizana eriho? (okubuririza; ahabwaki abantu barikukunda emiringo k'engyo)

7. Okozireki ningashi niki ekihindukire ahabwa okumanyisibwa kirikurugirira ahabya emiringo ensya eya sayansi ejumbirwe omu byamagara

8. Oine ntekateeka ki aha miringo etongozibwe nekigyendererwa ky'okuretaho okumanyisibwa aha emiringo ensya eya sayansi ejumbirwe ey'ebyamagara

Ekicweka C: okuteganisibwa kw'omubyempurizana oku abeebembezi abaine akakwate n'omwete barikubugana obwo baaba nibaronda ninga nibatunga omumanyisibwa aha miringo ensya eya sayansi ejumbirwe ey'ebyamagara

9. Oine okumarwa n'emiringo eyempurizana erikukozesibwa omukumanyisa aha miringo ensya eya sayansi ejumbirwe ey'ebyamagara? (a) eego (b) Ingaha

10. Hereza enshonga ahabwa ekiwagamba ahaigura

11. Nobugana obuzibu bwona omu mpurizana obwo waaba nokozesa emiringo ey'empurizana ei wagaamba aharuguru? Eego (a) Ingaaha (b)

12. Waaba wagamba Eego, gamba oburemeezi obwobugaine omukuronda okumanya aha miringo ensya eya sayansi ejumbirwe ey'ebyamagara

13. Nibata oku emiringo ensya eya sayansi erikujumburwa ey'ebyamagara oku yakumanyisibwa gye abebembezi n'abantu abaine omwete boona

Appendix iv: The study work plan

ACTIVITY	MARCH 2023	APRIL 2023	JUNE 2023	APRIL 2024	JUNE 2024	IN CHARGE
Identify the research topic & develop a research proposal						Researcher & supervisor.
Approval of proposal						Supervisor
Data collection and data entry						Researcher
Data analysis						Researcher
Report writing						Researcher & supervisor

Handing in report						Researcher

Appendix V: Mbarara university acceptance letter

UGANDA CHRISTIAN UNIVERSITY
A Centre of Excellence in the Heart of Africa

There is no objection
DBSLY.
29.05.2023

March 6, 2023

TO THE DEAN
OF STUDENT
MUST

Dear Sir/Madam,

Re: Access of Premises & Audience for Research Purposes

This is to introduce to you Ms. Reginah Nalunga RS20M54/207, a student from Uganda Christian University (UCU) pursuing the degree of Master of Arts in Strategic Communication.

The School of Journalism, Media and Communication's ultimate goal is to produce students with excellent skills, knowledge and talents in media and communication profession. Special emphasis is placed on sharpening their skills in writing, speaking, management, human and public relations as well as critical thinking. In addition to the normal theoretical and practical instructions offered in class, we require our students to demonstrate their abilities in research through dissertation writing.

The student has identified your office/organisation/institution/company as ideal for them to do their research through the use of questionnaires/ interview sessions.

I am kindly requesting you to assist them in any way possible to access the necessary audience at your institution to enable them carry out this exercise in their areas of interest.

We are delighted in advance for your usual cooperation and consideration.

Yours sincerely,

Franklin Adeka
Assistant Registrar
School of Journalism, Media & Communication
Uganda Christian University
0702704649/ 0784631466
fadeka@ucu.ac.ug/ arjmc@ucu.ac.ug

UGANDA CHRISTIAN UNIVERSITY
SCHOOL OF JOURNALISM, MEDIA AND COMMUNICATION

Appendix vi: Acceptance letter from Mbarara city council

INCASE OF ANY CORRESPONDENCE
ON THIS SUBJECT, PLEASE QUOTE
Your ref:
Our ref: CR/MC/ 164

MBARARA CITY

Office of the City Town Clerk
P.O BOX 290
MBARARA –UGANDA
www.mbararacity.go.ug
info@mbararacity.com
mbararara@gmail.com

MBARARA CITY

29th May,2023

Reginah Nalunga
Uganda Christian University
P.O Box 4
Mukono

DATA COLLECTION FOR A RESEARCH PROJECT.

Following your application for data collection on a research project for a period of three weeks from **30th May,2023** to **16th June,2023** you are hereby informed that your application has been honored.

You will collect data for your research project in Mbarara City, on **Science Based Health Innovations and the Preferred Communication Around Mbarara City"**. This will be in strict observance of codes of conduct.

You will report to the City Community Development Officer, Mbarara City for guidance.

Please note that there will be no kind of financial support.

Yours faithfully,

For: City Town Clerk
MBARARA
P.O.Box 290, Mbarara

Kansiime Barbra
For: TOWN CLERK

Copy: The City Community Development Officer, Mbarara City.
" The Program Co-ordinator, Uganda Christian University.