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A qualitative exploration of cultural illness perceptions and barriers to modern healthcare: the case of *Ikirimi* and traditional uvulectomy in Rwanda

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Abstract

Background Understanding cultural perceptions of illness is crucial for effective healthcare delivery. This study examines the ethnomedical concept of *ikirimi,* a culturally recognized illness in Rwanda characterized by perceived uvula abnormalities, and its traditional management through uvulectomy. This study explores the cultural understanding of *ikirimi*, its perceived causes, symptoms, and treatments, as well as barriers to integrating modern healthcare.

Methods An exploratory qualitative approach was employed, involving in-depth semi-structured interviews with eight participants: traditional healers, individuals who underwent traditional uvulectomy, and healthcare providers. A grounded theory approach which analyzes data in systematic manner to generate new theories was applied, with coding conducted in English after initial transcription and analysis in Ikinyarwanda to preserve Indigenous concepts.

Results Participants described *ikirimi* as an illness affecting the uvula (named as akamironko or akamirabugari or agashondabugari in Ikinyarwanda), characterized by swelling, elongation, and pus-like discoloration. Reported symptoms included fever, difficulty swallowing, coughing, and weakness, with children identified as the most affected group. Traditional healers diagnosed *ikirimi* through visual inspection of uvular morphology and movement and treated it by cutting the affected part of uvula and is known as *guca Ikirimi* 'traditional uvulectomy'. Barriers to integrating modern healthcare included skepticism about biomedical care, judgmental attitudes from providers, and communication gaps. Despite the prevalence of *ikirimi*, its biomedical correlates remain unclear, though participants associated it with severe throat illnesses such as tonsillopharyngitis.

Conclusion The findings highlight *ikirimi* as a socially constructed illness with deep cultural roots, significant health implications, and persistent barriers to modern healthcare. Addressing these barriers requires culturally sensitive approaches that integrate Indigenous knowledge with biomedical practices. Future research should explore the biomedical correlates of *ikirimi* and foster collaboration between traditional and modern healthcare systems to improve patient outcomes.

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Keywords Traditional medicine, Cultural illness perceptions, Indigenous knowledge, Healthcare-seeking behavior, Biopsychosocial impacts, Patient–provider communication, Transillopharyngitis, Qualitative research

Introduction

In Africa, traditional medicine has been a cornerstone of healthcare for centuries, as it has a perceived low cost, alignment with sociocultural, religious and spiritual values, and dissatisfaction with conventional healthcare by the community, and even today it remains the most used primary source of healthcare [1–4]. In remote areas with low resources and limited access to medical facilities, the experience of illness and its social context often dictate health-related decisions [5–7]. While such practices may challenge modern healthcare professionals—who may view traditional medicine as a barrier to appropriate care—they must be understood within the framework of local cultural beliefs and traditions [5–7].

In most African societies, health-related problems are often conceptualized and addressed using local terminology and culturally specific approaches in local communities [5–13]. In fact, cultural norms, beliefs, and local perceptions of illness play a crucial role in shaping the health behaviors of individuals and communities by influencing healthcare-seeking actions and treatment preferences [8–10].

Traditional uvulectomy is widely spread in sub-Sahara Africa and cuts the uvula, either complete or partial, in an unsterile setting for different reasons [14–17]. Uvula is the small, fleshy tissue hanging at the back of the throat, aiding speech and swallowing [18]. Traditional uvulectomy is associated with a range of complications, including bleeding, infection, and long-term morbidity [14–22]. In Rwanda, an illness locally referred to as *ikirimi* is traditionally associated with throat problems in children mainly and is frequently treated by cutting the uvula, a practice known as traditional uvulectomy [11–13]. Despite its prevalence, there is no clear consensus on what *ikirimi* represents, and no medical evidence conclusively links it to a specific disease of the uvula [11–13].

Given the potential health risks and the cultural significance of *ikirimi*, there is a critical need to understand its local perception, causes, perceived cures, and impact on healthcare-seeking behavior. This study aims to explore these dimensions, shedding light on how traditional beliefs intersect with modern healthcare in Rwanda, and providing insights that could inform culturally sensitive healthcare practices.

Methods

Study design

This study employed an exploratory qualitative design using in-depth semi-structured interviews to collect rich and nuanced data. This approach was chosen to explore community perceptions and practices surrounding *ikirimi*, a traditional illness treated through uvulectomy.

Study setting

The study was conducted in a rural sector of Nyagatare District, located in the Eastern Province of Rwanda. This area was selected due to anecdotal reports from community members who had their uvula amputated due to *ikirimi*. The Rwandan healthcare system is organized into three levels: primary, secondary, and tertiary care. Primary healthcare includes community-level care provided by community health workers, as well as health posts and health centers are staffed by nurses. Secondary and tertiary levels are staffed by doctors and nurses, and offer more specialized care [23, 24].

Although the Rwandan Ministry of Health recognizes the widespread use of traditional medicine, it does not guarantee its safety or quality. This is due to the absence of a legal, strategic, and regulatory framework for traditional medicine, which remains largely informal and personalized, with knowledge transmitted orally across generations [25].

Study population and sampling

Individual interviews were conducted with eight participants, five males and three females, aged 21–70 years. The participants included four community members, two traditional healers, and two nurses. Their educational backgrounds ranged from no formal schooling to a bachelor's degree (see Table 1).

This study purposively sampled eight participants: four community members who sought care at a health facility, two healthcare providers (nurses) working at the local health center, and two traditional healers. This targeted sampling approach ensured diverse and comprehensive perspectives on *ikirimi* and its treatment. Data saturation was achieved during interviews based on the predetermined sample size, as no new information emerged, and thus was achieved due to grounded theory approach, study site, and pilot study.

Table 1 Participant demographics

Participant type	Gender	Marital status	Age range	Education level
Community member	Female	Married	31–40	Bachelor's Degree (A0)
Nurse	Male	Married	31–40	High School Diploma (A2)
Traditional healer	Male	Married	61–70	Primary Education
Community member	Female	Married	21–30	None
Community member	Male	Married	21–30	Primary Education
Traditional healer	Male	Married	41–50	Primary Education
Community member	Female	Married	61–70	None
Nurse	Male	Married	31–40	High School Diploma (A2)

A0, Bachelor degree; A2, High School Diploma of Nursing

Participants were selected based on their willingness to provide information and specific inclusion criteria:

- *Community members*: At least 20 years old, with self-reported experiences of *ikirimi*. They were recruited when they visited the health center for unrelated health issues.
- *Healthcare providers*: Nurses with experience caring for patients who had undergone traditional uvulectomy or who presented with complaints of *ikirimi*.
- *Traditional healers*: Individuals who had treated patients for *ikirimi*. They were directly approached in the community.

Data collection

Data were collected using an interview guide tailored to explore perceptions and treatment practices at various levels of care, including the home, traditional healers, and health centers. The interview guide was developed in Ikinyarwanda, the national language, and refined through a pilot study involving six community members. The pilot interviews informed modifications to the guide but were not included in the final analysis.

Interviewer has created a good environment in the community and good relationship with individuals who helped to be in touch with traditional healers. Interviews were conducted in Ikinyarwanda by the first author, who audio-recorded all sessions with participant consent. Interviews with traditional healers were conducted at their homes to create a comfortable environment, while those with community members and healthcare providers were conducted in private rooms at the health center to ensure confidentiality. The interview guide had six main themes as questions, each theme had sub-questions, and some sub-questions also had sub-questions. Open-ended questions encouraged participants to elaborate on their responses, often prompted with follow-up questions such as "why" and "how." Those six main themes are: (1) The first theme was focusing on description of *ikirimi*, (2) the second theme, symptoms of *ikirimi* and clinical presentation (3) the third theme, etiology of *ikirimi* in broad spectrum, (4) *ikirimi* and traditional medicine, (5) *ikirimi* in the lens of modern medicine, and (6) the last theme was about: what could be the direction of treating *ikirimi* in modern medicine. Each interview lasted approximately one hour. The period of collecting data was between August and September 2016.

Ethical considerations

Ethical approval for the study was obtained from the Institutional Review Board of the University of Rwanda, College of Medicine and Health Sciences (Approval Notice No. 275/CHMS/2016). Written informed consent in Ikinyarwanda was obtained from all participants before conducting interviews. Confidentiality and anonymity were maintained throughout the study.

Data analysis

A grounded theory approach was used to analyze the data, enabling an in-depth understanding of the cultural perceptions and practices related to *ikirimi*. Grounded theory is a method which analyze data in systematic manner and enabling generation of new theories. It enables to learn empirical events, experiences, and potential analytic ideas [26, 27]. The interviews were transcribed verbatim in Ikinyarwanda to preserve the cultural and linguistic nuances of Indigenous concepts that lack direct English equivalents.

Transcriptions were thoroughly reviewed by the first author to ensure accuracy. Open coding was used, and data were managed using Microsoft Excel. Coding was conducted in English, with codes translated directly from the Ikinyarwanda text. However, translated codes from Ikinyarwanda text were used to generate other codes as subthemes, and then themes emerged. The coding process involved iterative reviews by the first author

(SB) and two additional researchers (VKC and MS) to enhance reliability and rigor.

Results

Three major themes emerged after doing analysis of the interviews (Table 2). Those three themes are: The first theme is Indigenous description of *ikirimi,* the second theme is social constructs surrounding *ikirimi,* and the third theme is barriers to seeking modern healthcare. The conceptual diagram which indicates how they interplay has been drawn (Fig. 1).

Parentheses containing a word (e.g., "(word)") are used to provide additional clarification or context for the preceding word without altering the original meaning as expressed by the participant.

Theme 1: Indigenous description of ikirimi

Participants, including nurses, described *ikirimi* as an illness affecting the uvula, characterized by swelling, elongation, and the presence of a pus-like discoloration at the tip. Some noted that the uvula could burst, releasing pus. While the nurses recognized the cultural understanding of *ikirimi*, they admitted uncertainty about its equivalent in modern medical terminology, often considering it an ambiguous condition in biomedical practice.

A community member stated:

> *"I see ikirimi as an illness inside the mouth caused by high-grade fever. When there is a high fever, the uvula swells and elongates, sometimes reaching the tongue."*

Ikirimi was often reported to co-occur with illness causing tonsillar swelling, described using various local terms such as *ibiheri*, *igiheri*, *agatembwe*, *ubutembwe*, *anjine*, and *gapfura yo hasi*. Among these, *ikirimi* was perceived as the most severe, with participants believing it could be fatal if untreated. A traditional healer explained:

"Ikirimi affects the uvula—it swells, changes color, and fills with pus mixed with water. Sometimes, it occurs with anjine (a tonsillitis-like illness borrowed from the French term angine)."

Participant reported that the term *ikirimi* was introduced by Burundians who previously lived in the region, bringing with them the practice of traditional uvulectomy. While some participants viewed *ikirimi* as a traditional term passed down through generations, others were unclear about the origin of the name and questioned why it referred to the uvula. Locally, the uvula is known as *akamironko*, *akamirabugari*, or *agashondabugari*.

Participants identified children as the most affected group, with some reporting that nearly all individuals in their villages had undergone traditional uvulectomy 'guca *ikirimi*'. A community member observed:

> *"In our village, almost everyone has had their uvula removed. The one who might still have it is rare—one in a hundred."*

Participants reported various symptoms of *ikirimi*, including fever, headache, difficulty swallowing and speaking, vomiting, refusal to breastfeed (in children), difficulty breathing, coughing, body weakness, neck pain, and in some cases bad breath (halitosis). These symptoms were perceived to disrupt normal functioning and significantly impact health.

Another community member explained:

> *"It is an illness that normally affects the throat. When your throat is affected, you start to have a fever throughout the body, and then you begin to cough. After coughing starts, you feel unable to*

Table 2 A summary of key themes and representative quotes

Theme	Sub-theme	Quotes from participants
Indigenous description of *ikirimi*	Defining *ikirimi*	A community member stated: *"I see ikirimi as an illness inside the mouth caused by high-grade fever. When there is a high fever, the uvula swells and elongates, sometimes reaching the tongue."*
	Illness occurring with *ikirimi*	A traditional healer explained: *"Ikirimi affects the uvula—it swells, changes color, and fills with pus mixed with water. Sometimes, it occurs with anjine (a tonsillitis-like illness borrowed from the French term angine)."*
	ikirimi prevalent	A community member observed: *"In our village, almost everyone has had their uvula removed. The one who might still have it is rare—one in a hundred."*
	Symptoms	Community member explained: *"It is an illness that normally affects the throat. When your throat is affected, you start to have a fever throughout the body, and then you begin to cough. After coughing starts, you feel unable to swallow when eating."*

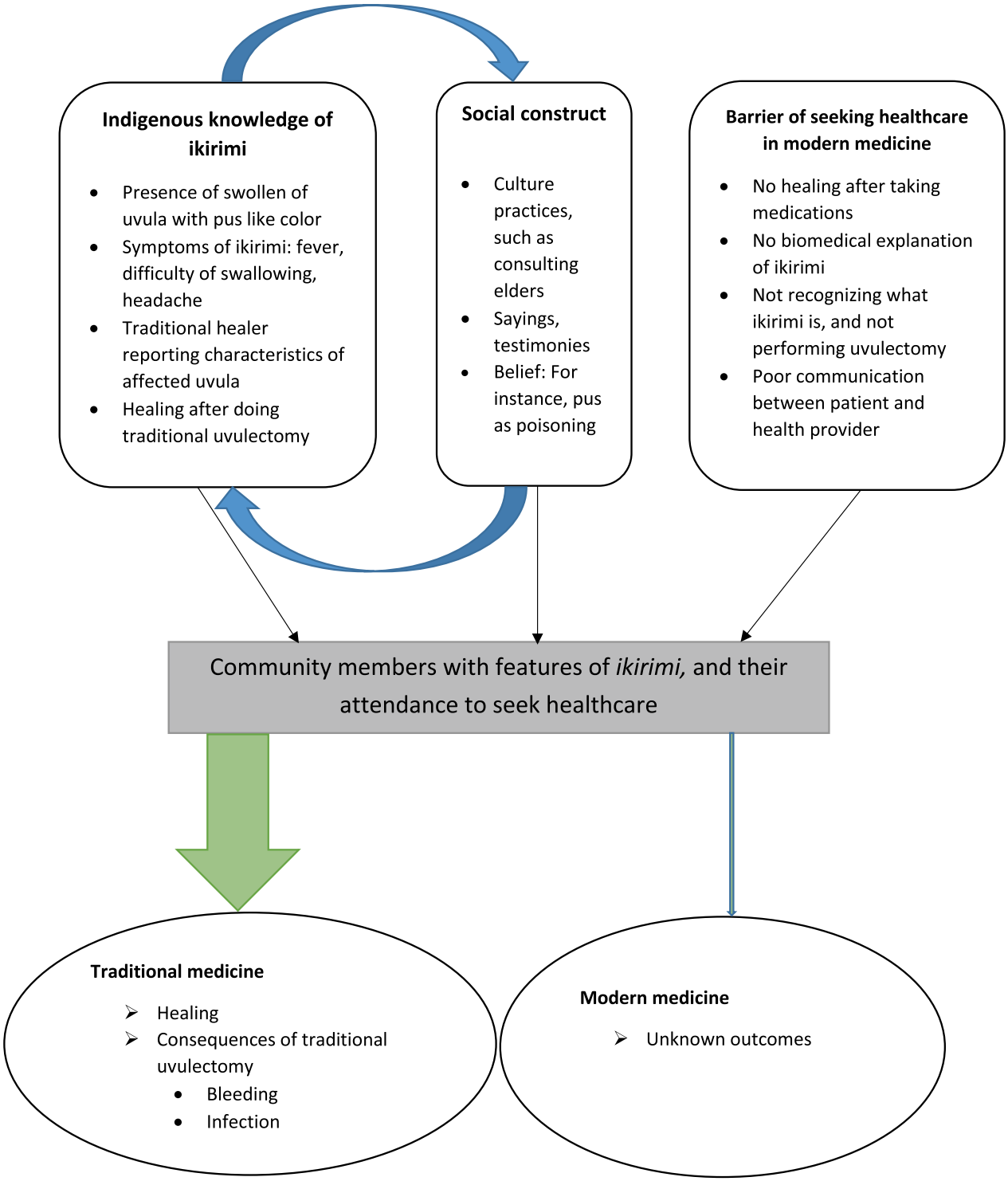

Fig. 1 Conceptual diagram illustrating interplay between cultural perceptions, traditional practices and barriers to modern healthcare

swallow when eating."

Participants provided differing views on the causes of *ikirimi*. Community members and traditional healers most frequently mentioned fever, bacteria, and hot weather. They also highlighted geographic and environmental factors as predisposing causes. Many believed that *ikirimi* was more common in hot regions, and some noted that their relatives living in cooler areas had never experienced the condition. On other hand, participants don't know really the causes except reporting from the one who taught them specifically traditional healer. While healthcare providers (nurses), primarily attributed it to microbial infections.

A traditional healer elaborated:

> *"I know that ikirimi as illness which mostly manifests abruptly in human, I don't know the causes. However, what I know people develop ikirimi during hot weather. Ehh, in cold weather it is not frequently."*

Traditional healers described their diagnostic methods, which involved examining the morphology and movement of the uvula. A swollen and elongated uvula with a pus-like discoloration was deemed a hallmark of *ikirimi*. Healers would use tools such as a spoon-like tongue depressor and a torch to visualize the uvula during consultations. They reported that a fixed uvula, which did not move up and down, was indicative of the illness. According to participants, traditional uvulectomy 'guca ikirimi' involves to resect the affected part of uvula "pus-like color"; the resected part will be shown to patient before throwing it away.

A community member recounted:

> *"When the traditional healer has finished cutting the uvula, traditional healer brings the resected uvula out, __after removing a resected uvula, the traditional healer gives you salt to swallow immediately".*

As number of participants reported that after traditional uvulectomy, salt and drugs (antibiotics) are recommended by traditional healers to enhance wound healing quickly. In past they used only salt according to some oldest participants.

A community member said:

> *"After cutting the affected uvula, they recommend you to go to the pharmacy to buy drug (antibiotics) which enables a quick recovery."*

Theme 2: Social constructs surrounding ikirimi

Traditional healers were seen as experts in managing *ikirimi*, with their knowledge passed down through generations. Participants shared that these healers could confirm the existence of *ikirimi* and provide tangible evidence, such as showing the excised portion of the uvula to the patient. This practice reinforced trust in their skills and contributed to the community's reliance on traditional uvulectomy.

A community member explained:

> *"The reason the traditional healer performs uvulectomy is that they were trained by others who had done it before. They know what they are doing."*

Fear of *ikirimi* was deeply ingrained in the community, with common sayings emphasizing its severity. Participants noted that the uvula's pus was believed to be poisonous and could cause death if it entered the stomach or lungs. This belief was a key driver for seeking immediate traditional treatment.

A participant recounted:

> *"If the swollen uvula bursts and its pus enters the stomach, you die. That is why they say the pus is poison."*

Additionally, cultural practices such as *kurebesha* involved consulting elders or individuals with experience in diagnosing *ikirimi*. Testimonies from those who had undergone traditional uvulectomy and recovered served as proof of the illness's existence and the effectiveness of the treatment (Fig. 2).

Informants talked about a strong cohesion in their community, seen by social caring between people, and

Fig. 2 Photograph of a participant who underwent traditional uvulectomy. The red arrow indicates the site of the amputated uvula

being attentive toward what is happening to others in the community.

A community member reported:

> *"__You have seen a person who is sick, then you just hear 'this one, the uvula has been cut (guca ikirimi)' without knowing what it is. Could they cut uvula really and you stay alive?"*

Theme 3: Barriers to seeking modern healthcare

Participants expressed dissatisfaction with the biomedical approach to managing *ikirimi*. Healthcare providers acknowledged their difficulty in explaining the illness in modern medical terms, which often led to a disconnect with patients. Traditional healers criticized modern healthcare for denying the existence of *ikirimi* and failing to provide effective treatments. This perception reinforced the preference for traditional care.

A community member shared:

> *"What I consider, health providers should accept ikirimi as it is. __For us we don't know how to call it, so we call it ikirimi, they should accept that it is ikirimi as we call it."*

A nurse explained:

> *"When they arrive at health facility, they don't explain what happened because they believe we don't accept ikirimi's practice related but when you inquiry from next of kins, they say that 'uvula was cut (guca ikirimi)'."*

Community members also reported feeling judged or dismissed when discussing *ikirimi* with healthcare providers. This lack of trust discouraged them from seeking care at modern health facilities. One participant shared:

> *"If you tell them your child has ikirimi, they might ask, 'What is ikirimi? How do you know?' This makes us afraid to speak."*

Participants recognize many gap to treat ikirimi in realm of modern medicine; considering consequences of traditional uvulectomy were reported, participants reported the potential benefits of collaboration between traditional healers and biomedical practitioners, suggesting that such partnerships could improve understanding and patient outcomes.

One traditional healer shared:

> *"My suggestion is to find out how to investigate ikirimi, and then they would conduct a research to know how it can be treated at health facilities."*

Discussion

This study explored how the concept of *ikirimi* is understood in a Rwandan community; its perceived causes and cures, and the barriers to seeking modern healthcare. Even though traditional medicine and the use of ikirimi are officially not accepted in Rwanda and traditional healers are arrested, it is still widely used in the community. The findings in this research show *ikirimi* as a culturally recognized illness, primarily treated through traditional uvulectomy '*guca ikirimi*', and it highlights the interplay of social constructs, Indigenous knowledge, and modern healthcare challenges in addressing the condition.

Indigenous description of ikirimi

Participants identified *ikirimi* as a traditional illness affecting the uvula, believed to be life-threatening if untreated. Also, *ikirimi* was also reported in Burundi, and traditional illnesses similar to *ikirimi* affecting uvula called *Akamiro* in Uganda and *kimeo* in Tanzania have been reported [28–30]. In fact, traditional uvulectomy practices are not only in Rwanda but also across Africa, suggesting that the perception of uvula-related diseases is widespread and deeply rooted in cultural contexts [13–22, 28–30]. Therefore, to know how ikirimi emerged in Rwanda communities would be a mystery. However, its prevalence and associated practices underscore its significance in local health narratives.

Our findings suggest that a significant portion of the community may have undergone uvulectomy, emphasizing the need for epidemiological research to quantify its prevalence and implications. Comparisons with other culturally rooted surgical practices, such as female genital mutilation, highlight the existence, impact and cultural significance of traditional medical interventions, but also the negative consequences [31, 32].

The understanding of *ikirimi* as a condition reflects Indigenous knowledge systems, which combine beliefs, experiences, and practices passed through generations. This knowledge has historically contributed to community health and resilience [33]. On the other hand, uvula infection was reported to be caused by Hemophilus influenze type b and Group A streptococcus pharyngitis, and characterized by swelling of uvula and may present with pharyngitis or epiglottis [34–36]. However, it remains unclear whether *ikirimi* represents a biomedical condition or a culturally constructed illness. Future studies could investigate the symptomatology, clinical pathology, and potential biomedical correlates, such as tonsillitis or tonsillopharyngitis, which are common in children

and, if untreated, can lead to serious complications like rheumatic fever and rheumatic heart disease which are more prevalent in sub-Saharan Africa [37–39].

Post-treatment after traditional uvulectomy such as taking salt and antibiotic underscores the need to contextualize it within both modern and traditional medicine frameworks. Traditional medicine has been essential in communities long before integration of modern healthcare in Africa, thus could have revolutionized in working together. Future direction of collaboration and bridging the gap between traditional medicine and modern healthcare in Africa society could also better directed [40, 41].

Social constructs surrounding ikirimi

The findings reveal that *ikirimi* is socially constructed, with its recognition and management rooted in local beliefs, sayings, testimonies, and cultural practices. The intergenerational transmission of knowledge about *ikirimi* ensures its persistence and relevance in the community. Local sayings, such as the belief that pus from the uvula is poisonous, contribute to the fear and urgency associated with the condition, driving individuals to seek traditional treatments. This has some similarities in Uganda and Tanzania study, *Akamiro* and *Kimeo* are deeply social constructed illnesses. For instance, in Uganda study it is also believed that if it bursts you die, and both studies indicate that traditional healers are acknowledged to know what they are doing [29, 30].

Social interactions and testimonies play a critical role in shaping health-seeking behavior. Participants described how observing others' experiences with *ikirimi* reinforced their belief in the illness and the efficacy of traditional uvulectomy. In fact, illness has a cultural meaning, and biomedical and experiential dimensions [42]. Therefore, if communities of Africa learnt illnesses not only uvula-related (such as *ikirimi)* in the past through experiences and have contributed to a health community, this reflects the broader role of culture in shaping health perceptions and decisions, as noted in prior studies emphasizing the sociocultural determinants of illness experience and coping [42, 43].

Culturally, elders are seen as custodians of knowledge and are consulted for their wisdom, including in health matters. Traditional healers, who openly demonstrate their procedures and explain their practices, hold significant authority in validating the existence of *ikirimi*. Traditional healers, in turn, play a pivotal role in maintaining cultural harmony, offering treatments that align with community values and beliefs [44].

Barriers to seeking modern healthcare

The study highlights significant barriers to integrating modern healthcare into the management of *ikirimi*. Participants expressed skepticism about modern healthcare providers' understanding and acknowledgment of traditional illnesses. Healthcare providers, in turn, reported difficulty reconciling *ikirimi* with biomedical concepts, leading to a lack of effective communication and trust.

Poor patient–provider communication emerged as a key barrier. Participants often felt judged or dismissed when discussing *ikirimi*, which discouraged them from seeking care at modern health facilities. This aligns with existing literature emphasizing the importance of cultural humility and a biopsychosocial approach in addressing patients' culturally rooted health beliefs [45, 46]. To address these barriers, healthcare providers need training in cultural competence and humility to better understand and integrate traditional health beliefs into care. This could facilitate mutual understanding and improve patient outcomes, as suggested in other contexts of culturally sensitive care [46].

Traditional uvulectomy has risks and serious negative consequences can occur as with any traditional and surgical intervention [14–22]. The practice of traditional uvulectomy is illegal in Rwanda, which may have influenced participants' willingness to share their experiences openly [47]. Despite this, the practice persists, indicating its deep cultural significance and the limitations of legal restrictions in altering entrenched behaviors. Indigenous practices and traditional medicine could be explored more and be revolutionized for the benefit of patients, as some studies revealed better outcomes of patients when traditional medicine approach is combine with modern healthcare [48, 49].

Limitations

This study has limitations. Traditional healers may have been less forthcoming due to the illegal status of traditional uvulectomy, potentially introducing bias. To mitigate this, interviews were conducted in their homes to provide a comfortable and confidential environment. Additionally, the translation of Ikinyarwanda concepts into English posed challenges, as some Indigenous terms lack direct equivalents. To preserve the original meaning, data were analyzed in Ikinyarwanda, with codes translated into English and reviewed collaboratively by co-authors. Lastly, this study is a qualitative research, and its purpose was to generate knowledge around *ikirimi* treated with traditional uvulectomy.

Conclusion

This study provides valuable knowledge of *ikirimi* which is treated by doing uvulectomy by traditional healers. *Ikirimi* reflects a complex interplay of cultural beliefs, social constructs, and Indigenous knowledge, highlighting the need to approach health conditions within their local context. Its management and perception underscore the significance of traditional health systems and the challenges they pose to modern healthcare integration.

Future research should prioritize exploring the biomedical correlates of *ikirimi*, its epidemiology, and its potential links to conditions such as tonsillopharyngitis. Investigating these connections will aid in bridging traditional and modern healthcare paradigms. Efforts to integrate these systems should focus on fostering collaboration between traditional healers and biomedical practitioners, enabling culturally sensitive care that aligns with community values and improves health outcomes. Healthcare systems can benefit from adopting inclusive approaches that respect and engage with Indigenous knowledge while promoting safe and effective medical practices. For instance, effective communication skills training for healthcare providers which include cultural competency and humility.

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Author contributions
SB, MS, MF, and VKC conceptualized the study. Study design was done by SB, MS, FXS, KB, MF, and VKC. Data collection and transcription were done by SB. SB, MS, and VKC did analysis. SB drafted the manuscript. Manuscript was reviewed by MS, FXS, KB, MF, and VKC.

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Availability of data and materials
The datasets generated or analyzed during the current study are available from the corresponding author upon reasonable request, due to the promised confidentiality with the participants.

Declarations

Ethics approval and consent to participate
This study was approved by the Institutional Review Board of the University of Rwanda, College of Medicine and Health Sciences (Approval Notice No. 275/CHMS/2016). Written informed consent was obtained from all participants prior to participate in this research.

Consent to publish
Not applicable.

Competing interests
None.

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