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Public health communication during the COVID-19 health crisis: sustainable pathways to improve health information access and reach among underserved communities

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This study aims to explore the perspectives of community leaders (CL) on trusted sources of health information, examine their roles, challenges, and needs in disseminating COVID-19 health information, and identify opportunities to improve public health reach and access for underserved communities. This qualitative study included seven focus groups conducted via online video conferencing from April-June 2021. The participants ($n = 9$) were CL recruited from the Texas Community Engagement Alliance (CEAL) for their experience working with underserved communities in Dallas, Texas. Data were coded deductively and analyzed thematically. The analysis resulted in three themes: (1) Information fatigue, mistrust, and desensitization were experienced by community members and leaders; (2) CL were expected to process, verify, and share accurate and timely COVID-19 health information; (3) CL identified potential strategies to improve COVID-19 health info access and reach. CLs were critical in addressing mis/disinformation and fostering trust in public health communication, particularly in underserved communities. They acted as vital intermediaries for health information, striving to debunk mis/disinformation and disseminate accurate health information. Public health strategies could benefit from prioritizing the integration of CL in communicating health information during crises and rebuilding trust within historically and racially marginalized and underserved communities. Supporting CLs, for example, through resources and training programs to counter misinformation and provide access to culturally and linguistically tailored health resources, may significantly enhance the access and reach of evidence-based health communication during health crises.

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Introduction

Rapid and effective communication of clear, concise health information during adverse public health crises is important in protecting public health and safety (Desborough et al. 2021). The rapid dissemination of scientific advancements, health advisories, resources, and safety protocols can help the public make informed decisions, mitigate risk factors, and support those affected (Desborough et al. 2021). During the COVID-19 outbreak, governments worldwide implemented health and safety directives, while media outlets and social media were used to share health information and resources (Desborough et al. 2021).

Despite these widespread efforts, there were challenges in reaching and resonating with all population segments, particularly in medically underserved communities (Shearn and Krockow 2023). In this context, the role of Community Leaders (CL) in health information dissemination became pivotal because they were trusted within their communities. For instance, one study found that CL were uniquely positioned to understand local challenges and they played a central role in public health response during the COVID-19 pandemic, including serving as trusted sources of health information and communicating risk and harm reduction strategies (Michener 2020).

During adverse public health events, keeping up with the latest developments can be challenging, even for medical professionals and researchers (Dubé et al. 2022). The influx of data, with varied interpretations, can lead to confusion and conflicting messages (Dubé et al. 2022); (Wild et al. 2021). During the COVID-19 outbreak, mask mandates, lockdown policies and vaccine processes changed rapidly due to political pressures, logistical constraints and new research evidence (Lyu and Wehby 2020; Rains et al. 2022). To combat the disease outbreak different prevention and treatment strategies were implemented, but these were not always accurately or effectively communicated, especially to marginalized communities (e.g., rural, minority, low socioeconomic).

Furthermore, the rapid advancements in digital communication platforms (e.g., websites, social media) have resulted in an infodemic – an overabundance of information, some of which is false or misleading, especially during a disease outbreak, when there is a higher need for health information (Mheidly and Fares 2020; World Health Organization 2022). In 2014, less than 10% of people reported using traditional media (e.g., books, newspapers) to seek health information, whereas 10–15% used a healthcare professional, 10–15% talked to a friend or coworker, and greater than 45% used the internet (Jacobs et al. 2017). Internet use to find health information has also increased access to mis/disinformation (Jacobs et al. 2017). A systematic review found that the prevalence of social media posts with health misinformation was up to 87% and about 1 in every 2.5 social media posts about vaccines contained misinformation (Suarez-Lledo and Alvarez-Galvez 2021). Mis/disinformation results in distortion of scientific evidence, opinion polarization, decreasing credibility of circulating information, erosion of confidence in health initiatives and increasing mental and physical fatigue, all of which may lead to adverse health outcomes and economic consequences (Borges do Nascimento et al. 2022); (Clemente-Suárez et al. 2022). For instance, at the peak of the COVID-19 pandemic, misinformation significantly influenced public behavior including reduced acceptance of preventative measures like mask-wearing, social distancing and vaccine uptake, and in some cases the misinformation about the efficacy of certain medications led to their shortage for patients who needed them for other conditions (Romano et al. 2021). Thus, effective methods for disseminating accurate health information during public health crises are needed.

BIPOC (Black, Indigenous, and other People of Color) communities face significant healthcare access and reach disparities, including inadequate insurance coverage, language disparities, and lack of access to culturally competent healthcare providers, resulting in many seeking alternative avenues for health information outside of their healthcare providers (Fiscella et al. 2000; Nair and Adetayo 2019; National Academies of Sciences et al. 2017).

During the COVID-19 pandemic, leaders within different organizations played a critical role in disseminating health information and resources to communities. Many people (e.g., pharmacists, trained school administrators, military personnel) that would not typically administer vaccines to the public stepped up to increase capacity (Merks et al. 2021; Pillay 2020). These leaders became sources of health information. Thus, by understanding how community leaders obtained, communicated, and distributed COVID-19 health information, we can create more effective public health models to better reach and serve underserved communities. This study, therefore, aims to (1) uncover perspectives of community leaders on trusted sources of health information, (2) explore the practices, challenges, and needs of community leaders in disseminating COVID-19 health information, and (3) describe opportunities to improve public health communication, reach, and access for underserved communities.

Methods

Study design and setting. This qualitative study utilized semi-structured focus group discussions ($n = 7$) with community leaders ($n = 9$) from Dallas, TX, USA, from April–June 2021. A focus group (FG) guide (Supplementary Table 1) was developed to align with research questions, informed by literature (Higashi et al. 2021; Schoch-Spana et al. 2021). The FG domains centered around COVID-19, online sources of information, mis/disinformation, suggestions for adapting and disseminating information, and rationale for web content. An initial draft of the guide was produced as part of the 'COVID Communications Resource Hub' project—one of seven Texas Community-Engagement Alliance (CEAL) Consortium research projects aimed to enhance education, access, and inclusion of underserved communities in COVID-19 prevention and treatment efforts—and was reviewed by an expert (RASF) in community health interventions.

Participant recruitment and data collection. Participants were conveniently recruited from a COVID-19 community advisory board because of their vast experiences as leaders in underrepresented communities. Ten community leaders were invited to the study, but one dropped off for personal reasons. A series of seven FGs (6 + 1 make-up FG to cater for low turnout in one of the FGs) were conducted via video conferencing. The same community leaders were invited to each session. Two team members trained in qualitative methods conducted each FG. One was the lead moderator who facilitated discussions (MGS). The other (RASF) served as co-moderator who assisted in capturing a detailed account of the discussions. Participants completed a demographic questionnaire before the FGs, which were audio recorded, lasting 60–90 min each.

Data analysis. All FGs were transcribed verbatim and imported into NVivo (QSR Version 12). After reviewing the transcripts, researchers developed a deductive codebook based on the World Health Organization's (WHO) Strategic Communications Framework for Effective Communications (World Health Organization 2023). LJR author initially coded all FG discussions using the deductive codebook and generated quote queries for each content area in the WHO framework. PG read all transcripts, reviewed the quote queries, and iteratively categorized the

Table 1 Characteristics of participants (*n* = 9).

Characteristic	*n* (%)
Sex	
Male	3 (37.5%)
Female	6 (62.5%)
Race	
Black/African American	3 (33.3%)
Hispanic/Latino	3 (33.3%)
White	2 (22.3%)
Other	1 (11.1%)
Age Range	
18–30 years	2 (22.2%)
31–45 years	1 (11.1%)
46–60 years	4 (44.5%)
61–75 years	2 (22.2%)
Education Level	
College courses	1 (11.1%)
College graduate	5 (55.6%)
Post-graduate	3 (33.3%)

data using a thematic analysis approach. Once data were categorized, researchers further sought patterns and relationships to continue iteratively categorizing the data and generating initial themes. PG, ALMU, and JS met to discuss the emerging themes, identify key points, and guide additional data organization. Following the meeting, PG reviewed the data and finalized all themes. Finally, all researchers involved in data analysis (PG, LJR, JS, ALMU) and the rest of the research team reviewed and approved the final themes.

Results

Participants were highly educated community leaders from diverse backgrounds (Table 1). The following themes emerged from the perspectives of the community leaders: (1) Both members of the community and their leaders experienced information fatigue, mistrust, and desensitization (2) Community leaders were expected to rapidly process and share accurate COVID-19 information (3) Community Leaders identified potential strategies to improve COVID-19 health information access and reach.

Theme 1: Both members of the community and their leaders experienced information fatigue, mistrust, and desensitization.

Community leaders received COVID-19 health information from multiple online sources, including local news stations, county websites, reputable community leaders (e.g., judges and mayors), and national sources like the Centers for Disease Control (CDC) and the World Health Organization (WHO). Information was also distributed through social media, emails, and within Black/African American fraternities, sororities, and faith-based organizations.

> *“I listened to the online version of the Dallas Morning News, and they have information about COVID-19. Again, I live in the Dallas suburbs, so there’s always information on the city’s website.”*

> *“I followed the Dallas County judge and the Ellis City mayor for COVID-19 health information.”*

> *“I go to my fraternity [meetings]…. Almost two or three times a week, local chapters have a workshop where you can share, ask questions, and receive information.”*

Most community leaders expressed that during the COVID-19 pandemic, there was too much information from various sources, and it was often contradictory and unreliable. Several also mentioned seeing contradictory COVID-19 health information in the media, from reputable organizations, and recognizable individuals.

> *“There is a lot of information that is not helpful that contributes harm to the community, especially around some of the vaccine hesitancy that people may have.”*

> *“You know, I was trying to avoid this, but immediately after we concluded our meeting last week, the [politician] released some ridiculous information about achieving herd immunity with 19% of the people being vaccinated, and he did it on TV, and as soon as he did it, people on Facebook took it and ran with it.”*

Many community leaders shared that mis/disinformation and virus-related fraud schemes contributed to the mistrust of COVID-19 health information, while others shared that their communities were prone to distrust because of historical racial injustices.

> *“There are a lot of scams connected to registering for the vaccine. People are being asked for their Medicare number or to put down a deposit to get their second shot. Older adults who may be more vulnerable to the virus are more susceptible.”*

> *“The discussion among people who look like me [Black/African American] is, ‘Here we go again with the Tuskegee study.’ Even though this is something different, and it happened years ago, people still know about it. It’s still in their mind.”*

Over time, community leaders and their communities felt desensitized to health information. For example, one participant stated, “*It just feels like a waste of energy to try to fight it sometimes, but what happens if I don’t say something*?” For community leaders, desensitization to information became a barrier to disseminating up-to-date information to community members.

Theme 2: Community leaders were expected to rapidly process and share accurate COVID-19 information in professional and personal settings.

Community leaders were trusted by their communities to supply or verify accurate health information. They needed to filter through COVID-19 information sources and rapidly disseminate to their communities. This happened in their professional roles and informal settings such as barbershops, Facebook groups, and churches. One participant shared that he provided COVID-19 information to his friends: *“I have friends that contact me, especially the guys at the barbershop who tell me COVID-19 information they’ve seen on Facebook. They give me an opportunity to talk to them and convince them since they see me all the time and trust me.”*

Some community leaders described their roles as pseudo-experts who, despite not being trained, had been put in a position of authority to offer guidance and solutions to their communities on COVID-19 health information. Several community leaders mentioned feeling overwhelmed and ill-equipped to continually provide accurate COVID-19 health information.

> *“Being a nurse, I have learned that throughout the years, instead of people calling their doctors, they will call, email, or text me because they trust what I say or my opinions or directions. Since I’ve been a nurse in this town, they recognize me and know how I work; that kind of history is important. So, when they see an update or a story, they tag me on it, and I try to read it, but I think a lot of it is misinformation, so I try to give them my opinion.”*

> *"I do not work for money, and I am not an authority, but I get bombarded with emails and Facebook messages. So, I am considered a go-to person, and l share my experiences with others. I will even do research to help them."*

> *"It's a battle that's hard for many of us who are thrust into being pseudo-experts in a pandemic."*

Community leaders used multiple strategies to avoid spreading misinformation and to disseminate accurate COVID-19 health information. For instance, they relied primarily on local sources of health information, such as county-run websites, and national and internationally reputable sources, such as the CDC and the WHO.

> *"I get tweets from the Dallas County Public Health Department, and I know the CDC and WHO also have Twitter accounts, where they repetitively put out tweets on coping with COVID-19. I find those to be incredibly helpful."*

However, many community leaders also stated that all sources of information, including information from trusted local and federal organizations, needed to be scrutinized, as they sometimes provided incorrect information. Some also carefully reviewed potential sources of bias among organizations, such as the organization's funding sources. Most community leaders viewed government and non-profit organizations as less likely to have conflicts of interest than privately-owned organizations.

The community leaders repeatedly expressed that combating misinformation and preserving community trust was exhaustive and often overwhelming. Many believed that proactively building and sustaining trust with the community was the most effective way to fight COVID-19 mis/disinformation. *"We want to ensure that we continue to give good and credible information and continue to be a trusted source for the community."*

Theme 3: Community leaders identified potential strategies to improve COVID-19 health information access and reach.

Community leaders proposed various methods to reach people with credible health information, such as using flyers, home visits, radios, schools, churches, videos, and messages on public transit and encouraging people to share with family and friends. They also suggested using social media as the best way to reach many people, plus faith-based organizations and senior centers for those with little to no access to technology.

> *"I also try to send stuff to my young adult daughters, and I encourage them to share it with their friends."*

> *"We had a vaccine drive and a huge number of people canceled. So, we put it on social media, and so many people were available. We were packed within the hour."*

> *"Something helpful for folks who don't have access to information is working with faith-based communities, senior centers, and other organizations in the community that work with older adults."*

Although many suggestions were aimed at improving health information reach, there was also a recognized need to improve access to COVID-19 health information by tailoring it to specific communities. Several community leaders mentioned it would be helpful if they received information that was already packaged and ready to be disseminated to facilitate quick and prompt sharing. One participant stated, "One of my priorities is looking for *a website that has things I can share easily."*

To facilitate easy dissemination of COVID-19 health information, they desired information and materials already translated into different languages and were culturally appropriate for diverse racial and ethnic groups. Another participant shared, *"It helps if it's translated already into Spanish, as that's a huge thing for us."* In emphasizing the importance of culturally relevant information, another participant stated, "*There is a need to go beyond translation. It's not just that it is language-appropriate translation but that it is also culturally relevant. It should be respectful, not condescending, and the material, including the pictures, should represent the people you're trying to reach."*

Community leaders also expressed that written materials should be adapted to ensure readability for people with lower literacy levels. For example, one participant described the importance of information being at the appropriate reading level: "*To our population, we look for things that are not too high level, so something that everybody can read, and everybody can easily understand."*

The community leaders disclosed that the communities' reliance on them to provide accurate and trusted information would have been easier if the COVID-19 health information had been tailored to specific audiences and packaged in a format that could easily be shared on social media (e.g., an infographic). They also suggested leveraging recognizable, relatable, and trusted community leaders and organizations to build credibility in disseminating COVID-19 health information.

To address having too many competing sources of information, they suggested having a "one-stop shop," such as a comprehensive website where all qualified health providers and community leaders could obtain accurate COVID-19 health information. As one participant suggested, *"I think what we are missing is something universal where people can just see all the information in one place. Something like your website and resource hub."* This resource would ensure that all parties involved with health dissemination have consistent information to build and retain community trust.

Discussion

Information mistrust was common during the COVID-19 pandemic, especially among BIPOC communities who bore a disproportionate burden of COVID-19 health consequences (Ojikutu et al. 2022). Community leaders in this study reported that the need to provide accurate and timely information was high and compounded with a lot of mis/disinformation. Multiple studies show that COVID-19 mis/disinformation often led to mistrust, reduced acceptance of preventative measures, and contributed to vaccine hesitancy (Ojikutu et al. 2022). The spread of online mis/disinformation was pervasive during the COVID-19 pandemic, exacerbating this ongoing public health issue, particularly regarding vaccine hesitancy (S. K. Lee et al. 2022). However, mis/disinformation negatively influencing disease prevention measures like vaccine uptake is not just for COVID-19, but for other infectious diseases and immunizations efforts (S. K. Lee et al. 2022). These study's findings may apply to other public health issues affected by mis/disinformation.

In this study's context, the role of CL became increasingly critical. As trusted figures, they were placed in the unique position of debunking misinformation and validating official public health communication. This role was driven by community trust and the urgent need for credible information. The CL expressed a keen awareness of their responsibility in influencing public opinion and behavior, driven primarily by the motivation to provide their communities with the most accurate and helpful information possible. This intention was particularly evident in their proactive strategies to consult reputable sources, combat misinformation, and tailor messages to meet their communities' needs. However, despite these commendable efforts, the reliance on CLs for information dissemination also highlights a significant vulnerability in the public health system, especially in reaching individuals with low trust. The potential risks associated with this informal dissemination method are noteworthy, particularly the spread of misinformation by well-intentioned individuals who may inadvertently lack accurate information or the skills to debunk mis/disinformation. This concern is also raised by Ecker et al. (2022) who notes that misinformation can proliferate even in well-meaning networks, leading to public health challenges. Public health authorities may engage more actively with community leaders to mitigate these risks. Such collaboration would empower CLs with the right tools and information and enhance the overall effectiveness of public health campaigns.

The CL highlighted the influence of race on health information-seeking behavior. Drawing on historical injustices, like the Tuskegee experiments, and the tendency of people to trust members of one's racial group, the community leaders highlighted how their communities expressed doubt and wariness towards traditional healthcare providers. This mistrust is not an isolated sentiment but a reflection of a broader pattern of skepticism that arises from systemic racial discrimination in healthcare (Jaiswal 2019). This finding is corroborated by a poll that found that 63% of Black and 45% of Hispanic adults report they have experienced serious incidents of discrimination in their lifetime, and 17% and 14%, respectively, indicating they experienced this discrimination while getting health care for themselves or a family member (Hamel et al. 2020). The mention of Tuskegee experiments and distrust in healthcare systems underscore the critical importance of understanding the historical context when addressing health information-seeking behaviors in different racial groups. Prior research has demonstrated that trust in health information sources varies by racial group. For instance, Black and Hispanic individuals have persistently lower rates of health information-seeking behavior when compared to white individuals (Fareed et al. 2021). However, Black and Hispanic populations have higher rates of trust in diverse sources of health information, including family, friends, and charitable organizations, as opposed to healthcare providers and internet health information sources (Fareed et al. 2021). Our findings add to the evidence of racial differences in health information-seeking behavior and the need for continued efforts to diversify approaches to disseminating health information. It also suggests that health institutions at local, state and national levels need to rebuild trust in communities affected by historical injustices. Additional focus should be on developing strategies for dismantling misinformation while being sensitive to the historical context of racial discrimination in healthcare.

Community leaders in this study had a health background (e.g., nursing); however, others did not, and most were not trained to interpret COVID-19 health information or play a role in debunking mis/disinformation. Despite this, they played an undeniable role as trusted information conduits in their communities, and their perceived authority and trustworthiness were especially crucial given the widespread mistrust in national entities and official channels for public health communication. This often led them to be approached by others, making them pivotal in communicating COVID-19 health information. Still, the community leaders in this study were highly educated and vehement about not wanting to spread COVID-19 misinformation. To circumvent the mis/disinformation, community leaders relied on trusted and reputable sources of health information; some even assessed potential sources of biases among these information sources. However, it remains unclear if the community leaders could debunk mis/disinformation and accurately interpret or translate COVID-19 health information. This underscores the need to provide these community leaders with appropriate resources and training to enhance their capacity to disseminate accurate health information. Furthermore, while CL have shown diligence in trying to circumvent mis/disinformation, there is an evident need for further research to understand their specific methods of discerning credible health information. Previous research has found that community leaders can be trained to provide accurate and reliable health promotion information (e.g., colorectal cancer, physical activity, nutrition) (Cole et al. 2017; Wilcox et al. 2013). Thus, replicating existing models may be needed for other health outcomes, including a model for health crises like the COVID-19 pandemic.

Another critical issue raised by community leaders was the overload of COVID-19 health information that they and their community members experienced, which contributed to information fatigue and desensitization. The community leaders felt burdened and fatigued with synthesizing and disseminating health information to their local communities. Indeed, other studies have similar findings regarding COVID-19 information fatigue and desensitization (Seale et al. 2022). Information overload is a critical concern because it can lead individuals to ignore all information, including guidance from health experts or authoritative sources (C.-J. Lee et al. 2018). Additionally, information overload can lead to anxiety, stress, delaying decision-making, and lack of critical evaluation of the information, potentially leading to delaying protective health behaviors or adopting unfounded or dangerous behaviors (Clark et al. 2019; C.-J. Lee et al. 2018; Nagler 2014; Parra-Medina and Álvarez-Cervera 2021). The relentless influx of information, coupled with the daunting task of countering misinformation, especially in a public health crisis, can lead to a sense of futility and exhaustion (Stevens et al. 2021). Therefore, it is imperative to equip community leaders with comprehensive support mechanisms that bolster their capacity to remain steadfast and effective in their roles. This support should encompass access to accurate and timely information and resources such as resilience training programs, peer support networks, and access to mental health resources.

Another strategy that community leaders suggested would help deal with information overload and mis/disinformation was having a single source of accurate, timely, and culturally appropriate COVID-19 health information. This approach could help streamline the flow of information, reducing the burden on community leaders and enhancing the effectiveness of their communication efforts. It is important to note the community leaders reviewed the Texas CEAL COVID-19 Information and Resource Hub website, which was developed as a tool for finding and relaying trustworthy information and materials on COVID-19.

In addition to having a single source of COVID-19 health information, community leaders shared many other strategies for increasing access and reach of COVID-19-related information based on their experience working with local communities. For instance, they suggested using multiple communication mediums (e.g., radio, schools, churches), encouraging community members to share trusted information with family and friends, and translating information into multiple languages. These strategies are also supported by research that demonstrates that using various mediums of communication can improve reach and timeliness, as individuals may prefer or have access to particular mediums (Ingram and Reed 2016). Word-of-mouth is a powerful communication tool that previous research demonstrates to effectively increase health information reach (Bradford et al. 2017). Translation of health information into multiple languages—by native speakers and performing a back translation—are effective strategies included in the WHO Strategic Communications Framework to increase the understandability of information (World Health Organization 2023). Although these strategies are critical for health communication, there continues to be a lack of consistency and rigor in applying them in practice, an area of study that deserves further investigation (Tan and Cho 2019).

Strengths and limitations. The community leaders were highly educated and diverse in age, race, and sex and they were well-informed and could provide multiple perspectives. Future studies should include a broader range of educational backgrounds, such as those without college degrees, to ensure a more comprehensive representation of community leaders. The sample size of this study was small; however, the study's qualitative nature and ample time with community leaders (7–10.5 h each) allowed for the exploration of rich and in-depth perspectives. The researchers' distinct backgrounds and experiential differences compared to the participants could have impacted the analysis but were mitigated through researchers' reflection on potential biases throughout the analysis process. In some cases, the perspectives of community leaders may not have been representative of the individuals or communities they interact with or serve.

Public health implications. This study underscores the critical role of CL in public health communication, especially during health crises like the COVID-19 pandemic. Their unique position of trust within communities highlights the need for targeted public health strategies that leverage their influence. For instance, with the evolving challenges of the COVID-19 pandemic, such as the emergence of new COVID-19 variants and discussions around the need for booster shots, CLs can serve as essential channels for evidence-based public health communication. Their engagement may be instrumental in helping communities understand and adapt to ongoing preventative measures.

To address the pervasive issue of misinformation, which has been shown to exacerbate health crises and contribute to resistance to public health measures, it is imperative to equip CL with the tools and resources necessary for effective communication. This may include training programs that enhance their ability to discern and counteract misinformation, as well as providing them with ready-to-disseminate, culturally appropriate resources suitable for different health literacy levels and strengthening their resilience in navigating public health challenges. Furthermore, policy implications arise from the need to create interventions designed to rebuild trust in public health systems, particularly in communities with a history of healthcare discrimination. Incorporating CL in these efforts may be strategic in creating more effective community-centric public health interventions. For practitioners, there may be a need to diversify the approaches used in disseminating health information to improve the reach and effectiveness of evidence-based health messages.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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Author contributions

RASF conceptualized and designed this qualitative research study. RASF, VL, MGS, and LX collected data. PG, ALMU, JS, LJR, and CDR analyzed and interpreted the results. PG, ALMU, and JS drafted the manuscript, and the rest reviewed and validated the themes. All authors contributed to revising the manuscript and gave substantive feedback. All authors read and agreed to the published version of the manuscript.

Competing interests

The authors declare no competing interest.

Ethical approval

This study was performed in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Texas A&M University Institutional Review Board (IRB-2022-1003-M).

Informed consent

Informed consent was obtained from all participants.

Additional information

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