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ORIGINAL RESEARCH

Assessing the appropriateness of dissemination strategies and the role of community-based volunteers in promoting insecticide-treated bed nets in Kalumbila District, Zambia: A qualitative study

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ABSTRACT

Introduction: Despite global efforts to eliminate malaria, it remains a significant issue. Insecticide-treated nets (ITNs) are widely available and cost-effective, yet their adoption and proper use are often hindered. Understanding the challenges in ITN uptake involves examining the dissemination strategies used by community-based volunteers (CBVs), which are often understudied. This study investigated these strategies and CBVs' roles in rural health facilities of Kalumbila District, Zambia.

Methods: This exploratory case study used four focus group discussions with a total of 28 household heads, seven in-depth interviews with community leaders and CBVs, and seven key informant interviews with health facility staff and ITN distribution program officers to gather data. Interviews and focus group discussions were transcribed and coded manually before generating themes through inductive thematic analysis.

Results: CBVs played crucial roles in advocacy, social mobilization, awareness creation, registration and distribution of nets, and enforcing correct net use. However, low manpower, high turnover, and inadequate incentives hinder sustained CBV engagement. Contextually appropriate communication strategies with culturally relevant messages were vital to improving net use. The credibility of information sources, particularly health facility staff and CBVs, influenced community acceptance and trust. Findings highlighted the need for communication strategies that are linguistically accessible and visually engaging, considering diverse literacy levels.

Conclusions: Effective ITN promotion depends on the vital roles of CBVs and contextually appropriate communication strategies, with a focus on overcoming sustainability challenges for long-term malaria control and elimination.

Keywords: Malaria, insecticide-treated bed-nets, community-based volunteers, health promotion, Africa.

Abstract in Español at the end of the article

INTRODUCTION

Though significant advances have been made globally to eradicate malaria, it continues to be of concern to public health. Half of the world's population is at risk of getting infected with malaria [1]. A World Health Organisation (WHO) report indicates that 249 million cases and 608, 000 deaths were recorded in 2022 [2]. Of these cases and deaths, 94% and 95% respectively were recorded in Africa with children under the age of 5 being the most affected [3]. In Zambia, the whole population is considered at risk of Malaria infection [4]. The disease distribution in the country follows climatic patterns (temperature and rainfall), which lead to disproportionate disease burden across regions [5].

Rural areas bear a higher malaria burden than urban areas with children under 5 years being the most vulnerable to the infection [6]. To ensure that the rural, often most affected communities receive equitable health care (health promotion, prevention, treatment, rehabilitation, and palliative care), efficacious interventions have been rolled out in Zambia [7]. These interventions include Intermittent Preventive Treatment in pregnancy, improved case management and treatment, Indoor Residual Spraying, Long Lasting Insecticide Nets (LLINs), and Prevention during pregnancy with LLINs [6]. The use of ITNs as a strategy of malaria control was adopted in Zambia in the year 2001. Mass distribution was later introduced as an effort to increase coverage and subsequent use of bed nets per household in 2005 [8]. Despite free mass distribution increasing ITN ownership, Amoran, et al., (2012) warned that free distribution of ITNs would not necessarily translate into bed net use [9]. Studies on barriers and facilitators of ITN use have reported education level, parity, malaria prevalence, marital status, and other ideations as some of the factors that affect net use [10]. To increase the uptake of ITNs in rural areas, appropriate health education strategies addressing these key factors are necessary to generate demand among those most at risk [9]. Some of the strategies used include door-to-door visits, Information Education Communication (IEC) material distribution, road shows, advocacy, community meetings, and others [11].

Many countries grappling with Malaria cases have embraced the use of CBVs to deliver malaria prevention interventions including promotion of ITNs [12]. The purpose of involving CBVs is to alleviate the malaria burden by strengthening ownership, legitimacy and support of the interventions [13, 14]. There are studies that have demonstrated the barriers and facilitators to ITN uptake and use in related contexts [15, 16, 10]. However, key in understanding the challenges with uptake of ITNs are the dissemination strategies used by the community-based volunteers (CBVs) [17], yet these are understudied in most cases. As such, this study had two objectives, first, to investigate the roles of community-based volunteers in the promotion of ITN use and second, to explore the perceived appropriateness of dissemination strategies used in the promotion of bed net uptake and use.

Strategies/key messages used in promotion of ITN use.

The use of ITNs for malaria control was adopted in Zambia in the year 2001. Between 2001 and 2004, various methods were used to distribute insecticide treated nets targeting different geographic, economic, and vulnerable societies as dictated by net availability and donor funding [11]. In 2005, a mixed approach to delivery of insecticide treated nets was adopted adding free mass distributions which account for 92% of total nets distributed. The Antenatal care (ANC) clinics, under 5 clinics, commercial market, school-based distributions, and other channels form the most important continuous distribution channels and account for the remaining 8% of total nets distributed [18].

Strategies that include advocacy among community leadership, community engagement, media and others were integrated in the national communication strategy for malaria elimination 2017-2021 [19]. Within the study area, door-to-door visits, IEC material distribution, road shows, advocacy meetings with community leadership, community meetings, and others were used to promote net uptake and usage.

The communication strategy outlined examples of key messages whose objectives included to, i) increase knowledge of malaria/the mosquito; ii) increase understanding of vector control methods (Indoor Residual Spraying (IRS)/Larval Source Management (LSM)/LLINs); and iii) communicate the community benefit of vector control methods. These messages are provided below:

- IRS and LLINs prevent malaria by killing or repelling mosquitoes,
- LLINs insecticides are not harmful to children or adults,
- LLINs are free. Sleep under a net every night, throughout the year,
- Not sleeping under a net puts you and others at risk of malaria,
- Prevention is better than cure. You can import malaria anywhere you travel. Not sleeping under a net puts you and others at risk of malaria.
- Encourage your neighbors/community to have their houses sprayed, sleep under LLINs.
- If you are infected with malaria, mosquitoes can transmit malaria parasites from you to others. Sleeping under a net every night and allowing your house to be sprayed stops this cycle. [19]

The dissemination of such messages is often a responsibility of subnational and community structures that include the district health office, health facilities and neighborhood health committees (NHCs). Community-based volunteers (CBVs), who are integral to these structures, serve as trusted intermediaries between the health system and the communities they serve [20]. The role of CBVs in malaria control interventions has been reported in literature to include ITN distribution, health education and behavior change communication. In Mozambique for instance, CBVs were central in mobilizing com-

munities and raising awareness, resulting in increased ITN uptake and use [21]. Similarly, in Nigeria, CBVs collaborated with traditional leaders to overcome logistical challenges by mobilizing local resources such as bicycles to aid in distribution efforts [9]. Though CBVs have been involved in several ITN dissemination efforts in Zambia, limited evidence exists on their experiences and perceived appropriateness of dissemination strategies used. This study fills this gap by exploring the CBVs' roles and the contextual appropriateness of dissemination strategies used to promote ITN uptake in Kalumbila District, Zambia.

METHODS

Study design

An exploratory case study design was adopted to understand community perceived fit of dissemination strategies used to promote use of ITNs and the role played by community-based volunteers [22].

Study setting

The study was conducted in Kalumbila District of the Northwestern province of Zambia. The district falls in the agroecological region III of the country characterized by a rainfall of over 1000mm per year and has an international border with the Democratic Republic of Congo [23]. This predisposes it to imported malarial cases from mobile communities. The district is also home to two large mines, Lumwana Mining Company and Kalumbila Minerals Limited, which opened in 2007 and 2015 respectively. The presence of mines has facilitated the increase in population at a rate of 8.1% per year [24] and creation of settlements that may encourage conditions such as damming that increase malaria transmission. Two rural communities (Jiundu and Musele) where mosquito nets had been distributed during the 2020 mass distribution period were selected for data collection. These communities were chosen not only because they benefited from ITN distribution but also because the government health facilities in the communities received support from Kalumbila Minerals Limited for the malaria community health initiatives.

Sampling strategy

The study purposively sampled participants from national, subnational and community levels who had taken part in the 2020 ITN mass distribution effort. 28 household heads who had registered to receive nets in the last mass distribution campaign in each village participated in focus group discussions (FGDs). In-depth Interviews (IDIs) were held with community leaders within the study areas who had facilitated ITN distribution within their communities. These leaders included, neighborhood committee members, community health workers, and village headmen from the two villages. Recruitment of suitable community participants was assisted by health facility workers. We also held key informant interviews (KIIs) with health facility workers, district, provincial and national ITN distribution program officers.

Table 1. Category of respondents.

Data Collection techniques	Category of Respondents	Number of Interviews
IDIs	NHC Members	2
	Community Health Workers	3
	Traditional Leaders	2
	Total IDIs	7
KIIs	Health Facility Workers	3
	National Informants	2
	Provincial informants	1
	District Informants	1
	Total KIIs	7
FGDs (Musele Village)	Male Household Heads (8 participants)	1
	Female Household Heads (6 participants)	1
FGDs (Jiundu Village)	Male Household Heads (8 participants)	1
	Female Household Heads (6 participants)	1
	Total FGDs	4

NHC – Neighborhood Health Committee; IDI – In-depth Interviews; KII – Key Informant Interviews; FGD – Focus Group Discussions

Data collection and sample size

Data was collected using FGDs, IDIs and KIIs to obtain multi-level insights on ITN dissemination strategies and CBV roles in ITN promotion. A total of seven IDIs were conducted among community leaders (NHC members, CHWs and traditional leaders) and seven KIIs were conducted among national and subnational programme informants. Data saturation was deemed to have been reached after the seventh interview, as no new themes emerged from participants. Each interview lasted between 35 minutes and one hour.

Four FGDs were conducted, two among males whose households were registered for ITN collection and two among females whose households were registered for ITN collection, which lasted a minimum of one hour. All discussions were conducted face to face, guided by pretested discussion guides with open-ended questions related to (1) general knowledge of malaria preventive measures, (2) perceptions regarding ITNs as malaria prevention methods, (3) Malaria and ITN information access, (4) Perceived appropriateness of communication strategies used in promoting ITNs and (5) the perceived role of the community in development and delivery of ITN promotion messages and strategies guided by study objectives. The guides were pretested with one facility in-charge, 2 CBVs and community members from Kan-

zala health facility (not included in the final sample) and adjustments were made to refine question phrasing and sequencing for clarity and flow. Data collection was done from April to June 2023 by the first author and a research assistant trained in study objectives and approaches, qualitative data collection methods, and ethical considerations during data collection. Table 1 provides the category of respondents and number of interviews from each category of respondents in the study.

Data analysis

All discussions were audio recorded and transcribed verbatim for analysis. To ensure quality analysis, three levels of team reviews were conducted. First, the postgraduate program supervisors reviewed the interview guides to ensure that interviews were conducted in line with study objectives. Second, translated scripts were reviewed to verify that translation preserved the original meaning. Third, the generation of subthemes and coding was independently verified by four analysts to ensure consistency.

Data was analyzed in an iterative thematic analysis process as described by Mihas [25]. A priori themes were determined from the study objectives whereas the subtheme on corporate support emerged from the data. Initial familiarization with data was done while transcribing, reading, and rereading transcripts. During this process, subthemes related to the objectives were identified from the data. Codes relating to the subthemes were reviewed from text by examining for regularities, convergences and divergences in the data [26]. A code book was developed based on the research objectives from which major themes were obtained. To illustrate the themes, descriptive codes and related participant quotes identified using numerical identifiers from original text were used and are presented in Table 2 and the results section.

Table 2. Themes and Codes from the study.

Major Themes from the objectives	Subthemes and Codes from data
Roles of CBVs in ITN Promotion	Advocacy
	Social mobilisation
	Awareness creation
	Registration and Distribution of nets
	Enforcement of correct net use
Perceptions of strategy/message suitability	Context and cultural appropriateness of messages
	Credibility of messages
	Usefulness of Communication strategies/messages
	Sustainability of SBC efforts
Corporate community ITN promotion support	Facility level logistical support
	Partnership in outreach and program Implementation

Ethical consideration

The study was reviewed by the University of Zambia Biomedical Research Ethics Committee (UNZABREC-Ref. No. 3504-2022) and the National Health Research Authority (NHRA- Ref No: NHRA000021/08/02/2023). Informed consent was sought from all participants prior to participation. Anonymity was ensured by removing identifiers from the quotes and only numerical participant IDs were used. All audio recordings and transcripts were stored in password protected folders accessible only to the authors to ensure confidentiality.

RESULTS

The results are presented according to the main and related sub-themes. The first main theme is about roles of CBVs in ITN promotion and had sub-themes advocacy, social mobilisation, awareness creation, registration and distribution of nets, and enforcement of correct net use. The second main theme is about the perceptions of strategy/message suitability whose sub-themes are context and cultural appropriateness of messages, credibility of messages, usefulness of communication strategies/messages, and sustainability of SBC efforts. Lastly, we present corporate community ITN promotion support with facility level logistical support and partnership in outreach and program implementation as sub-themes.

Roles of CBVs in ITN Promotion

Advocacy

Community-based volunteers together with health facility workers collaborated with local community leadership like chiefs to advocate for ITN uptake and use. This advocacy solicits community´s participation in the intervention.

> *"The traditional leaders are usually there just to support us, but they do not disseminate the information. For instance, we won't say the chief is going to disseminate the information, No. But just that courtesy to say in case of anything they*

are aware that okay, this is what is happening… the chief is the accepted leader of the people." (KII 5, Health Facility Worker)

Advocacy with local leaders helped to create community trust for program implementers. For example, in the study area, implementers were suspected of selling the nets by the communities, however, the trust was restored through the headmen who were engaged for advocacy.

"*People have faith in their leaders, so when I spoke to them (the community), they were able to understand since I assured them that we will follow the matter and find out the truth about the issue (sell of the nets).*" (IDI 1 Headman)

Social mobilization and awareness creation

Another role that community-based volunteers mentioned was social mobilization. This task was completed through megaphone announcements or was solicited from religious leaders and other community leaders for purposes of creating awareness about ITN collection days, points, and order.

"*As CBVs, we go around the villages and announce that on these specific days, we shall be giving out the mosquito nets. We sometimes use megaphones and at other times we go door to door… We (also) use churches, schools and village headmen and indunas who are there in those villages*" (IDI 2 CBV)

Beyond mobilizing the community for meetings and distribution events, community-based volunteers were responsible for disseminating messages that created awareness about malaria and net use. One of the CBVs put it this way.

"*We also as community health workers go door to door telling the people in their homes. When registering them, we teach even when distributing. We cannot rely on the nurses, they have their work and are busy with that, so if we rely on having them (to) teach the community alone, they will not manage because this place (the facility) is busy. Therefore, as community health workers we help out when there are clinical programs, they carry us into the community and we help, those that go to the clinic find them there and they teach them there. They tell what to teach and we go to the people and disseminate it. When we have a lot of people speaking about the same thing, it helps very much.*" (IDI 4 CBV)

Registration and distribution

The health facility staff working through community-based volunteers registered communities for distribution. They collected such information as the number of household members which helped in estimating nets required in that area. They also were responsible for distribution of the nets during mass campaigns. CBVs distributed the nets from a central location or took the nets door to door. In the community-based distribution approach, which had not been implemented, a trusted community figure would be entrusted with the nets and would distribute them on demand to the community.

"*So we go and register people, we collect all household data. Then we go and distribute to the houses we had collected data from. During the distribution, we pick a central place for the zone and call out the register from there and give out according to the names. The central places sometimes are churches, schools, or marketplaces.*" (IDI 4 CBV)

"*There is another distribution channel called community based… We haven't explored it yet as a country or as program, but it's part of our distribution channels. With it, the net is given to the community as and when it is needed, but then the catch is you must identify the person within your community, the trusted person.*" (KII 2 Program officer)

Enforcement of correct net use

The participants reported that nets were sometimes used for purposes other than the intended one. As such, community leaders in the study area have instituted some form of bylaws to deter communities from net misuse such as fines for any member found to misuse mosquito nets.

"*Some traditional leaders have come up with bylaws or community laws or whatever, where they actually fine if they find somebody misusing a net, they are fined a goat, whatever, and so on, so that sort of deters individuals from misusing the net.*" (KII 1 Program officer)

Another participant added that,

"*Those misusing the nets for charcoal, maize and fishing purposes, are brought to the local authorities and we warn them or discipline them to clean the hospital or clinic. Sometimes we grab charcoal and donate to the clinic. We do not have a standard measure, but we do discourage such practices.*" (IDI 1 headman)

On a similar note, community members felt that continuous follow ups on net use could potentially discourage net misuse.

"*It requires someone who… can make follow up on the use of the nets nicely, that way no one would misuse the nets.*" (Female FGD1 R1)

The CBVs recognised that making follow ups post distribution efforts was their responsibility but stated that there were few CBVs to do that and that there were no incentives to motivate them to that regard.

> *"If we had manpower, we would effectively monitor usage for other purposes like charcoal and report. We who do this job do it voluntarily, as doing a voluntary job for a long time is hard, a way should be found to help us be motivated and work efficiently."* (IDI 4 CBV)

From the findings presented above, community-based volunteers performed roles together with or as delegated by health facility workers. However, it was rare to find situations in which CBVs initiate their own initiatives.

Perceptions regarding suitability of dissemination strategies and messages in ITN Promotion

To illustrate the perceptions, subthemes including context and cultural appropriateness, credibility of messages, usefulness of communication strategies/messages, and sustainability of SBC efforts are presented below.

Context and cultural appropriateness

The messages and strategies used were believed to be in line with cultural beliefs. For instance, the IEC material that show a man, woman and their child sleeping under a net, was perceived as simply an effort to show that even parents are at risk and must be protected. It was not regarded as an inappropriate depiction.

> *"A net is important in this way, it must show that children must sleep under the net, and the parents also should sleep under it, they are also at risk of malaria. There is no problem, for me, I will be sleeping with my husband without a problem."* (Female FGD1 R1)

Credibility of messages

The messages were perceived to be credible dependent on their source. Health facility staff were considered a more credible source of messages. Though community health workers were also regarded as a credible source of information, the community perceived CBVs as being more loyal to the facility than they were to the community interests. As such, communities felt that CBVs protected the interests of the facility more than those of the community.

> *"It is difficult for the CHWs to say to me the things they think are not right about the program since they consider the facility workers as their superiors. They are scared that they may not work well."* (IDI 7 NHC)

As such, some community members did not regard community-based volunteers as representatives of the community in health facility meetings.

> *"The CHWs are workers of the clinic we have other community representatives at the clinic."* (Male FGD2 R1)

Usefulness of communication strategies/messages

Participants reported that pictures incorporated on IEC materials were engaging. The pictures could depict the message on the material to people that may not be able to read. Most of the material provided during campaigns were in English, this made it difficult for community members who were unable to read English to engage with the material without a third party to explain. Nonetheless, efforts were made to translate messages into languages that could be understood.

> *"When we receive just in English, we encourage the districts to summarize the key points of the key messages that they can printout on an A4 paper and distribute so that the old man in the village who can only read local language can also be included."* (KII 3 Program officer)

Other than the language of the IEC material, participants felt that demonstrations of how to hang the nets would be more effective since it is more engaging with the community.

> *"There are those who find it difficult to understand and others who want you to do things for them or rather demonstrate as a show of an example, the community feels nice like that. But if you just hand over without saying anything, the community receives and feel nice but then fails to follow that well."* (IDI 4 CBV)

The use of lay language and people in radio programming efforts was perceived as way to prevent the temptation of becoming technical with the dissemination efforts.

> *"As health workers, we tend to be too technical. You take someone on radio, and they, you know, use these big terms that members of the community will not be able to understand."* (KII 1 Program Officer)

Sustainability of SBC efforts

Participants noted that intermittent behavior change efforts made it difficult to change behavior and later sustain it. Several challenges including lack of follow ups, high CBV turnover, lack of motivation for CBVs and cost of SBC implementation were perceived as some of the challenges to sustainability of SBC efforts.

Follow-ups

The participants noted that post distribution follow ups to monitor net usage could potentially sustain the behavior of sleeping under the net and discouraging misuse thereafter. However, follow ups were not regularly done.

> *"If follow ups were done, most of these things happening in the homes like a mosquito net being damaged, we would know. Sometimes children tear the nets, sometimes they take nets and pack,*

but if we had manpower to have us go door to door to check the nets torn and repair them, this would work... we would effectively monitor misuse like charcoal tying and report." (IDI 4 CBV)

High CBV turnover

High CBV turnover was regarded as the main reason for which there was low 'manpower' to assist with communication and distribution efforts. The high turnover rates resulted from CBVs seeking better remuneration and career progression elsewhere.

> "*There is high turnover, if a school leaver decides to volunteer as a CBV, and then two years down the line, you invest and train this person and so on you give them all those incentives. Two years down the line this person is accepted to go and study, so you will have you know, that turnover and they become fewer and fewer*" (KII 1, Program officer)

High cost of SBC

Furthermore, interpersonal communication (IPC) was perceived as the most important form of communication to illicit uptake of ITNs. However, it was also noted that it was an expensive strategy requiring capacity building of CBVs, incentivizing them, and providing them with reference material for their IPC efforts.

> "*That (IPC) requires a lot of money, you will need to invest in the training of the community-based volunteers, you need to invest in the development of the tools with the key messages and also, the incentives, because these people need to be mobile, and you can't do it as a one-off activity or intervention, it has to be continuous*" (KII 1, program officer)

Corporate community ITN promotion support

Facility level logistical support

Health facility staff reported that the mine contributed equipment such as lights, weighing scales and malaria testing kits that strengthened overall service delivery. While these resources enhanced the health facilities' operational capacity, they did not alter dissemination strategies, which remained under the Ministry of Health.

> "*One of the things that we see is… they (mine) help with a lot of things, malaria testing, they bring lights for using at the clinic, weighing scales and most of the things they do bring. We relate well with them.*" (KII 5, Health Facility Worker)

Partnership in outreach and program Implementation

The mine also collaborated with health facilities on malaria prevention outreach in schools and communities. Contributions included megaphones for CBVs and transport support to community based ITN distribution centers. These activities reinforced program delivery strategies without changing CBV roles or programmatic dissemination strategies as all partners were expected to align to national malaria intervention guidelines.

> "*There are programs they (mines) do specifically in the community through the clinic and we work together… they gave us megaphones and transport, not that they have their own CBVs during ITN distribution.*" (KII 4, Health Facility Worker)

> "*We do give policy direction. We do have guidelines to guide everyone implementing malaria interventions. When it comes to partners that are supporting us, they buy into our strategy, so they don't just wake up and say, 'I'm going to do this.*" ." (KII 1 Program Officer)

DISCUSSION

The findings of this study demonstrated that successful ITN promotion and uptake requires strong community participation with community-based volunteers being key community partners. While their role in programme design was not apparent, CBVs were key in advocacy, social mobilization, awareness creation, enforcement, registration and distribution of nets. The study further showed that for easy uptake of ITNs, communication strategies required context and cultural relevant messages to be presented in more engaging manners through/by credible sources. Further, support received from Kalumbila Mine regarding community ITN promotion is demonstrated. Although these roles of CBVs and perceptions about dissemination strategies were specific to ITN promotion, they could be adapted to support other health interventions that rely on strong community participation.

Advocacy roles of CBVs demonstrated in this study were cardinal for community buy-in. This agrees with the Alliance for Malaria Prevention, [27] who admonish that interventions run a risk of rejection when led by people or material from outside that community. In Nigeria, advocacy with traditional and religious leaders led to mobilization of resources for transportation support at community level using personal bicycles [28]. CBVs involvement in social mobilization and awareness creation within their own communities was also a key strategy in Mozambique's malaria control and prevention efforts [21]. Involvement of CBVs is vital as CBVs are recognized, trusted, and respected members of the community [29]. In addition, use of CBVs can support delivery of services by promoting shared communication and increased commitments at community level [30].

In this study, we found that CBVs distributed nets from a central location and/or delivered them door to door in some zones. The involvement of CBVs in registration of households and distribution of ITNs has been reported in other mass distribution efforts within sub-Sahara African countries [31, 32, 33]. For example, in Tanzania, volunteers received coupons from pre-registered caregivers in central LLIN issuing points [33]. Wang et al. [34] recommend that community point distributions have the potential to yield sizeable time savings compared to door-to-door distributions.

The strategies and messages used for ITN promotion were regarded culturally appropriate. Cultural competence in centrally designed health promotion strategies is key in addressing cultural differences of user [34]. Any education (including health education) that is not founded on a society's culture alienates that society from itself [36]. As such, communities oppose 'strange' messages as a matter of self-preservation [37].

In this study CBVs were regarded as a credible source of health messages. This perception makes communities more likely to accept messages of ITN use from CBVs resulting in more positive mindsets and behavior attitudes [38]. It is therefore important to protect the trust and respect CBVs have among communities [37]. However, we found that CBVs who expressed loyalty to health staff were not regarded as community representatives and were not trusted, like the finding by Gholipour et al. [39]. This perception can be improved by involving communities in the selection of CBVs and engaging them in the work of CBVs. This approach maintains a balanced relationship between CBVs, the communities and the health system [40, 41].

Further, the perception regarding how engaging the IEC material and communication strategies agreed with Thorseth's, [42] recommendation that IEC must be 'designed with illiteracy in mind.' This means images alone must convey the intended message, technical jargon must be avoided by using local languages familiar to those communities. This doesn't only make messages useful but ensures that healthcare messaging is delivered equitably [43].

Perceived challenges to ITN promotion including lack of follow ups, high CBV turnover and high costs of social behavior change are important to sustainability of health programs. For instance, one domain in the capacity for sustainability framework includes funding stability [44]. In this study, high CBV turnover and lack of follow ups were all directly related to lack of motivating incentives- a result of funding instability, especially after the distribution exercise. As such to address sustainability challenges, in ITN programs, theoretically informed approaches must be employed to design, develop, implement, evaluate, and sustain interventions [44].

Lastly, the move from facility based primary health care (PHC) to community-based primary health care (CBPHC) through strengthened community level workers such as CBVs is a promising solution to persistent PHC challenges [45]. However, this move shifts challenges of transporting health commodities such as ITNs to community outreach points on the health facilities [46]. As demonstrated in this study, community level institutions, including corporate organizations, can be leveraged to strengthen last mile transportation, given that health centres represent the final link from the central ITN distributor to the community [47, 48].

Limitations and strengths

Interviews with community level participants were conducted in local language and translated to English for analysis, this could have resulted in lost insights in the translated transcripts. As with all qualitative studies, it is recognized that findings in this study are not generalizable beyond the intervention district. However, lessons learnt from this study can be used to promote ITN distribution approaches in other districts, particularly in efforts to strengthen community based ITN distribution approaches. Lastly, credibility of findings was enhanced by triangulation of results obtained through IDIs, KIIs and FGDs. The use of various data collection methods allowed for insights from multi-level participants.

Conclusion

From this study, it can be concluded that the success of ITN promotion in Kalumbila District, Zambia, hinged on the integral roles played by CBVs. Sustained engagement and support of these community actors beyond the net distribution phase may enhance continued use and reduce misuse of nets. However, efforts to integrate CBVs formally into the mainstream health system should be carefully managed to preserve their legitimacy and trust within the communities they serve.

Based on the study findings, the following recommendations are proposed to enhance appropriateness of dissemination strategies and CBV roles in promotion of ITN uptake:

- Development of dual-purpose mechanisms that both build capacity for CBVs and provide formal recognition to reduce turnover and enhance motivation without compromising their embeddedness and trust within communities.
- Ensure dedicated funding for SBC sustainability, enabling regular household follow-ups by CBVs and establishment of feedback structures to reinforce ITN use.
- Strengthen coordination between health facilities and community structures to restore community trust and ownership of SBC dissemination strategies.

Future research should explore the influence of mine-induced demographic shifts and settlement patterns, as well as how corporate partnerships with health facilities affect community perceptions, and sustainability of ITN dissemination strategies.

DECLARATIONS

Publication consent
Not applicable.

Competing interests
The authors report no conflicts of interest.

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Data availability
Anonymised transcripts of the qualitative interviews can be provided by the corresponding author upon reasonable request.

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Evaluación de la pertinencia de las estrategias de difusión y del papel de los voluntarios comunitarios en la promoción de mosquiteras tratadas con insecticida en el distrito de Kalumbila, Zambia: un estudio cualitativo

RESUMEN

Introducción: A pesar de los esfuerzos globales por eliminar la malaria, esta sigue siendo un problema importante. Los mosquiteros tratados con insecticida (MTI) son ampliamente accesibles y rentables, pero su adopción y uso adecuado suelen verse limitados. Comprender los desafíos en la utilización de los MTI implica examinar las estrategias de difusión empleadas por los voluntarios comunitarios (VC), las cuales han sido poco estudiadas. Este estudio investigó dichas estrategias y el papel de los VC en establecimientos rurales de salud del distrito de Kalumbila, Zambia.
Métodos: Este estudio de caso exploratorio utilizó cuatro grupos focales de discusión con un total de 28 jefes de hogar, siete entrevistas en profundidad con líderes comunitarios y VC, y siete entrevistas con informantes clave de los centros de salud y responsables del programa de distribución de los MTI para recopilar datos. Las entrevistas y los grupos focales fueron transcritos y codificados manualmente antes de generar temas mediante análisis temático inductivo.
Resultados: Los VC desempeñaron un papel fundamental en la promoción, movilización social, sensibilización, registro y distribución de mosquiteras, así como en la supervisión del uso correcto de las mismas. Sin embargo, la escasa dotación de personal, la alta rotación y los incentivos insuficientes dificultaron la participación sostenida de los VC. Estrategias de comunicación adaptadas al contexto, con mensajes culturalmente pertinentes, resultaron esenciales para mejorar el uso de los mosquiteros. La credibilidad de las fuentes de información, en particular del personal de salud y de los VC, influyó en la aceptación y confianza de la comunidad. Los hallazgos subrayan la necesidad de estrategias de comunicación que sean lingüísticamente accesibles y visualmente atractivas, considerando los diversos niveles de alfabetización.
Conclusiones: La promoción eficaz de los MTI depende del papel esencial de los VC y de estrategias de comunicación adaptadas al contexto, con un enfoque en superar los desafíos de sostenibilidad para un control y eliminación de la malaria a largo plazo.

Palabras clave: Malaria, mosquiteros tratados con insecticidas, voluntarios comunitarios, promoción de la salud, Africa.

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