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ORIGINAL RESEARCH

Acceptability and adoption of integrated malaria case management at community level in under-five children in Manono health zone, Democratic Republic of Congo

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Abstract

Introduction: Integrated Community Case Management of Malaria (iCCM) is one of the main interventions aimed at reducing mortality and morbidity due to malaria in under five children. However, many factors affect its acceptability and adoption at the community level. We sought to explore how different attributes of the iCCM program shaped its acceptability and adoption in Manono Health Zone in the Democratic Republic of Congo.

Methods: This was a qualitative case study that applied Roger's diffusion of innovation theory. Five (n=5) key informant interviews were conducted with program implementers, and twenty in-depth interviews were done with community health workers (n=8) and caregivers (n=12) in Manono Health Zone, Tanganyika Province. Data were analyzed using thematic analysis.

Results: Community members considered the iCCM intervention acceptable based on its perceived relative advantages including provision of free services, proximity of services, reduced waiting time and better follow up of patients. The intervention was found to be compatible with community members' expectations of health services but incompatible with cultural beliefs about sickness in some communities such as the Pygmies ethnic group. These beliefs influenced healthcare-seeking behaviors. The intervention was advantageous as it improved community members' knowledge and understanding of malaria, its cause, prevention, symptoms and treatment. Meanwhile, frequent shortages of drugs and supplies affected adoption of the iCCM intervention by community health workers.

Conclusion: Our study indicates that iCCM was accepted at the community and facility levels, but its adoption depended on sustained support from the government and different organizations.

Keywords: Acceptability, adoption, community, case management, malaria, Congo.

Abstract in Español at the end of the article

INTRODUCTION

In 2022, there were an estimated 249 million malaria cases globally with the majority of these, about 233 million, in the World Health Organization (WHO) African region [1]. The Democratic Republic of Congo (DRC) has the second highest number of malaria cases and deaths globally after Nigeria and accounts for more than half (53%) of the cases in the Central African region. In DRC, malaria is among the principal causes of morbidity and mortality representing 44 percent of all outpatient visits and 22% of all deaths [2]. In 2016, 13.4% of deaths among children under five years of age were caused by malaria and 47% of malaria episodes occurred in this age group [2]. The Tanganyika Province has the second highest prevalence of malaria in the DRC after Uele Province and accounts for 48.6% of under-five malaria cases [3].

Many countries grappling with malaria cases have embraced integrated community case management of

malaria (iCCM) as a standard intervention whose goal is to alleviate the malaria burden by empowering the community to address and manage cases effectively [4]. Integrated community case management of malaria is based on the evidence that well-trained and supervised community health workers (CHWs) equipped with Rapid Diagnostic Tests (RDTs) and artemisinin-based combination therapies (ACTs) can provide prompt and adequate treatment of cases within 24 hours of malaria onset to help reduce mortality and morbidity among under-five children [5]. This approach facilitates prompt and effective detection and treatment of malaria in underserved under-five children in areas with limited or no access to care [6].

To ensure scalable implementation and equitable coverage of iCCM, it is generally recognized that many health system influences must coalesce. The quality and consistent supervision of CHWs, comprehensive community mobilization campaigns, and continuously available commodities are considered necessary to position iCCM as an effective strategy [7]. Tine et al. stated that an intervention may have a high level of efficacy under clinical research conditions, but this does not necessarily mean that the communities for which it is intended will accept and adopt it [8]. Acceptability refers to the perception among implementation stakeholders that a given treatment, service, practice or innovation is agreeable, palatable or satisfactory. It is assessed based on the stakeholder's knowledge of, or direct experience with various dimensions of the innovation being implemented, such as its content, complexity or comfort. Whereas adoption is the intention, initial decision or action to try or employ an innovation, both by those who implement it and the beneficiaries [9].

In 2004, the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) issued a policy on the management of febrile illnesses in community settings. This policy highlighted the important role of community-based treatment of malaria. It stated that community management can reduce overall malaria mortality by 40% and under-five mortalities by 60% and severe malaria morbidity by 53% [10]. In the DRC, the Ministry of Health incorporated community healthcare sites as part of its community system policy to implement the management of childhood illnesses in the community in December 2005. The community health care sites are in areas where the nearest health center is more than 5 km away or an hour walk away and are run by trained CHWs. The package of activities implemented at the community health care sites includes the case management of simple cases of malaria, diarrhea, pneumonia and malnutrition and the referral of cases with danger signs [11]. A study conducted in Fungurume in the DRC showed that the implementation of iCCM using trained volunteer CHWs with RDT based diagnostics and ACTs was a promising approach for detecting and treating malaria promptly and effectively as well as for improving basic medical access to rural, underserved populations [12]. Community health workers are fundamental in bridging the gap between the health system and the community and providing other services at the community level. They facilitate access to care in the communities they serve.

We used Rodger's diffusion of innovation (DOI) theory to evaluate the acceptability and adoption of iCCM [13]. The DOI theory describes how innovations and other advancements spread throughout societies and cultures from introduction to widespread adoption. The framework indicates that the rate at which an innovation spreads is a function of the intervention itself and the setting it is implemented in. This theory covers essential elements that measure factors influencing the acceptability and adoption of community interventions [14]. The DOI relates to how conditions increase or decrease the possibility that members of the social system will adopt or accept an innovation. The perceived characteristics of an innovation includes its relative advantage over other options, compatibility with existing practices and values, perceived simplicity or ease of use and observability which is the degree to which the results of an intervention can be visualized [15]. Previous iCCM research has applied the Diffusion of Innovations (DOI) theory to examine factors shaping acceptability and uptake—including studies on community acceptability and adoption of iCCM in Uganda [16]. Nonetheless, DOI remains underutilized in broader community health research, a gap this study seeks to address. Therefore, we sought to explore how different attributes of the iCCM program shaped its acceptability and adoption in Manono Health Zone in the Democratic Republic of Congo.

METHODS

Study design

A qualitative case study design was used to explore factors influencing the uptake of iCCM at the community level in a rural context [17]. The "case" consisted of the iCCM intervention and its unique features and the context shaping its adoption and acceptability in the community health system.

Study setting

The study was conducted from March to April 2023 in Manono health zone, which is in Tanganyika Province where the villages of Kitamata, Nkay, Mabwe and Nkonkole were conveniently selected. Manono health zone was purposively chosen because it is one of the malaria endemic regions where iCCM is implemented, with about 54% of under-five malaria cases [3]. Manono has a tropical savanna climate. The year is hot with a dry and wet season. The average annual temperature is 32 degrees, and it rains almost the whole year with the least number of rains occurring in July. The local health system in this region is fragile, access to care is often limited and the health system is generally unable to cope with malaria emergencies [18].

Community health systems context in the DRC

In the DRC, community health care sites are considered, as earlier indicated, part of its community health system to implement the management of childhood illnesses in the communities since December 2005. A community health system (CHS) is "the set of local actors, relationships, and processes engaged in producing, advocating for, and supporting health in communities and households outside of, but existing in relationship to, formal health structures" [19]. Evidence suggests that LMICs that have invested in CHS have made significant gains in public health [20–22]. In Manono health zone, the CHS comprised the committee of development of the health zone, the community animation cells (CACs), and the community health care sites run by CHWs chosen by the community members. Community health care sites are in community animated cell presidents' houses where parents bring their children at any time.

Study population

The study population consisted of people who participated in malaria programs at community level. They were residents of the targeted health zone. The study targeted different key informants including the malaria program officials, CHS managers, nurses and doctors, while the community members included the CHWs and the caregivers.

Participant selection and recruitment

We used purposive sampling to select study participants, as this approach enabled us to identify individuals with in-depth knowledge and experience in the iCCM program. Our recruitment targeted those involved in the coordination and implementation of iCCM. The process began by identifying health zone managers, who guided us in selecting key informants and CHWs. Recruitment was participatory, involving the focal point person of the CHS to help identify and recruit CHWs and caregivers. All respondents were approached in person at their homes.

Data collection

Qualitative data were collected via in-depth interviews (IDIs) and key informant interviews (KIIs) using semi-structured guides. The interview guides included questions on the perceived advantage of the iCCM compared to the hospital management of malaria, the compatibility of the iCCM with community values and practices; the complexity of the intervention as well as the observed results of the iCCM. The interviews were conducted by the first author under the supervision and support of JMZ, AS, MM and PM. Before data collection, the interview guides were piloted to ensure that they were suitable and adapted where necessary. The interview guides were first translated into French and Swahili to ensure that the participants understood the questions. To ensure that the guide did not lose its meaning after translating, we sought help from a native French translator with expertise in research and sensitive to the culture to conduct a back-translation. The data collection tools were piloted with a small sample of the target population to identify any potential ambiguous questions. The interviews were audio recorded after consent was obtained from the participants. Some field notes were taken during the interviews. The data were collected over 3 weeks, from March to April 2023. The recordings were transcribed verbatim and then translated into English.

A total of 25 interviews were conducted with key informants (n=5), community health workers (n=8) and caregivers (n=12). Key informants were drawn from the Manono Health Zone and Saint Joseph Health Care while the CHWs and caregivers were found in 4 villages in the Saint Joseph Health Area (Kitamata, Nkonkole, Nkay and Mabwe villages). The key informants were asked questions about their roles, perspectives and support for the iCCM. The participants were invited in the face-to-face interviews at their homes or offices. Each interview lasted for approximately 40 minutes, and the data were collected over a period of 3 weeks.

Data analysis

After all the audio interviews were transcribed verbatim into a word document, the research team familiarized themselves with the content by thoroughly reading the transcripts. A thematic analysis approach was used to identify and report patterns (themes) within the data [23]. The data were analyzed manually, and a code list was developed and shared with supervisors for further refinement of the coding structure. We used a deductive coding approach to develop subthemes. To ensure validity of the coding decisions, we used a team consensus or collaborative coding approach. After initial coding, the research team met to review the coded text, discuss interpretations and reconcile any differences in code application. The codebook was refined accordingly and applied to the full dataset. This collaborative process strengthened the transparency of the thematic analysis.

Ethics

Approval to carry out this research was obtained from the University of Zambia Biomedical Research Ethics Committee (IRB00001131 of IORG0000774) and the Medical Ethics Committee of the University of Lubumbashi (UNILU/CEM/025/2023) in the DRC while permission was obtained from the health zone office in Manono. Participants were informed about the purpose, procedure, risks and benefits of the study during data collection. They were given a chance to choose to participate in the study. They also informed that they had the right to withdraw from the study at any time. Written informed consent was obtained from all study participants before administering the interview guides. All participants were interviewed in private, and all the documents were kept confidential. The data were securely stored on a password-protected computer.

RESULTS

This section presents key findings from the analysis of factors influencing the acceptability and adoption of iCCM. The data are presented based on the perspective of community health workers, community members and key stakeholders. The findings were grouped around four of Roger's diffusion of innovation attributes and four thematic categories emerged: benefits of iCCM compared to other alternatives, understanding and usability of iCCM, visible results of iCCM and compatibility of iCCM with the local context.

Table 1. Summary of the coding tree.

Categories	Themes
The relative advantages of iCCM	• Economic advantage of iCCM • Increase access to services
Simplicity and complexity of iCCM	• Usability of iCCM
Observability	• Positive results • Understanding of iCCM • Management of CHWs
Compatibility	• Alignment of iCCM with child health needs • Cultural beliefs shaping health-seeking behaviours

The relative advantages of the iCCM

The economic advantage of the iCCM

According to the CHWs and the caregivers, the iCCM intervention provided free malaria services at the community healthcare site. The key informants indicated that iCCM helped the community because most of the people in the health zone were poor and could not afford to buy drugs and pay for the tests. The CHWs were supported with free drugs and RDTs to provide to under five children who suffered from malaria in their communities. At the health facility, malaria treatment was also free, but patients would still pay for the file and the lab tests.

> "*We help the community for free, when at the hospital they will have to pay for the file and other services.* (IDI- CHW)"

In addition, the iCCM was implemented in villages situated more than 5 km from the health facility. The nearest village was situated 35 km from the health facility. Caregivers mentioned that community healthcare sites were near their homes, and as such they do not have to pay transport fees to seek care. CHWs also mentioned that parents even brought their children at night without having to worry about transportation.

> "*For me to go to the hospital, I will have to pay a motorbike rider to take me there, go and come, and it is expensive; here, in the village, we don't pay for transport to see papa moral* (IDI- CHW)"

Increased access to services

The iCCM also reportedly increased access to the health system because it brought malaria health services closer to the people. A key informant indicated that due to the poor state of the roads in the region and the distance between the health facility and the villages, community healthcare sites were placed directly in the village to improve the proximity of services. Most caregivers liked the iCCM intervention because the community healthcare site was near their homes, and they could take their children to the CHW any time.

> "*As you know in our country, the state of the roads is very bad and the distance between the community and the health facility can be more than 30 km. Putting the community healthcare site directly in the community helps the population access care. I think it is a good intervention.* (KII-Malaria program official)"

The iCCM was also associated with a shorter waiting time. Caregivers indicated that when they visited the hospital, they would always find a long queue, and they would have to wait for hours before they could be attended to. They also indicated that at the hospital the doctor would send them to the lab and then the pharmacy where they would have to wait again. Caregivers stated that at the community health care site, they would be attended to immediately and that it was rare for them to find people waiting. At the community health care site, the CHW quickly performed the tests and provided treatment compared to the hospital.

> "*When I take my child to the hospital, I always find a lot of people waiting. When it is my turn, the doctor will see us, and he will send us to the lab. After the lab, I will have to come back to him, and he will send me to the pharmacy. With the CHWs we do everything at the same place.* (IDI-caregiver)"

Further, it was reported that patients were regularly followed under iCCM. The CHW explained that when a child with malaria came to the facility, they would provide the first dose of drugs to the child. After 12 hours, they would visit the child to assess if there was an improvement. Mothers reported that CHWs always visited them the following day after the treatment to see if the child had improved. If the child was still sick, they would refer him or her to the health center for further medical review and support. This approach was better compared to the hospital where no one would come to check on them at the house.

> *"The CHW pricked the child on the finger and tested for malaria. After that, he gives him drugs and explains to us how we are supposed to give the medicine to the child. Then they will come and visit us at home to see if the child is improving. However, at the hospital we take too long to see the doctor, and we will have to queue to the lab and the pharmacy. They don't check up on us after we leave the hospital.* (IDI- caregiver)"

Simplicity and complexity of iCCM

Usability of iCCM

The CHWs demonstrated good knowledge and understanding of the information given to them during their training and supervision. They explained how to perform an RDT, how to administer ACTs according to the children and what to do in case of complications. They also knew how to recognize the danger signs of malaria.

> *"When a child comes with high body temperature, I think of malaria. I do an RDT which is a test of malaria. When it is positive, I know it is malaria. Malaria is treated with the artesunate/amodiaquine combination. We administered drugs according to the age of the child. When a child comes with signs such as convulsions. I won't treat. I just refer to the health center because it is complicated malaria, and we don't treat those cases at the community site.* (IDI- CHW)"

Availability of incentives motivated CHWs to deliver services. CHWs worked as volunteers who received some incentives only when there were trainings or vaccination campaigns. To help CHWs in their work, they received bicycles to assist them travel to the health centers to take the reports and collect drugs. However, the bicycles were not enough especially in villages with difficult access during the rainy season. Most CHWs stated that they would sometimes not be paid for the work, even though they would continue working because of the love of their community as well as the respect and recognition they received.

> *"They don't pay us; we just receive little money for transport when there is a vaccination campaign, but we receive bicycles for community healthcare sites. However, we continue working because of the love of our communities. Our village is very far from the health center; if we stop working, people will die. However, a lot of people quit because they don't get paid.* (IDI- CHW)"

CHWs also indicated that they always faced a shortage of drugs and RDTs which posed a serious problem for the management of malaria. The key informants explained that drug stockouts occurred at different levels posing a significant challenge. CHWs were trained to issue stock alerts when supplies were running low to prevent disruptions in service delivery to the community. CHWs and caregivers mentioned that the intervention was difficult to use and access because of frequent and frustrating drug stock outs.

> *"We sometimes experience a shortage of drugs and RDTs, and it is frequent, which is why malaria is still in our community. When we don't have drugs, we send them to the health center or they go to the market to buy drugs, but most of the time, they don't accept to go to the health center because at the community site, drugs are free of charge. They even accuse us sometimes of hiding drugs* (IDI- CHW)"

The malaria program focal person further explained that the health zone was no longer completely covered by community healthcare sites. The health zone used to have 150 sites and only 49 were functional. Most of the sites closed because most of the partners withdrew their support.

> *"… With the support of some partners, we used to have the community healthcare site even here in Manono. For each health zone, we used to have partners who supported us with drugs and tests to help the CHWs to treat malaria.* (IDI- CHW)"

Observability

Positive results

Healthcare workers (HCWs) observed a reduction in workload at the facility level because simple cases of malaria were treated in the community. CHWs also helped with case detection of simple and complicated malaria in the community. The community welcomed the intervention, and they explained that it was a good one. With the help and support of the government and other partners, the iCCM constituted a good alternative to health care as it was directly offered in the community.

> *"When community members adopt their health problems in their communities, we are also relieved in our tasks, and complicated cases are reduced at the hospital,* (KII- Medical Doctor)"

When fully functional, iCCM had recorded several positive results. Caregivers stated that their children received better treatment at the community healthcare site, and a difference was always observed in the health of the children before and after treatment by the CWHs. CHWs also explained that they always visited children in the villages after treatment, and they mostly found them in a better state compared to before treatment.

> *"We do see a big difference in the health of children after treating them for Malaria, because the following day or after few hours we go and visit them we find the child who was sick playing running even eating.* (IDI- CHW)"

Healthcare workers agreed that there was a positive result because the referrals of complicated cases of Malaria to the health facilities decreased due to increased accessibility to services in the community. They also reported they observed reduced frequency of disease episodes, cases of complicated malaria and child malaria-related deaths at the hospital.

> "*Since the time we started telling people in the village to sleep under a mosquito net, to clean the surroundings of their houses, to go quickly to the community site when a child has a fever to get treatment, we have seen that children do not get sick the way they use to and they don't die the way they use to die.* (IDI- CHW)"

The health care workers believed that iCCM had contributed to a reduction in morbidity and mortality among children under the age of five since its introduction. The number of patients with anemia due to complicated malaria had decreased at the hospital.

> "*We used to transfuse up to 50 children per week at the hospital, but now we have 7-10 blood transfusions per week. Additionally, malaria mortality has decreased; we used to register up to 40 deaths a month due to malaria, but like for this month, we just had 5 deaths.* (KII-Nurse)"

Understanding of iCCM

The CHWs reported that because of the training they received in iCCM, they now had better knowledge of malaria, its causes, signs and treatment, and this knowledge made their work easy. During home visits, CHWs taught community members about malaria. The CHWs and caregivers indicated that malaria was caused by mosquito bites, grass and stagnant water around their house. Some mothers reported that because of the rains, their houses were destroyed, and mosquitoes entered their houses and bit the children. Others said malaria comes because they did not sleep under mosquito nets. Both caregivers and CHWs mentioned fever, shivering, and over-talking as the signs of malaria.

> "*Malaria is a sickness coming from mosquitoes. The body of the child will be hot, and the child will start talking more than usual. Some even convulse.* (IDI- Caregiver)"

The focal person of the CHS reported that CHWs were trained in the iCCM and that they were supervised monthly. The supervisors ensured that the CHWs understood the information given during training and supervision to avoid mistakes. CHWs who found some components of the intervention such as the administration of drugs difficult to understand were helped during supervisory visits.

> "*CHWs are trained in the management of Malaria, diarrhea and pneumonia. They are trained by the DPS (Provincial Department of Health) in partnership with USAID. From 2014 to 2017, the program was very intense, and training was conducted every six months. We also supervise them frequently; those who are weak are accompanied monthly and those who are able are monitored every two months. We always check to avoid making mistakes. We coach them during our supervisory activities; we sit together and analyze the data of their activities.* (KII- focal person CHS)"

The CHWs had a good understanding of the information given to them during their training on the iCCM and supervision of how to perform an RDT and how to administer ACTs according to the age of the child and what to do in case of complications. They also knew how to recognize danger signs of malaria.

Parents also indicated that it was easy for them to understand any information provided by CHWs when they took their sick children to the community health care site. They explained how CHWs demonstrated to them how to administer drugs and how to prevent children from contracting malaria again.

Management of CHWs

The Provincial Department of Health in partnership with USAID oversaw training CHWs in the management of malaria, diarrhea and pneumonia. From 2014 to 2017, the program was very active and intense, and training was conducted every six months. CHWs who joined during that period received training in iCCM while others stated they had never been trained.

> "*We were trained just once in 2014, when we were called to the health zone office. Since that time, they never called us again. Some nurses in charge of the health area come and visit us and give us updates on what is new, what they have learned in their training.* (IDI- CHW)"

The supervision of CHWs was performed frequently by nurses from the health zone. Supervisory visits were made once a month per community animation cell (CAC). Thursdays and Sundays were planned for supervision because people did not go to the farms or to the mines. There was one CAC per village, and the CHWs shared households. During the visits, CHWs are evaluated during supervision, where they are observed in their daily tasks.

> "*We have intensive supervision in the community healthcare sites where we work with CHWs, we evaluate them when there is a patient, and if there is no patient, we do simulations. We can even look for a case of fever in the community and ask them to perform malaria tests, and if there is a challenge, we orient them or just show them how to do it on another patient.* (IDI- Nurse)"

Most of CHWs explained it was easy for them to perform RDTs and to administer ACTs to patients. Key informants indicated that during supervision, CHWs were observed when they were treating a patient. Some CHWs easily understood instructions, while for a few others, there was a need to repeat the instructions many times and follow them closely.

> "*When a child comes with a fever. We start by pricking the finger and obtaining blood that we place in the test, adding water, and if it shows two lines, it is positive. Then, we administered combination of artesunate and amodiaquine according to the age of the child. For the first dose, we crush the medicine on a spoon; then, we add a bit of water, and we give it to the child.* (IDI- CHW)"

Compatibility

Alignment of iCCM with child health needs

The compatibility of CHWs with the community expectations and values also promoted acceptability and adoption of the iCCM intervention. This compatibility was enhanced as CHWs are members of the community chosen by the community to represent them. In most villages, CHWs met this characteristic according to the community members.

> "*We are not the ones choosing the CHWs; the choice is made in the community by the chief of the village and the community members who know each other. The CHW should be welcoming someone who can enter every household. He should be sober and not involved in any conflict in the village. The community knows him very well and accepts him. At our level, we just look at if he can do his work or not.* (IDI- Nurse in-charge health area)"

CHWs explained that it was easy for them to respond children's needs when drugs were available. Unfortunately, frequent drug stock-outs were perceived as a major barrier to meeting children's needs in the community.

> "*Yes, we do meet children's health needs, but sometimes we don't have drugs. Right now, we don't have artesunate and we just have a few RDT tests. If a child comes with a fever, we just test and send them to buy drugs. When the drugs finish, we go to the health center to collect them; if they don't have too, they will get for us from the hospital. However, some they take long to supply us with drugs.* (IDI- CHW)"

Cultural beliefs shaping health-seeking behaviours

Local perceptions of the cultural origin and construct of sickness also shaped the treatment choice, thus affecting adoption of iCCM. Some caregivers explained that some sicknesses, such as what they called "musamvu" and "lukunga", which have similar symptoms like malaria are not treatable with modern drugs. Like malaria, these conditions were characterized by any type of convulsion. When a child suffers from these conditions, they take him to the traditional healer. However, some caregivers believed that these conditions were malaria, and hence they go and seek treatment from the CHW.

> "*We take our children to the CHWs. Sometimes we go to the traditional healers and when it is not working, we come and see our CHW. When he tells us that the drugs are finished, then we go to the health center in Manono.* (IDI- Caregiver)"

Some communities such as Pygmies and some religious groups (postolos), refused the intervention because the iCCM was not compatible with their beliefs. Pygmies are ethnic groups that traditionally subsist on a forager and hunter-gatherer lifestyle and believe of prefer herbal treatment. Postolos are religious groups that believe in faith healing. Since the introduction of behavior change programs, pygmies have been enrolled as CHWs, but more still more promotion need to promote acceptability of iCCM.

> "*Pygmies always refuse treatment, vaccination, mosquito net distribution or any intervention brought in their community. Unless we bring plumpy nuts, they will come in numbers. For them, any medical issue is treated by the traditional healer. We try to convince one of them who can understand, we give him a speaker during our campaign; he will sensitize them, and they will follow. If we can have one of them as a CHW, it will be helpful. We are trying to train some of them as CHWs, but there is still much resistance.* (IDI- CHW)"

DISCUSSION

The current study explored the factors that affected the acceptability and adoption of iCCM in Manono Health Zone to identify strategies to improve the community management of childhood malaria. Different implementation strategies have been put in place to support implementation of iCCM such as allocating resources to the program and conducting training and supervision of CHWs. ICCM was well accepted in all communities based on its relative advantage compared to the hospital management of malaria. Since the population in this region is poor and cannot afford to buy drugs or travel to health facilities, iCCM presented economic advantages, such as free services and reduced expenditures on transportation. ICCM also increased access to services by bringing care near to where people lived, findings which are related to other similar studies on community-based interventions [6, 16, 24, 25].

In addition, the characteristics of the CHWs recruited in the program which were compatible with the attributes of the intervention enhanced the acceptability

and adoption of iCCM. The CHWs were known, trusted and experienced members of the community. Use of trusted local members can trigger better adaptation and acceptability of services through promoting local ownership and legitimacy of implementation strategies [26-28]. Use of local resources such as CHWs has been widely recommended as they can promote penetration, and sustainability of health programs at the community level, as there are "mechanisms and processes which enable actors in the CHS to mobilize, collaborate and act collectively on health" [29].

Broad acceptability of iCCM was associated with positive results at the facility and community level. Observed positive outcomes included improved health of children to reduced mortality, morbidity, disease episodes, health facility decongestion and a reduction in the referral of complicated malaria cases. These results are consistent with a study conducted in Uganda where the key results of iCCM were quick treatment of children by CHWs, quick recovery, reduced frequency of disease episodes, reduced child mortality and reduced health expenditure. Healthcare workers also reported reduced patient traffic and workload at health facilities [16].

Regarding simplicity of the intervention, the CHWs found the program easy to use and understand. CHWs are community members without any medical background to treat simple cases of malaria [30, 31]. Implementation of the iCCM improved their knowledge and understanding of malaria, and this knowledge made the intervention easy to use. This is due to the training and supervision that they receive in the iCCM [16, 25]. A study from Kenya revealed that CHWs with more years of experience in diagnosing and treating malaria may have a higher level of expertise and knowledge, which results in a higher quality of service [32]. More experienced CHWs may have a better understanding of the community's needs, preferences, and cultural beliefs. As a result, they may be more effective in providing community members with relevant health promotion information, advice, and support malaria prevention and treatment activities [32].

However, CHWs still faced many challenges which affected their performance as well as acceptability and adoption of iCCM, such as insufficient training and supervision. A study from Zambia showed that to have a positive impact on CHW supervision, the frequency and quality of supervision are essential [33]. Despite the benefits of iCCM for community members, more is still needed to make it more acceptable at community level. These results are consistent with a similar study conducted in Uganda [16].

Factors such as frequent drug stock outs, lack of motivation of CHWs and lack of sustained funding to support the intervention made the intervention difficult to use. This complexity negatively affected the adoption of the intervention. Different studies performed in Nigeria, Ghana and Zambia have shown that an irregular supply of drugs and RDTs contributes to the low performance of CHWs, making the intervention difficult to use [6, 34, 35]. Complexity can affect acceptability of community interventions as it might hinder shared communication, increased commitments collective responsibility in addressing implementation problems [26, 36, 37]. A study conducted in Uganda suggested that knowledge of malaria does not negatively affect the performance of CHWs due to the long familiarity with malaria in their community, and the training for malaria was adequate because malaria was not new in their community [38].

The study also showed that the lack of motivation through incentives as well as the lack of funding to support the intervention affected the adoption of the intervention. The health system in D.R. Congo is still fragile given the recent political crisis. This crisis resulted in many partners withdrawing their support to the CHS, which resulted in many community sites shutting down and a reduced frequency of training and supervision. Studies from Yemen and Soudan showed that conflict, political crisis and any related insecurity weaken the iCCM service delivery because the lack of ownership by national and district health officials and this hampered service delivery and sustainability. Implementation agencies have failed to advocate effectively for funding for iCCM in emergency and unstable political contexts [39]. Different results were found in Central Africa Republic, where the program continued undisrupted, and was successful over many years, despite conflict and instability because NGOs were able to support CHWs with regular training, on-site supervision and maintenance of the supply chain of essential commodities throughout the periods of instability [40, 41]. However, a study from Malawi showed that the recent political crisis, which led to the withdrawal of major funders, underscores the risky nature of reliance on donor funds for critical interventions. Due to limited funding, the prioritization of iCCM at the district level is also a challenge, as resources allocated do not reflect projected budgets [42].

Some local perceptions of the origin and construct of the disease shaped treatment choices in most communities. ICCM was found to be incompatible with cultural beliefs in some communities and religious groups although efforts are made through the behavior change program that teaches community members about different illnesses, their prevention and how to access care when the children are sick. These findings are similar those of a study conducted in Malawi, where some religious groups described themselves as non-users of formal health services and restricted people from seeking care during sickness [43].

To strengthen iCCM implementation at the community level, it is important to address key health system barriers such as shortages of essential supplies which undermine community capabilities such as trust, social cohesion, and teamwork. These capabilities are critical for the effective implementation and sustained adoption of the program [44-46]. It is also important to inte-

grate a critical perspective approach in the implementation process of programs in communities to regularly identify or uncover deeper social, cultural and religious myths which could negatively interact with health systems factors to undermine affective implementation of programs [29]. By uncovering these structural barriers, implementers may possibly trigger collective action aimed at promoting acceptability of health interventions at community level [29].

Strengths and limitations

This qualitative study used the perceived characteristics of Rodger's diffusion of innovation (DOI), which gave us an in-depth exploration of barriers to the implementation of iCCM. The model has been recommended for its contribution to understanding behavioral change and thus facilitating the study of how people adopt innovations (15). The DOI helped us collect data from a wide variety of sources as well as identify different targets of implementation efforts related to the iCCM which enabled us to compare different opinions and increase the validity of the findings.

The study was conducted in a setting with very particular characteristics, during the rainy season, and when most of the people were on the farms and accessibility to other villages was almost impossible. This limited our sample size although we tried to recruit a diversity of participants in the study Zone. The use of qualitative approaches limited the extent to which this study can be generalized. Another limitation of the study is the potential influence of social desirability bias by the CHWs, caregivers and key informants. CHWs, who consider themselves as an extension to the formal health system, may have been inclined to provide responses that reflect positively on their performance. Caregivers, likewise, may have felt the pressure to express trust in CHWs and satisfaction with the care received, and may minimize concerns related to challenges they face. Key informants may have overstated the effectiveness of supply chains management and consistency of supervision to align their responses with institutional expectations.

Conclusion

The findings of this study indicate that integrated Community Case Management (iCCM) was well accepted at both community and health facility levels; however, its sustained adoption depended on continued support from government and partner organizations. To strengthen adoption, implementers should clearly communicate the advantages of iCCM to community members and health authorities by demonstrating its comparative value over facility-based care. This approach can increase community demand and reinforce stakeholder commitment.

Several challenges—such as drug stock-outs, low motivation among community health workers (CHWs), and inadequate funding—added complexity to iCCM delivery. Prioritizing community needs, enhancing CHW motivation, providing regular training and supportive supervision, and strengthening partnerships can improve implementation quality and make the intervention easier for both CHWs and community members to use.

Visible outcomes of the intervention, including reduced morbidity and mortality, fewer complicated malaria cases, and improved child health outcomes, strongly influenced CHW performance and increased community enthusiasm. Overall, the findings suggest that iCCM is well received; however, successful implementation requires adaptation to the local context. Strengthening behavior change at the community level is essential, as the intervention was sometimes perceived as incompatible with local beliefs and expectations. Ensuring that health messages align with cultural norms and harmonizing iCCM with national policies will support long-term acceptability and sustainability. Despite its promise, substantial efforts are still required to position iCCM as an effective and reliable alternative for delivering health services at the community level.

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AI utilization

Since English is not the primary language of authors, AI was used to proofread some of the sentences in the manuscript.

Competing interests

The authors declare no competing interests.

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Author contributions

All the authors contributed to the study design. NKK carried out the data collection. NKK, JMZ, AS, MM, CJ and PM analyzed the data. NKK drafted the manuscript. All the authors have read the manuscript.

Data availability

The raw data generated and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

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ABSTRACT IN SPANISH

Aceptabilidad y adopción del manejo integrado comunitario de casos de malaria en niños menores de cinco años en la zona de salud de Manono, República Democrática del Congo

Introducción: El Manejo Integrado Comunitario de Casos de Malaria (iCCM, por sus siglas en inglés) es una de las principales intervenciones orientadas a reducir la mortalidad y morbilidad por malaria en niños menores de cinco años. Sin embargo, diversos factores influyen en su aceptabilidad y adopción a nivel comunitario. Buscamos explorar cómo distintos atributos del programa iCCM moldearon su aceptabilidad y adopción en la zona de salud de Manono, en la República Democrática del Congo.

Métodos: Este fue un estudio de caso cualitativo que aplicó la teoría de difusión de innovaciones de Rogers. Se realizaron cinco (n=5) entrevistas a informantes clave con implementadores del programa y veinte entrevistas en profundidad con trabajadores comunitarios de salud (n=8) y con cuidadores (n=12) en la Zona de Salud de Manono, provincia de Tanganica. Los datos se analizaron mediante análisis temático.

Resultados: Los miembros de la comunidad consideraron que la intervención iCCM era aceptable debido a sus ventajas relativas percibidas, como la provisión de servicios gratuitos, la proximidad de los servicios, la reducción del tiempo de espera y un mejor seguimiento de los pacientes. La intervención resultó compatible con las expectativas comunitarias sobre los servicios de salud, pero incompatible con algunas creencias culturales sobre la enfermedad en ciertas comunidades, como el grupo étnico pigmeo. Estas creencias influyeron en los comportamientos de búsqueda de atención en salud. La intervención también fue ventajosa porque mejoró el conocimiento y la comprensión de la malaria —sus causas, prevención, síntomas y tratamiento— entre los miembros de la comunidad. No obstante, la escasez frecuente de medicamentos e insumos afectó la adopción de la intervención por parte de los trabajadores comunitarios de salud.

Conclusión: Nuestro estudio indica que el iCCM fue aceptado tanto a nivel comunitario como en los establecimientos de salud; sin embargo, su adopción dependió de un apoyo sostenido por parte del gobierno y de diversas organizaciones.

Palabras clave: Aceptabilidad, adopción, comunidad, manejo de casos, malaria, Congo.

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