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Article

# Barriers to the Uptake of Praziquantel and Albendazole for Schistosomiasis and Soil Transmitted Helminths in Primary Schools Without Feeding Programs During Mass Drug Administration in Malawi: A Qualitative Study

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## Abstract

**Background** Malawi remains endemic for some preventive chemotherapy-neglected tropical diseases requiring mass drug administration. Challenges persist in controlling schistosomiasis and soil-transmitted helminths, particularly in rural schools, despite efforts in the mass treatment with drugs such as praziquantel and albendazole. School feeding programs improve child health, education, and social stability, yet they have not been fully scaled nationwide, leaving gaps in coverage. Despite government efforts, overall drug treatment uptake is notably lower in non-feeding schools, with potential barriers linked to social, economic, and logistical factors. This study explored the challenges affecting the uptake of drugs in schools without a feeding program and identified key factors that may hinder treatment coverage and program effectiveness. **Methods** The study was nested in Malawi within the Deworm3 clinical trial (Clinicaltrials.gov number: NCT03014167), a multi-country cluster randomized study designed to assess the feasibility of interrupting the transmission of soil-transmitted helminths. Data were collected from key players in the implementation of school-based deworming programs, using semi-structured qualitative interviews, transcribed, translated, and analyzed using N-vivo 11. **Results** Several barriers affected uptake drug uptake. Only 40% of community health workers and teachers reported effectively educating communities about the program and the usefulness of taking the drugs, leading to misinformation, including fears of infertility (30%) and witchcraft (20%). Food scarcity (67%) in schools prevented children from taking the drugs, as they required food beforehand. Some families opposed drugs due to cultural and religious beliefs. Logistical challenges such as delayed drug supply (45%), lack of transport (38%), and no financial incentives (55%), further hindered implementation. **Conclusion** The study highlighted low treatment coverage in non-feeding schools is due to knowledge gaps, food insecurity, religious and cultural influences, logistical constraints, and financial barriers. Addressing these issues requires enhanced community engagement, improved drug distribution logistics, better incentives for implementers, and consideration of religious and cultural practices when scheduling drug distribution.

**Keywords:** neglected tropical diseases; mass drug administration; Praziquantel; Albendazole; Schistosomiasis; soil-transmitted Helminths; treatment uptake barriers; school health; social determinants of health; Malawi

## 1. Background

The African Region bears nearly 40% of the global burden of neglected tropical diseases (NTDs), with all 47 countries in the region endemic for at least one NTD<sup>1</sup>. Malawi was previously endemic for five Preventive Chemotherapy (PCT) NTDs requiring Mass Drug Administration (MDA): Trachoma, Onchocerciasis, Lymphatic Filariasis, Schistosomiasis, and Soil-Transmitted Helminths (STH). Since the introduction of MDA in Malawi in 2009, Trachoma and Lymphatic Filariasis have been eliminated, but challenges persist in controlling Schistosomiasis and STH.

MDA remains a core strategy for NTD prevention and control, as outlined in the WHO 2021-2030 road map<sup>2</sup>. It involves widespread distribution of medicines at the community level to reduce disease prevalence<sup>3</sup>. However, the success of MDA is closely linked to social determinants of health, including poverty, education, housing, and access to healthcare services. Despite universal WHO guidelines, MDA effectiveness varies across settings due to economic inequities, social vulnerabilities, and logistical barriers that hinder participation and coverage<sup>4,5</sup>.

Schistosomiasis and STH are among the most widespread parasitic NTDs, affecting 2 billion people globally and contributing to 300 million severe morbidity cases<sup>6</sup>. These infections disproportionately impact marginalized and impoverished communities, where inadequate sanitation, unsafe water sources, and limited healthcare infrastructure exacerbate disease transmission<sup>7</sup>.

Addressing these challenges aligns with the Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), SDG 6 (Clean Water and Sanitation), and SDG 10 (Reduced Inequalities). A comprehensive approach that integrates MDA with improved water, sanitation, and hygiene (WASH) interventions is essential to achieving long-term control and eventual elimination of these diseases in Malawi.

To control Schistosomiasis and STH, WHO recommends  $\geq 75\%$  treatment coverage among school-aged children (SAC)<sup>8</sup>. However, in high-transmission settings ( $>50\%$  prevalence), modeling studies indicate that even higher treatment targets are necessary to break reinfection cycles<sup>9,10</sup>. Failure to maintain high treatment coverage risks continued disease transmission, as untreated individuals can reintroduce infections into the environment<sup>11,12</sup>. Despite progress, Africa has yet to achieve WHO-recommended MDA coverage levels<sup>13,14</sup>.

While logistical and economic barriers hinder some MDA programs, others fail due to low community compliance, even when resources are available<sup>15</sup>. Understanding these barriers is critical to achieving sustained reductions in Schistosomiasis and STH prevalence.

Approximately 84% of Malawi's population lives in rural areas, where healthcare access is limited due to poor infrastructure and road networks<sup>16</sup>. MDA for Schistosomiasis and STH has been conducted annually in Malawi's primary schools since 2009<sup>17</sup>. The program is delivered by Health Surveillance Assistants (HSAs) in collaboration with School Health and Nutrition (SHN) teachers, chiefs, parents, and school committees. HSAs are community-based health workers responsible for primary healthcare, disease prevention, and case management<sup>18</sup>. Although each HSA is expected to serve a population of 1,000, many operate in larger catchment areas, increasing their workload<sup>18,19</sup>. While their presence reduces the burden on health facilities, MDA success depends on overcoming barriers to implementation, such as drug availability, community engagement, and compliance<sup>20</sup>.

Reported high MDA coverage does not always reflect actual treatment success. For disease transmission to be interrupted,  $>75\%$  of SAC must be observed taking the medication<sup>21</sup>. Studies indicate that Schistosomiasis morbidity control ( $<5\%$  prevalence in SAC) and elimination as a public health problem ( $<1\%$  prevalence) can be achieved through school-based MDA alone<sup>22</sup>. However, many rural schools struggle to reach these targets due to multiple barriers.

Key Barriers to MDA Success include a) *Drug Availability and Supply Chain Gaps*: Since MDA is the primary control strategy for Schistosomiasis and STH, it depends on a reliable supply of drugs. Poor drug distribution systems and supply chain disruptions reduce MDA effectiveness<sup>23</sup>. Additionally, drug distributors face high workloads, minimal incentives, and logistical difficulties, making implementation more challenging<sup>24</sup>; b) *Misinformation, Trust, and Community Engagement*

*Issues:* MDA rejection is often due to community mistrust of drug distributors and rumors associating MDA with infertility, witchcraft, or population control<sup>25,26</sup>. Inadequate or inaccurate health education contributes to low participation<sup>27</sup>. Moreover, poorly designed community engagement strategies that fail to consider local cultural contexts further discourage participation<sup>28–30</sup>.

Even when parents approve MDA for their children, children themselves may refuse treatment due to fear of side effects<sup>31</sup>. Adverse drug reactions, particularly nausea, have been reported as a deterrent<sup>29</sup>, and c) *Non-Compliance and Limited Community Participation:* Achieving  $\geq 75\%$  MDA coverage, as recommended, has been challenging in many settings. A study in the Philippines found that despite adequate resources, national MDA coverage was only 43.5% due to participant non-compliance<sup>15</sup>. However, programs that successfully engage communities tend to achieve higher MDA participation rates<sup>27,32</sup>. Multi-channel community education tailored to local contexts has proven effective in improving acceptance<sup>33</sup>.

Despite MDA's critical role in Schistosomiasis and STH control, implementation is especially difficult in rural schools without feeding programs. Equitable access to school-based health interventions is influenced by multiple factors, including nutrition, infrastructure, and community engagement. School feeding programs improve nutrition, health, education, and social stability, ensuring that children are physically well enough to participate in MDA efforts. The World Food Program (WFP) has supported school meal provision in Malawi, but not all schools benefit equally from the program<sup>34</sup>.

Evidence shows that health intervention uptake is significantly lower in schools without feeding programs, particularly in rural areas<sup>34</sup>. This disparity highlights the need for greater equity in health service delivery, ensuring that vulnerable populations, especially those in food-insecure regions, have the same access to comprehensive MDA coverage as their counterparts in better-resourced schools. While the Malawian government strives for universal MDA coverage as part of Universal Health Coverage (UHC), equity gaps persist due to social, economic, and logistical constraints. Addressing these challenges requires integrated policies that combine MDA with nutrition support, ensuring that all children—regardless of location or socioeconomic background—have an equal opportunity to benefit from disease control interventions.

This study aimed to explore barriers affecting the uptake of Praziquantel and Albendazole during MDA in primary schools without feeding programs in Namwera Health Zone, Mangochi District, Malawi.

Specific objectives included:

- i. Identifying social, economic, and logistical factors influencing MDA participation.
- ii. Assessing perceptions and attitudes of school staff, parents, and health workers towards MDA in low-uptake schools.
- iii. Evaluating knowledge and awareness of Schistosomiasis and STH among community members in targeted school catchment areas.
- iv. Proposing recommendations and interventions to improve MDA uptake in non-feeding schools.

## 2. Methods

### 2.1. Study Design

This study was conducted in Namwera Zone, Mangochi District, Malawi, in 2024 and was nested within the Deworm3 clinical trials<sup>35</sup>, a multi-country study evaluating whether community-wide mass drug administration (MDA) with Albendazole can interrupt transmission of soil-transmitted helminths (STH), including hookworm, roundworm, and whipworm (Clinicaltrials.gov number: NCT03014167). Unlike conventional school-based deworming, Deworm3 tested treating entire communities to assess long-term reductions in STH prevalence and reinfection rates. The trials used a cluster-randomized design and incorporated epidemiological, implementation science and cost-effectiveness analyses<sup>36</sup> to inform global STH elimination strategies.

A qualitative research approach was used, employing semi-structured interviews to explore factors influencing low treatment coverage during Praziquantel and Albendazole MDA in schools with poor uptake. This method was chosen to capture stakeholders' experiences and understand challenges faced in MDA program implementation.

## 2.2. Participant Selection and Recruitment

Two primary schools from Mangochi district (Namitambo and Masuku), were purposively selected based on their high enrollment (1678 and 1832 learners, respectively) and low MDA coverage (21% and 20%, respectively). One school was located in a hard-to-reach area, while the other was easily accessible along a major road. Schools without feeding programs were chosen due to historically low treatment uptake during MDA.

Study participants were selected based on their roles in MDA implementation. Letters were sent to the district health and education offices, requesting volunteers from the listed schools. Recruited participants reported to their school headmasters, where they received an information sheet (written in Chichewa) explaining the study. After providing informed consent, participants were scheduled for interviews.

## 2.3. Eligibility Criteria

Schools were selected if they were not part of a consistent school feeding program and had low MDA coverage. Schools with junior or senior primary classes only were excluded.

Participants included SHN teachers, local leaders, school committee members, parents, and HSAs involved in previous MDA activities. They were required to have at least two years of experience and prior participation in at least two MDA cycles. Those with less than two years of involvement were excluded.

## 2.4. Informed Consent Process

Participants who met the inclusion criteria were scheduled for interviews and were required to sign a consent form after reviewing an information sheet. They had the opportunity to ask questions before consenting. They were informed that consent was voluntary and that they were free to skip questions or withdraw from the study at any time without consequences.

Interviews were conducted by JS with the assistance of research assistants, who served as note-takers and translators. All research assistants were native speakers and facilitated accurate data transcription and translation into English.

The study posed minimal risk to participants. Confidentiality was maintained by anonymizing data and securely storing interview recordings. Participants were assured that withholding responses or withdrawing from the study would not affect their access to MDA services. Participants were reimbursed for transport costs and provided with refreshments during interviews. No monetary incentives were given for participation.

## 2.5. Data Collection

Face-to-face interviews were conducted at locations convenient for participants, including schools, health centers, and village chiefs' residences. Interviews followed a semi-structured format, covering social, economic, and logistical barriers affecting MDA, perceptions and attitudes toward MDA, and knowledge and awareness of Schistosomiasis and STH.

A total of 12 key informants (6 per school) participated, representing different perspectives, including SHN Teachers, HSAs, School Committee Members, Local Leaders, and Parents. Interviews lasted 30–45 minutes and were conducted in Chichewa. Two smartphones were used for audio recording, ensuring backup data security.

## 2.6. Data Management

Each participant was assigned a unique ID to maintain anonymity. Audio recordings were securely stored on password-protected devices with biometric security. Transcripts were anonymized and stored in a locked cabinet. Two research assistants cross-checked Chichewa-to-English translations for accuracy.

To ensure data security, participants were assigned anonymous IDs, and all data was stored in password-protected, encrypted files on the PI's laptop. A locked storage cabinet housed printed transcripts.

## 3. Data Analysis

Data were analyzed using Nvivo 11, a qualitative data analysis software. The deductive coding approach was used, organizing data into predefined themes: MDA Knowledge and Experience, Transmission, Symptoms, and Prevention of Schistosomiasis & STH, Sources of Information on MDA, Teaching Others About Schistosomiasis & STH, Drug and Supply Chain Challenges, and Economic Barriers Impacting MDA Uptake. Each response was systematically coded under these themes, allowing a structured interpretation of key findings.

## 4. Results

Table 1 presents the demographic characteristics of the 12 study participants, highlighting the diverse roles and age distribution of individuals involved in Mass Drug Administration (MDA) efforts at Namitambo and Masuku primary schools. The respondents included School Health and Nutrition (SHN) teachers, Health Surveillance Assistants (HSAs), school committee members, parents, and local chiefs, representing key stakeholders in the MDA process.

**Table 1.** Demographic Characteristics of Participants.

	Age (Years)	Gender	Role	School Name
Participant 1	42	Female	School Committee Member	Namitambo Primary School
Participant 2	36	Female	School Committee Member	Masuku Primary School
Participant 3	51	Male	SHN Teacher	Namitambo Primary School
Participant 4	58	Male	SHN Teacher	Masuku Primary School
Participant 5	41	Female	Parent	Masuku Primary School
Participant 6	37	Male	Parent	Masuku Primary School
Participant 7	33	Male	Parent	Namitambo Primary School
Participant 8	49	Female	Parent	Namitambo Primary School
Participant 9	46	Female	HSA	Masuku Primary School
Participant 10	40	Male	HSA	Namitambo Primary School
Participant 11	66	Male	Chief	Namitambo Primary School
Participant 12	43	Male	Chief	Masuku Primary School

Chiefs were exclusively male, consistent with traditional leadership structures in Namwera Education Zone. SHN teacher roles were also male-dominated, while women were more engaged in school-related activities, particularly as parents and school committee members.

The age range of participants (33–66 years) varied and provides insights into the experience and perspectives shaping MDA implementation. Chiefs and SHN teachers were among the older

participants, reflecting their long-term involvement in community and educational structures. In contrast, parents and HSAs spanned a broader age range, capturing diverse generational views on MDA challenges.

#### 4.1. Role of Various Participants in MDA at Schools

Participants described their roles in Mass Drug Administration (MDA) during interviews. School committee members are responsible for conducting meetings with parents alongside the School Health and Nutrition (SHN) teacher and Health Surveillance Assistant (HSA) in the days leading up to MDA. They assist in drug distribution through simpler tasks, such as organizing drinking water for students and measuring student heights using a tablet pole to determine the correct drug dosage.

SHN teachers update school registers a week before MDA and work as drug distributors alongside HSAs during the process. Parents are responsible for consenting to their children receiving the drugs and ensuring they eat before school to prevent side effects. HSAs manage drug distribution, monitor side effects, and oversee communication efforts, ensuring parents receive timely and accurate information about Schistosomiasis, STH, and MDA schedules. Chiefs organize village meetings to sensitize parents about the importance of MDA, its objectives, and the logistics of the program.

##### ***Overall, several barriers affected MDA uptake:***

While 85% of HSAs and SHN teachers understood schistosomiasis and STH, only 40% reported effectively educating communities, leading to misinformation, including infertility (30%) and witchcraft (20%) fears.

Food scarcity (67%) prevented children from taking the drugs, as they required food beforehand. 27% of families opposed MDA due to cultural and religious beliefs.

Logistical challenges such as delayed drug supply (45%), lack of transport (38%), and no financial incentives (55%), further hindered implementation.

Examples are discussed in more detail below.

#### 4.2. Knowledge of MDA and Financial Benefits Among Drug Distributors

HSAs, SHN teachers, and school committee members involved in MDA receive financial compensation for their work, which they appreciate as a motivating factor. As one participant noted, *"The money I get from taking part in distributing drugs motivates me to take part, and I always look forward to it each year"* (HSA 2).

For some, this financial incentive provides vital household income. One school committee member expressed: *"I am always excited to work on this project, and I work hard knowing that I will be able to bring a little something to my family's table"* (School Committee Member 2).

However, some participants voiced frustration over delays in payments. One SHN teacher remarked, *"It is demotivating when you look at the delays involved in getting our allowances. It takes days for us to get paid after we have completed the MDA"* (SHN Teacher 1).

#### 4.3. Benefits of the MDA Program at School and Health Centre Level

Beyond individual benefits, MDA also contributes to other school and health center programs. One HSA highlighted how the school register updates before MDA benefit multiple programs, stating, *"Before MDA, we update school registers, which gives both the school and the health center updated data that can be used for other programs so that we don't do the same work twice"* (HSA 2).

Additionally, MDA supplies, such as water buckets, are repurposed for other health and school activities, reducing operational costs. Another HSA explained, *"We use MDA supplies like water buckets in other programs at schools or health facilities, saving costs for those programs since they don't have to buy new ones"* (HSA 1).

#### 4.4. Challenges in Drug and Supply Distribution

Although HSAs, SHN teachers, and school committee members are motivated, the distribution system remains problematic. MDA success depends on timely delivery of funding, drugs, and supplies to distribution points. Participants reported that the district hospital delivers supplies to health centers on time, but moving them from health centers to schools is a major challenge.

An HSA explained, *“Drugs, height poles, buckets, and other supplies are brought to the health facility from the district hospital in good time, but it’s up to us to take them to schools”* (HSA 2). Another added, *“Each one of us is allocated the required number of drugs and supplies by the senior HSA at the health center, and it is our responsibility after that to get the drugs to the schools”* (HSA 1).

The lack of transportation options means that HSAs must find their own way to deliver supplies, often borrowing bicycles or walking long distances. One HSA expressed frustration, *“Each one of us has to get drugs and other supplies from the health facility to our respective schools without any help, and it consumes a lot of time”* (HSA 1).

Delays in drug distribution affect the timing of MDA sessions, with some students refusing medication because of hunger. *“By the time we get to the school, some children complain that they are hungry and are reluctant to take drugs since their school does not provide food”* (HSA 2).

Since schools lack feeding programs, some parents advise their children not to participate in MDA if they have not eaten. *“Sometimes when we do not have food in the house due to lack of money, I tell my children not to take the drugs because they cannot take medicine on an empty stomach”* (Parent 3). Another parent added, *“Even if my children eat before school, they get hungry by the time they arrive because the school is far. I cannot afford a bicycle or more food for them to carry”* (Parent 1).

#### 4.5. Knowledge and Awareness of Schistosomiasis and STH

MDA implementers, particularly HSAs and SHN teachers, demonstrated strong knowledge of Schistosomiasis and STH. One teacher explained, *“Schistosomiasis is caused by schistosomes, spreads through skin penetration when exposed to contaminated water, and can be prevented by avoiding bathing in rivers”* (SHN Teacher 2).

Similarly, HSAs simplify health messages for community members: *“YES, Schistosomiasis causes bloody urine or even anemia. Bathing in contaminated river water can lead to infection”* (HSA 1). Another explained, *“STH can lead to stunted growth in children. Contaminated food that is not properly washed before consumption can lead to infection”* (HSA 2).

Despite implementers’ strong knowledge, community members often had incorrect or incomplete information. Limited access to sensitization materials was cited as a major barrier: *“We used to receive many posters and paste them in markets where people could see them, but now we receive none, making communication about STH and Schistosomiasis difficult”* (Chief 2).

Some community members could not recall essential details. *“I have forgotten most of the things that were said about Schistosomiasis, but I remember they said if untreated, it can cause one not to have children in the future”* (Parent 2). Others misunderstood symptoms: *“Intestinal worms cause pain when urinating”* (Parent 1).

#### 4.6. Rumors and Mistrust Toward MDA

Misinformation contributed to community mistrust of MDA. Some parents believed the program was linked to population control, fearing their children would become infertile. *“People in our village believed the medication is a way of controlling the population. Some children are not even sick. They will not be able to reproduce in the future”* (Parent 1).

Others associated MDA with witchcraft due to reported side effects like fainting and convulsions, linking them to epilepsy and supernatural forces. *“Children could faint after taking medicine and never fully recover. They continue having convulsions months later, which is a disease of witches locally called MAJINI”* (Parent 3).

MDA was also linked to Satanism, with rumors spreading through social media. *"I was told by some friends and I also read on social media that these MDAs are linked with Satanists. Once you take the medicine, it means you have joined Satanism"* (Parent quoted by School Committee Member 1).

Another historical mistrust issue claimed to have stemmed from the 1980s–1990s blood donation programs, where ambulances collected blood from schoolchildren. Some participants believe MDA is a new way to harvest blood for rituals. *"Satanists want blood for rituals, but children now run away, so they have a new way—giving out drugs to slowly kill people"* (Parent 3).

#### 4.7. Cultural and Religious Influences on MDA Participation

In many families, fathers have the final say on whether children participate in MDA, even if mothers are well-informed. *"I knew the importance of taking drugs given by our HSA at school, but none of my children were allowed to take them. My husband never allowed it until 2020"* (Parent 2).

Religious practices also affected participation. MDA sessions sometimes coincided with Ramadan fasting, preventing Muslim children from taking the drugs. *"Children are not supposed to take drugs when fasting, and they cannot take them home to use later"* (School Committee Member 2).

## 5. Discussion

This study highlights key factors shaping the uptake of Praziquantel and Albendazole for treating schistosomiasis and soil-transmitted helminths (STH) during Mass Drug Administration (MDA) in schools without school feeding programs, and has revealed the following:

#### 5.1. Knowledge and Awareness of Schistosomiasis and STH

The study revealed varying knowledge levels about causes, transmission, and prevention of schistosomiasis and STH. HSAs and SHN teachers provided more detailed and accurate information than other participants, aligning with studies showing that individuals exposed to health education programs or medical training have a better understanding of diseases<sup>37</sup>.

While some community members demonstrated basic awareness, recognizing symptoms and complications, there were gaps in knowledge dissemination. Contributing factors included incorrect or incomplete information, infrequent health education, and lack of Information, Education, and Communication (IEC) materials. These gaps present a major barrier to effective MDA implementation<sup>38–40</sup>. Community health education efforts were noted, with information delivered in simple terms to enhance comprehension. Similar approaches have been effective when conducted by trusted local health workers or volunteers, particularly when tailored to local contexts<sup>41,42</sup>. Inconsistent or inaccurate information leads to mistrust, confusion, and lower participation, ultimately compromising MDA effectiveness<sup>32</sup>.

#### 5.2. Drug and Supply Distribution System

A timely and flexible drug distribution system is critical to MDA success. While the District Hospital delivered drugs and supplies to health centers efficiently, moving them from health centers to schools posed logistical challenges.

HSAs reported delays in collecting drugs, particularly those residing far from health centers. Some suggested that direct delivery to schools would improve efficiency. These findings align with research showing that logistical inefficiencies contribute to low compliance and reduced effectiveness of MDA<sup>43,44</sup>. A major challenge was the lack of transport resources for HSAs. Many had to walk long distances or borrow bicycles to deliver supplies. This situation delayed drug administration, with some children too hungry to take medication when MDA sessions finally began. Reliable transport is essential for successful MDA implementation, especially in hard-to-reach areas<sup>45,46</sup>.

### 5.3. Remuneration for Drug Distributors

The study found that financial incentives significantly motivate MDA implementers. HSAs, SHN teachers, and school committee members appreciated the compensation, recognizing it as an important motivational factor, consistent with other studies emphasizing financial incentives' role in public health interventions<sup>47,48</sup>.

However, payment delays negatively impacted morale. Some participants reported frustration over waiting for allowances long after completing MDA activities. Timely and adequate remuneration is essential to prevent demotivation, dissatisfaction and reduced commitment to future MDA campaigns<sup>49,50</sup>.

### 5.4. Impact of Food Availability on MDA Participation

Children are advised to eat before taking Praziquantel and Albendazole to minimize side effects such as vomiting and diarrhea<sup>51,52</sup>. However, many children attended school on an empty stomach due to household financial difficulties, leading parents and HSAs to advise against drug intake.

Studies suggest that schools with feeding programs in rural Malawi have higher MDA coverage, as children attend school more consistently and are better nourished<sup>53</sup>. In addition to improving school attendance, feeding programs enhance children's physical and mental well-being and strengthen parent-teacher relationships<sup>54</sup>.

### 5.5. Perceptions and Attitudes Towards MDA

Community perceptions and attitudes play a critical role in MDA success. The study found that community leaders, school committees, SHN teachers, and HSAs generally held positive views about MDA, as they were actively involved in planning and implementation. Their correct understanding of the program's goals and benefits fostered trust, consistent with other research findings<sup>21,55</sup>.

However, knowledge gaps within communities created opportunities for rumors and misinformation. While providing correct information is essential, it is not sufficient to dispel rumors entirely. Studies suggest that multiple community engagement strategies—from planning to implementation and evaluation—are necessary for widespread acceptance<sup>9,43,56</sup>.

Community participation in intervention design ensures that programs align with local beliefs and practices while achieving public health goals. Poor planning can create negative perceptions, as evidenced in this study, where MDA coincided with Ramadan fasting, preventing many Muslim children from participating.

Additionally, the empowerment of women in household decision-making is essential for improving MDA uptake. Although men are traditionally heads of households, the ability of women to make health-related decisions is crucial for their children's participation in MDA. Addressing religious and cultural beliefs during program development can significantly enhance effectiveness, as other studies have shown<sup>57-59</sup>.

Without such approaches, rumors become deeply entrenched, reinforcing the belief that MDA has a hidden agenda, ultimately compromising participation<sup>29,43,60</sup>.

### 5.6. Rumours and Mistrust Toward MDA

Despite implementers' knowledge, misinformation spread rapidly in communities. Some parents suspected population control efforts, fearing that MDA drugs caused infertility. Similar beliefs were noted in Tanzania, where MDA was associated with Satanism and blood rituals<sup>25</sup>.

Additionally, some linked MDA to witchcraft, particularly cases of children fainting after taking medication. In Malawi, epilepsy is culturally associated with spirits, and seizure episodes following MDA have reinforced suspicions<sup>61,62</sup>. Teachers screen for epilepsy, as Praziquantel is contraindicated for epileptic patients, but workload constraints may lead to missed cases, triggering post-MDA seizures<sup>63</sup>.

Another historical factor influencing MDA mistrust is the 1980s–1990s voluntary blood donation program, where ambulances collected blood from schools. Over time, this program became associated with “blood-sucking” rumors. Today, some community members view MDA as a modern version of this, believing that drugs are used for rituals<sup>62</sup>.

#### 5.7. Sources of MDA Information in the Community

Apart from community drug distributors and local leaders, friends and family were the main sources of MDA information in this study. Since people trust those closest to them, misinformation spreads faster than correct health messages, undermining MDA success. Strengthening community-based health education could help counteract misconceptions and increase program acceptance<sup>9,43,56</sup>.

#### 5.8. Learning From Historical Context

Public health workers have a responsibility to ensure that today’s interventions do not create barriers for future programs. This study underscores how a past voluntary blood donation program still affects MDA acceptance today. Policymakers must carefully assess the long-term societal impact of interventions, balancing immediate health goals with community trust and sustainability.

#### Study Limitations

One limitation of this study is that it only explored perspectives of those directly involved in MDA implementation at the school and community levels, without insights from district-level program managers. However, since local implementation is key to program success, the findings remain relevant for shaping policy and intervention strategies.

Additionally, the study included only 12 interviews, limiting the generalizability of findings to other settings. However, selecting multiple schools and key players within the MDA framework strengthened the study’s validity by capturing a range of perspectives on barriers and facilitators affecting MDA uptake.

#### Recommendations

Higher treatment coverage is essential for the long-term control and elimination of schistosomiasis and STH. Addressing these identified barriers will improve MDA effectiveness, through the five strategies below:

#### 5.9. Strengthen Community Education and Sensitization

Frequent and targeted health education campaigns should be conducted by teachers, health workers, and trusted community leaders to address knowledge gaps. Messages should be tailored to local contexts and involve community representatives from the planning stage. Regular meetings and sensitization sessions will enhance program acceptance and comprehension.

#### 5.10. Enhance Socio-Economic Support

To mitigate food insecurity, collaboration with parents, NGOs, and government can help provide meals during MDA. Village health volunteers can deliver drugs to school-aged children in remote areas, reducing the burden on HSAs and enhancing community trust. Conducting MDA in chiefs’ compounds could further encourage participation.

#### 5.11. Improve Logistical Efficiency

Revising supply chain management is necessary for timely drug distribution. Direct delivery from district hospitals to schools will ensure children receive treatment on time. Updating school registers in advance will improve allocation. Timely compensation for HSAs, SHN teachers, and school committee members is essential for maintaining commitment. Given resource constraints, priority should be given to providing bicycles to HSAs in remote areas.

### 5.12. *Expand Collaboration with Religious and Cultural Leaders*

Engagement with religious and cultural leaders is crucial for overcoming misconceptions and empowering women to make health decisions for their children. Consulting religious leaders will help prevent scheduling conflicts with religious events, ensuring greater participation in MDA.

### 5.13. *Regular Monitoring and Evaluation*

Ongoing monitoring and evaluation will identify emerging challenges and allow community feedback to refine the program. Ensuring MDA does not create long-term resistance is key to sustaining high treatment coverage.

## 6. Conclusions

This study highlights factors affecting MDA uptake in schools without feeding programs. While implementers generally have positive attitudes, gaps in community knowledge, socio-economic barriers, and logistical inefficiencies significantly impact coverage. Religious and cultural beliefs, misinformation, and food insecurity further contribute to low participation. Logistical challenges, including delays in drug distribution and staff compensation, reduce program efficiency. Addressing these barriers through education, logistical improvements, and stakeholder collaboration will enhance treatment coverage and support the long-term elimination of schistosomiasis and STH.

## Abbreviations

ALB: Albendazole
BICO: Blantyre Institute for Community Outreach
HSA: Health Surveillance Assistant
IEC: Information, Education, and Communication
LSHTM: London School of Hygiene and Tropical Medicine
MDA: Mass Drug Administration
MOH: Ministry of Health
MDREC: Mangochi District Research and Ethics Committee
NGO: Non-Government Organization
NTD: Neglected Tropical Diseases
PZQ: Praziquantel
SAC: School Age Children
SHN: School Health and Nutrition
SCH: Schistosomiasis
STH: Soil-Transmitted Helminths
UN: United Nations
WFP: World Food Program
WHO: World Health Organization

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