# Gender norms and mass deworming program access: A qualitative assessment of gender-associated opportunities and challenges to achieving high mass drug administration coverage

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A thesis

submitted in partial fulfillment of the

requirements for the degree of

Master of Public Health

University of Washington

2019

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Program Authorized to Offer Degree:

Global Health

University of Washington

## Abstract

Gender norms and mass deworming program access: A qualitative assessment of gender-associated opportunities and challenges to achieving high mass drug administration coverage

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**Background:** The World Health Organization's Neglected Tropical Disease Roadmap has accelerated progress for eliminating select neglected tropical diseases (NTDs). This momentum has catalyzed research to determine the feasibility of interrupting transmission of soil-transmitted helminths (STH) using community-wide mass drug administration (MDA). An estimated 1.5 billion people are infected with STH globally, the majority of whom reside within the poorest communities in low- and middle-income countries. This paper aims to identify potential gender-specific barriers to accessing and participating in community-wide STH MDA and ensure programs are equitable and maximize the probability of interrupting STH transmission.

**Methodology/Principal Findings:** This research was conducted prior to the launch of community-wide MDA for STH in Benin. We conducted focus group discussions (FGDs) with 40 men, 38 women, and 15 community drug distributors (CDDs) across ten FGDs in Comè, Benin. Our findings included: MDA was not properly packaged for addressing preventative services as well as treatment. Women feel a lack of empowerment around MDA programs. Both men and women felt that MDA delivered at no cost would reduce financial barriers and allow increased participation, particularly for those with low income. Women

expressed interest in increased engagement in the decision-making process of community-based programs while men often did not perceive themselves to be at great risk for STH infection and did not express a high demand for treatment.

**Conclusions/Significance:** Men and women were enthusiastic about community-wide deworming and felt this approach will allow them more control over deworming of their families than the current school-based approach. The community-wide distribution strategy appears well suited for women and children and may be preferred by women, who feel as though it provides them more control over the health of their families. Involving women in participatory problem solving to address low-coverage populations may be a successful strategy to improve coverage of deworming programs.

## Background and Significance:

The World Health Organization (WHO) estimates that 1.5 billion people are infected with soil-transmitted helminths (STH) globally, including hookworm species (*Necator americanus* and *Ancylostoma duodenale*), roundworms (*Ascaris lumbricoides*), and whipworms (*Trichuris trichiura*) (1). Infections with STH are associated with significant morbidity, including iron-deficiency anemia, malnutrition, growth faltering, and cognitive deficiencies (2, 3). Current WHO guidelines focus specifically on the control of morbidity due to STH, targeting empiric treatment to those individuals who disproportionally experience STH-associated morbidity: school- and -preschool-aged children and women of reproductive age (4, 5). However, while this strategy is highly successful in reducing population-level morbidity due to STH, high reinfection rates and continued infection in untreated individuals (such as adults) means that this strategy is unlikely to reduce prevalence to levels that can be sustained without continued treatment. Global interest is shifting towards an elimination strategy and focusing on the possibility of breaking the transmission of STH through community-wide mass drug administration (MDA). However, the success of elimination efforts is predicated on achieving both high levels of treatment coverage (the proportion of individuals offered treatment) and high levels of compliance (the proportion of targeted individuals effectively treated). Understanding gender-specific barriers to accessing and participating in MDA campaigns in STH-endemic communities is necessary to ensure that programs are delivered equitably and achieve targeted outcomes of morbidity reduction and, eventually, interrupted transmission.

The WHO Neglected Tropical Disease (NTD) Roadmap and London Declaration have accelerated progress toward eliminating select NTDs such as lymphatic filariasis (LF) and onchocerciasis, and formalized long-term disease-specific goals for other NTDs (7, 8). This political momentum has also catalyzed research to determine the feasibility of interrupting STH transmission using community-wide MDA (9). Community-wide MDA would address persistent challenges associated with adult reservoirs of infection, who are not treated under the standard of care and can contribute to onward STH transmission in the community (10). The DeWorm3 project is testing the feasibility of interrupting STH transmission using community-wide MDA in Benin (9). Benin has a population of roughly 11 million people, with 53% living in rural areas (11). All STH species are endemic to Benin, with a national prevalence of 22.7% and up to 650,000 pre-school age

children and 1.6 million school-age children in need of treatment each year (12, 13). STH risk is associated with inadequate access to safe housing, sanitation, or water. In Benin, 72% of households report limited access to sanitation, while 40% of households live below the poverty line (14, 15).

Gender inequities often intersect and exacerbate other known inequities such as socioeconomic, geographic, or disease risk inequities (16, 17). The Gender Inequality Index (GII), a measure of gender disparity, ranks Benin 146$^{th}$ out of 180 countries with a GII score of 0.611 (17). Gender disparities are observed in education, where 32.7% of men receive secondary education, as compared to 18.2% of women, and men are twice as likely to be literate (18, 19). Available evidence suggests that gender and social hierarchy may influence MDA participation, especially with respect to supporting participation in offered treatment (6, 16, 20). One study found that in communities where the men spend their days working away from home, they are not able to participate in pre-MDA sensitization, and thus may be less likely to participate in deworming campaigns (6). This observation may have a broad negative effect on MDA coverage. In societies where men are considered heads of household, lack of awareness around MDA may affect their entire family's ability to participate in the program. By focusing on gender-specific barriers to participating, MDA campaigns can reach those who may have been systematically missed in prior programs.

MDA programs often utilize respected and knowledgeable community members to work as Community Drug Distributors (CDDs) during MDA. In order for community-wide MDA programs to achieve high treatment coverage, CDDs need to understand gender-specific barriers to MDA and tailor educational activities appropriately, to ensure that all community members, including women, can make informed health decisions (6, 16). As most CDD in Benin are male, it is not clear whether they are able to address gender-specific barriers and their implications in MDA coverage.

Research informing methods to increase coverage and compliance in MDA for NTD control or transmission interruption programs should take into account gendered barriers and facilitators towards MDA participation. Yet, minimal research has been conducted regarding gender-specific influences on MDA program success, let alone how MDA program access may reflect gender dynamics in a given community (20). In this qualitative study, we evaluated perceived facilitators and barriers to an upcoming community-

wide MDA delivery for STH (i.e. the DeWorm3 Project) and how these perceptions differ between men and women. We also examined if and how CDD perceptions of barriers and facilitators align with gender-specific concerns.

## Methods

This qualitative study was conducted prior to the first round of MDA in the DeWorm3 Project as part of the study's formative research. The DeWorm3 Project is a cluster randomized trial testing the feasibility of interrupting transmission of STH in the Commune of Comè, Benin; the study design has been described in-depth elsewhere (9). The DeWorm3 Project was reviewed and approved by the Institut de Recherche Clinique au Bénin (IRCB) through the National Ethics Committee for Health Research (002-2017/CNERS-MS) from the Ministry of Health in Benin. The study was also approved by The Human Subjects Division at the University of Washington (STUDY00000180). ClinicalTrials.gov Identifier: NCT03014167.

### *Sampling*

Four of the twenty DeWorm3 intervention clusters in Benin were randomly selected for inclusion in this study. In each cluster, focus group discussions (FGDs) targeting sub-populations were conducted separately for adult men (4 FGDs conducted) and adult women (4 FGDs conducted). Within each selected cluster, twenty adult community members aged 18 and over (10 men and 10 women) were randomly selected from an exhaustive population census (Table 1). No more than one individual per household was identified for sampling. Selected individuals were called and invited to participate and, in the event of refusals, subsequent individuals on the sampling list were contacted until the targeted sample size was reached. Participants were provided with compensation to cover transportation and their time for attending.

Two FGDs were conducted with CDDs. CDDs were identified and randomly selected for inclusion in the FGDs based on the criteria that they must have been formally trained by the MOH and have participated in at least one previous MDA in their community prior to DeWorm3. Only 24 of the 171 MOH trained CDDs were female and within the focus groups 4 of 17 participants were female.

| Stakeholder | Sampling Frame | N |
|---|---|---|
| Men | Males 18 years of age or older randomly selected from four DeWorm3 intervention clusters | 4 FGD; total 40 participants |
| Women | Females 18 years of age or older randomly selected from four DeWorm3 intervention clusters | 4 FGD; total 38 participants |
| Community Drug Distributors | Male and female trained CDDs with experience delivering MDA in the four target community clusters | 2 FGD; total 17 participants (4 women, 13 men) |

*Table 1: Overview of Focus Group Discussion Sampling*

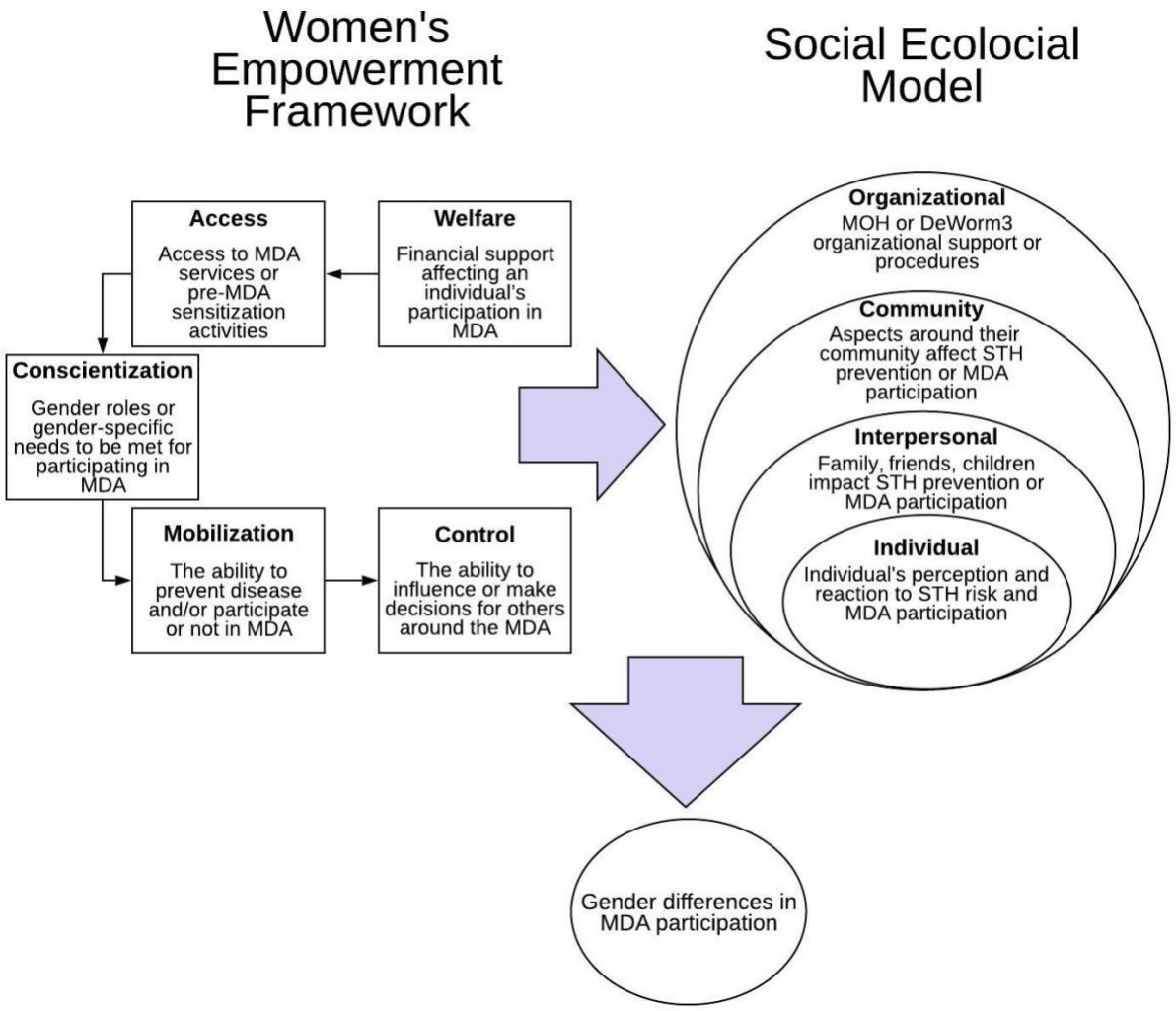
***Focus Group Discussion Procedures***

The FGDs were held in April and June 2018, prior to the first round of DeWorm3 MDA. Focus groups were conducted at various locations in each community, including private classrooms, meeting rooms, and the chief's residence. FGDs were recorded, and additional notes were taken by a second facilitator. After the FGDs, both the audio file and typed notes were uploaded into SurveyCTO and a secure hard drive (22). Discussions were transcribed in French or local languages (Mina and Watachi), and then translated into English by trained professionals in Benin. Both transcriptions and translations underwent quality assurance reviews to ensure accuracy throughout this process, and any discrepancies were referred back to the original transcriber or translator for review.

**Analysis**

We used the Women's Empowerment Framework (WEF) to inform our analysis (23). The WEF is based on the concept that equal participation in health and development programs empowers women (23). This framework incorporates five constructs that build upon each other to inform a nuanced understanding of gender empowerment: welfare, access, conscientization, mobilization, and control.

Definitions of each WEF construct, tailored to MDA for STH, are presented in Figure 1. "Welfare" involves how an individual's economic or financial status affects his or her health and the ability to obtain healthcare or participate in MDA (23). "Access" involves the distribution of resources and access to MDA information or pre-MDA sensitization activities. The next construct, "Conscientization," refers to the ability to understand differences between sex and gender roles and recognize any gender-specific needs related to MDA. "Mobilization" focuses on one's ability to put into action methods to prevent disease and to participate in MDA. Finally, "Control" relates to one's ability to make decisions about disease prevention and MDA participation. As conceptualized in the WEF, "Welfare" is the most basic form of gender equity, while "Control" is the ultimate form of equity. Within the context of MDA treatment coverage, each construct of the WEF can be differentiated in the coding process as having a negative or a positive influence, where negative depiction of the construct is considered a barrier to treatment and positive is a facilitator to treatment. In order to conceptualize potential contextual influences of gender-specific barriers and facilitators to treatment, we coded FGD content that pertained to levels of the social-ecological model (SEM, described below in Figure 1). The SEM elucidates the broader context of the planned MDA intervention, from population or global influencers down to personal influencers (24). Each of the levels (policy, organizational, community, interpersonal, and individual) impacts the next, so health interventions are believed to be more successful when interventions address the barriers and facilitators present at all levels. This two-component conceptual framework (i.e., WEF and SEM) was used to identify gender-specific differences in facilitators and barriers to high MDA coverage and to develop an understanding of how these barriers could influence STH transmission interruption programs.




ATLAS.ti 8 qualitative software was used to store and organize the transcripts (25). The codebook was prepared *a priori,* based upon the WEF and SEM frameworks, and a mix of deductive and inductive coding was used. The codebook was updated iteratively by the coders to provide clarity and inclusion of the inductive themes that were identified during the coding process. All transcripts were double coded, and the coders met weekly to discuss any variabilities in coding and to resolve differences. An additional third party reviewed discrepancies in codes and served as a tie-breaker.

Once all transcripts were coded, case memos were created by the two coders for each group (e.g. men, women, CDD) to document salient themes. Memos addressed each construct in the conceptual framework

and included (1) a summary of main findings within each group, including breakdowns by SEM level, (2) a short rationale or justification for the summary, and (3) supportive coded statements from the relevant data.

## Results

Themes that emerged from the FGD fit both the WEF and the SEM, with agreement between sexes on many issues, but some gendered differences. Deworming was generally perceived as beneficial to individual and community welfare, yet both men and women struggle to afford deworming drugs outside of MDA campaigns. Because STH are not the only health concern of these communities, both genders felt that MDA should be packaged with other preventative services. Overall, there was a perceived gap between the institutions and organizations involved in MDA delivery and communities, women feel unempowered by MDA programs. While they have been infrequently involved in MDA strategies and make up the minority of CDD, women desire increased involvement in community-based public health programs and feel that their voices should be heard at higher levels. In contrast, men perceive themselves to be at low risk for STH and did not express a need to be more involved. Finally, CDDs were unable to address women's concerns and only identified barriers by both genders. These themes are further elaborated, with representative quotes, in the sections below.

<u>Both men and women seek yet struggle to afford deworming drugs outside of MDA campaigns</u>

Across all FGDs, participants emphasized the significant risk of STH infection and the importance of seeking preventative treatment. Many of the adult FGD participants, who are not targeted by standard-of-care MDA programs, reported seeking and purchasing deworming medicines independently for their family. Participants of both genders noted that when they were not able to purchase deworming drugs because they could not afford them, they resorted to brewing traditional herbal teas (made from dried papaya seeds) that are widely believed to treat STH in Benin:

> *"Even if you go to the hospital, they will prescribe the medicine you have to buy. Nothing is for free. They will just prescribe some drugs to buy. If you do not have money, you become anxious and you have to resort to herbal teas." – Woman 4, Cluster 2*

Women whose primary income is generated by food services reported that their financial welfare, in particular, was negatively affected by poor access to affordable deworming medicines. One participant said that some women fear that they will lose their food vending licenses if they are suspected of having infectious health problems, including helminth infections:

> *"If it is this disease that has been diagnosed… they will then forbid you to prepare. On your paper, they will write with red pen and will not give it back to you. You will no longer cook. It is the law that forbids it. They will write a report, add your photo and send them to the town hall with as instructions that you are no longer allowed to cook and you should be arrested if you are found doing so.... Your trade will be at a loss." – Woman, Cluster 1*

Unlike women, who focused on the health and individual or interpersonal consequences of not receiving treatment, men were more likely to discuss welfare in a general context, with discourse about the importance of purchasing deworming drugs in their community.

The CDDs also discussed the financial burden associated with obtaining treatment for individuals who are not targeted by MDA programs and highlighted that the burden is shared amongst people of both genders. The CDDs commented that community-wide MDA would be widely beneficial to those who typically cannot afford treatment or cannot afford to send their children to school where they would be treated by the school-based distribution programs.

> *"It also allows parents to moderate their budget a bit. Otherwise, without this favor, I mean, if every time we had to go to the pharmacy to buy drugs, and mainly, here, we wait for the disease to reach a certain harmful level before we treat it, so it can still worsen children health. Now that there is this opportunity, that we enjoy, that include[s] free distribution of drugs, it lessens parents' job." – Man 2, CDD*

Both genders feel the MDA should be packaged alongside other preventative services

The CDD FGD participants reported that a lack of water, sanitation, and hygiene (WASH) resources might negatively affect community-based MDA coverage. For example, their prior experiences indicated that community members may not want to swallow the drugs with unsafe water as they often ask that the distributors provide clean water for them. Without provision of safe water, the CDDs feared that individuals would refuse to participate in community-wide MDA.

> "*We lack well[s], even SONEB (National Water Company of Benin) does not have its network here in the villages, that's why villagers will ask us [for] drinking water to take drugs. We have problems in the community" – Man 6, CDD*

Community members of both genders were in agreement that they felt knowledgeable regarding options for personal prevention of STH (ex. handwashing). Both genders noted that they felt more comfortable simply taking personal preventative measures to prevent STH. They discussed at length the tasks they completed to prevent STH in themselves and their families. Of note, both genders felt that personal preventative measures such as washing and preparing food were a women's responsibility.

> *"But if there is a lack of hygiene for oneself, for children or grandchildren, it is a problem; you cannot be well. It is necessary to keep the drinking water, the water for cooking and water for the laundry and the dishes in good conditions. These are the means of prevention of the diseases." – Woman 7, Cluster 2*

Feedback from male and female FGDs supported CDD reports; several participants noted that MDA is just a short-term fix if sources of infection such as unsafe water and open defecation persist in their communities. In this sense, the perception of community-wide MDA for community members of both genders was often negatively affected by a prevailing sense that programs were not comprehensive.

> *"If it's a medicine you're going to put inside so that we can drink that water without fear, please, do it. … If we have to treat the water of the well so we can use it until the fountain is made, do it for us. Latrines are important too. To [defecate] or urinate now, you can only do that on the ground.*

*When it rains, it flows with runoff water…it goes directly into the well and this is the water that you will still fetch for drinking; so try to help us." – Woman 2, Cluster 1*

Women specifically feel unempowered by MDA programs

Women reported that prior MDA campaigns have been dysfunctional, and they do not feel empowered to participate in future campaigns. Women stated that they have tried to participate in MDA campaigns in the past for other NTDs that utilized central distribution points, but the campaigns were not well organized with people waiting for long periods, at times without ever receiving the required drugs. In contrast, only one of the male participants discussed the timing and location of distributions as being a community-level barrier to treatment. Women felt that waiting to receive MDA medicines in this manner was not a good use of their time and they noted that, instead, door-to-door MDA removed participation burdens placed on women in particular. The women said that they often serve as "Heads of Distributions" for their families, thereby influencing the MDA participation of the entirety of their family. Central distribution points do not empower women to make treatment decisions for their whole family, the women reported.

*"If we have to meet at the delegate's ... for example, when we distributed mosquito nets, and I already talked about it... We could not take this because there was too much mess. We stayed under the hot sun. The sun was burning. If you sit until nightfall, you'll leave." – Woman 5, Cluster 1*

While men did not provide much feedback on prior efforts at community sensitization, women provided feedback on how communities can be more fully engaged in community-wide MDA. For example, several said community sensitization activities for prior community-based programs have been insufficient and frustrating. They highlighted that if they do not receive sufficient information about the time and place of imminent MDA programs, they won't be able to ensure that their families are fully protected.

*"Maybe the person may have an impediment on the day of the drug distribution, or maybe she is not informed because if she was absent the day the town crier passed the information; or if it came after the closing time of the distribution. For example, when distributing mosquito nets, I was not*

*served simply because I was not home when the agents were passing through." – Woman 3, Cluster 3*

Women desire increased involvement in community-based public health programs

A common theme throughout all of the women's FGDs was discontent with the lack of control and involvement of female community members in community-based public health programs. The discontent appeared to stem from negative experiences with school-based distribution. The mothers voiced concern that they did not know when their children were receiving drugs, what drugs they were being given, and if their child actually swallowed the drug or not. The mothers felt as though school-based distribution compromised their control over the health of their family.

*"Just that none of my children have ever taken the drug at school and I do not know what medicine it is. So, I have forbidden my children to take it" – Woman 6, Cluster 1*

These concerns were compounded by stories of children who fall ill after taking the drugs and need to be rushed to the hospital. Bother mothers and fathers stated that they exercise their control by keeping their children from school during MDA delivery days or forbidding their children from swallowing drugs provided. The lack of involvement and sensitization were primary causes for parents to reject the previous MDA and participants clearly stated that this should be addressed in order for the community-based MDA to succeed.

When discussing school-based distribution delivery, both genders expressed dissatisfaction with their lack of involvement. However, women were more focused on interpersonal relationships with their children and their own decision-making capacity about whether their child would participate, while men focused on organizational dynamics regarding how schools deliver MDA. In multiple FGDs, women stated that they should be present during MDA distribution to ensure that their child has eaten and taken the correct dose of the drug; They stated that their lack of involvement in the school-based distribution led to some children spitting out the dosage they were given whereas when the mother was involved, she can monitor that the entire dose was taken. While men voiced their frustrations around the current school-based program, did not specifically state any desire to be more involved in MDA programs.

Women believed that if given the opportunity, they would be able to oversee their families' dosing and obtain medication for any family members unavailable at the time of distribution, thus ensuring that every person would be treated. They reported the desire to better control their children's healthcare and emphasized that they would be more likely to consent to their child's participation in MDA for STH if treatment took place in the home as opposed to schools.

> *"In principle, if we had to respect the texts, before giving medicine to a child, we should ask him to go and call his mother. The mothers of the children should be present during the distribution. Every mum knows how she has educated her child. But how can a child respect the dosage of tablets you put into his hands? He might take two (2) tablets instead of just one. That can cause problems; it is not logical." – Woman 9, Cluster 2*

Women reported that they could positively influence mobilization for community-based public health programs. In some FGDs, women discussed the role of the mother specifically in monitoring and maintaining her children and family's health. Several women noted a clear negative impact on treatment coverage during prior MDA campaigns when women's perspectives were not considered prior to MDA distribution in their communities.

> *"The disadvantage that we may have is, for example, the non-involvement of mothers during the distribution of drugs. They are the ones at home, the drivers in the homes. Mothers should be given medications based on the number of people in the household. She is the one who will manage the medication." – Woman 2, Cluster 3*

The women also noted that they could assert influence on coverage of community-wide MDA programs via their social networks, since they already have relationships and avenues in which to influence their social circles.

> "If possible, we will also give information to other women about the benefits of the treatment. We can help you pass the information to our girlfriends. I have my shop at a crossroads. I will speak with my male and female clients and even with children"– *Woman 6, Cluster 2*

Men perceive themselves to be at low risk for STH

In the focus groups, men more readily discussed procuring deworming drugs for their children, rather than for themselves. Some men even stated that while they buy deworming drugs, they cannot recall the last time they treated themselves with the drugs. Male FGD participants often emphasized that only children are at risk of STH and require timely treatment, likely due to the prior messaging about children's risk of STH-associated anemia and associated school-based deworming programs.

> *"But, when it comes to intestinal worms, it's mostly children who suffer from it, and even me here, I cannot even tell you the last time I took de-wormers again. It's been more than 5 years now, I took deworming drugs again … worms only attack those age groups," –Man, Cluster 3*

Some men recognized that women are also at greater risk of STH infection; there are prevailing beliefs that eating sweet foods such as mangoes leads to STH infection or worm multiplication, and men stated that women have a specific proclivity for these foods. These misconceptions about risk and transmission may impact men's willingness to participate in the MDA, if they do not consider themselves vulnerable to infection. Men within the FGD were more likely to be distrustful of the MDA or declare that they were unsure if they would participate in the DeWorm3 program. However, interrupting STH transmission using community-based MDA will require treatment of individuals of all ages in order to address reservoirs of infection present in the community.

> *"There is no benefit in this treatment. I took the medicine and it did not help me. We must tell one another the truth. Even if you give me the drugs here now, I'll throw them on the way home. I still have bad memories." – Man 6, Cluster 1*

All but one male FGD discussed how STH infections in a household reflect poor hygiene and eating habits on part of the mother, as they are the primary caregiver to children. These quotes usually focused on how mothers might negatively impact their children. The different responses from men and women while discussing mothers' role in STH prevention and treatment highlighted some of the gender roles that exist within these communities and may need to be address for adequate treatment coverage.

*"So, when the mothers of children lack a little hygiene and that the children walk, are in contact with the ground and underpants, all that causes the disease of the worms." – Man, Cluster 3*

Community Drug Distributers were poorly equipped to identify gendered barriers

Unlike a majority of the community members, CDDs themselves did not mention frustrations around school-based distribution. The school-based program was a major concern of both men and women within these communities and the primary reasoning for women voicing a need for increased involvement. By not addressing this issue, the CDDs will not be able to provide the support and guidance women may need following the school-based program. Most CDDs expressed concerns regarding potential refusals associated with community member knowledge of STH or religious beliefs, which was not discussed as potential barriers by either gender.

Both men and women community members conveyed the need for thorough sensitization and transparency as well as community leader support. CDDs did believe that they may be able to bridge this gap between MDA programs and the community members. They are members of the communities they serve and, as the face of the distributions, will be able to reassure participants and provide more community-focused education. One CDD articulated that the selection of distributors will influence community trust and, ultimately, treatment coverage.

*"For example, if…it's foreigners that you have sent to these villages, we can have difficulties but at home, there are not too many difficulties compared to what is prohibited. We already know each other, even the villagers know us, we know our village." – Man 2, CDD*

More CDDs may be needed in order to address this issue and provide guidance on potential gender-specific barriers. One of the female CDDs stressed the same point as women in community member FGDs; there is untapped potential for women and mothers in particular to contribute to improved MDA treatment coverage by conducting sensitization within their immediate households and social circles.

*"It is in our communities, the time women stay at home, we must know these hours… those who are around, we will work with them, if it is the in night that others stay at home, so we will… continue with them " – Woman 2, CDD*.

Summary of themes

The relationship of each of the themes to the two components of our conceptual framework (i.e, the WEF and the SEM) is outlined in Tables 2 (presenting facilitators) and 3 (presenting barriers) below. In terms of facilitators at the individual level, women discussed how the inability to purchase deworming treatment negatively impacted their welfare but that the MDA will provide the drugs they needed regardless of financial status. For women, facilitators were primarily at the interpersonal level, as community MDA was thought to provide them with more control over the health of their children and other family members. There were no facilitators that emerged for men at either the individual or interpersonal levels. At the community level, women prefer the flexibility the door-to-door MDA provides them, since it does not require them to wait at a central location all day; while men prefer the MDA as it reduces their need to purchase drugs at the health centers. Within the organizational level, dislike for the current school-based distribution was a potential facilitator of MDA participation, as community-based distribution would allow men to have better control over their families.

The barriers at the individual level were that both genders feel comfortable with their own deworming prevention routines and may not see a need for MDA. Additionally, women believe themselves to be an unutilized asset for MDA while men do not see themselves as a risk and therefore do not prioritize the MDA coverage. Only men discussed interpersonal barriers around women being the primary source of risk for STH in their children and frustration that they are not more informed about their children's health. The only barrier at the community level was that both men and women perceived the MDA package to be lacking WASH resources to help prevent re-infection. Finally, at the organizational level, barriers to MDA success included lack of information and involvement for women within the program and distrust by both genders due to negative past experiences with MDA.

| | Welfare | Access | Conscientization | Mobilization | Control |
|---|---|---|---|---|---|
| Individual | Inability to purchase drugs negatively affected their welfare but the MDA will alleviate this burden | | | | |
| Interpersonal | | | As family caregivers and drivers, they can ensure the treatment is followed correctly | | Want to be able to make decisions about their children's health |
| Community | Drugs are expensive at facilities which increases demand for MDA | | | Typically, must seek out distributions, but this MDA allows them more flexibility | |
| Organizational | | | | | Views the current school-based system for impeding their control and therefore more inclined for change |

■Men ■Women ■Both

*Table 2: Summary of facilitators towards participating in the MDA broken down by gender*

| | Welfare | Access | Conscientization | Mobilization | Control |
|---|---|---|---|---|---|
| Individual | | | Their gender puts them in a role to positively impact the MDA but is not being utilized / Do not see themselves as a group at risk and needing to prioritize MDA | Feel comfortable with personal prevention strategies over MDA programs | |
| Interpersonal | | | Men believe that women are a major source of risk and infection for children | | Do not think they are being informed about their children's health |
| Community | | Lack of WASH resources to prevent STH (not bundled into MDA) | | | |
| Organizational | | Lack of information around the MDA | | Perception has been negatively colored by poor distributions in the past | Want more involvement in community MDA programs |

■Men ■Women ■Both

*Table 3: Summary of barriers towards participating in the MDA broken down by gender*

## Discussion

This study accounts for the perspectives of women and men in these communities, as well as perspectives of the volunteer CDDs who are working to reach them. These perspectives are necessary for identifying the gender norms influencing MDA coverage and the opportunities for overcoming gender-associated barriers to treatment. In this study, we found that while both men and women were enthusiastic about this new approach to deworming, they still had some reservations about implementation. Both men and women indicated that standard of care school-based deworming programs were problematic, however men and women cited different supportive rationale. Men were more likely to characterize the school-based program as exhibiting organizational flaws, such as providing drugs that caused side effects that could potentially result in the need to seek health care. which made them weary of future MDA programs, including community-wide MDA for STH. Alternatively, women perceived school-based distribution programs as disempowering of mothers, as they could not observe their children's treatment and ensure it was taken. The current school-based distribution protocol does include sensitization of parents about the MDA, but parents may find this insufficient and unempowering. As a result, the women welcomed an alternative approach to STH MDA that allowed them to exert more control over how and when deworming drugs were given to their children. This finding is supported by a study in Kenya which found that parents and village chiefs were unhappy with the level of involvement in school-based deworming there (26).

Additionally, women were more likely to describe situations where they felt they were underrepresented and underutilized during community-based public health campaigns, such as MDA programs targeting other neglected tropical diseases. The women indicated that they were in a unique position to help ensure high MDA treatment coverage by ensuring their family is sufficiently fed and prepared for the treatment to avoid side effects and then observing that the correct dosage was swallowed. This desire for more control was the predominant sentiment to come out of these focus groups. Within the WEF framework, equity in "control" is the final step in reaching women's empowerment. An earlier study in northern Benin also found an association between women's empowerment and improved nutrition (27). Including women in the deworming of their children and engaging them in the design and delivery of community-based STH MDA

would likely improve gender equity and contribute to women's empowerment. For example, Khan et al showed in a study in Pakistan that when unempowered, women were significantly less likely to seek out polio vaccination for their children (28).

Both genders expressed concern that they are not routinely treated during standard of care school-based STH programs yet cannot afford to purchase deworming drugs if they perceive themselves to be infected. Furthermore, men perceived women to be responsible for hygiene and therefore to blame if they or their children become infested. These perceptions could have negative effect on income-generating opportunities of women, particularly those engaged in food services. In contrast, men did not perceive themselves to be at high risk of STH infection, and thus demand for unprogrammed deworming medicines or access to community-based STH MDA was lower amongst men as compared to women. Woldu and Haile's study described men's perception of being biologically stronger than women and therefore less susceptible to malaria (29). Within our focus groups, however, men predominately discussed women's affinity for sweet foods or their responsibility for eating or hygiene habits as the main factor for risk. Previous studies consider typical gender role activities leading to differences in actual risk levels rather than perceived biological differences and their relation to risk perception (29, 30).

Our finding that women are perceived to play a critical role in household MDA treatment coverage is similar to reports from other studies. For example, Krentel et al. examined the dynamics surrounding couples' decision-making about participation in an LF MDA program in Indonesia (16, 31). They reported that women, especially mothers, play a critical role in decisions regarding household MDA participation and are more active than men in ensuring that their families are treated during MDA (16). In addition, Rilkoff et al found that door-to-door MDA in Uganda primarily reached women, who were most likely to be at home; in contrast, such programs were not suitable for men, for whom expanded centralized distributions were recommended (6). We found that women tended to be the ones responsible for collecting distributions within their communities, and that men were less likely to do this. Women were strongly in favor of door-to-door distribution of deworming drugs, as it allowed them to utilize their time efficiently while still receiving the distribution and engaging in the treatment of their entire family.

Intersectionality between factors such as location within community, poverty, education, and religion may also exacerbate gendered barriers. Living in the periphery of a village was brought up many times in relation to access to information about the MDA and community member's concern that they may not receive pertinent information as they are outside of the town-criers range. Additionally, poverty and one's ability to purchase treatment when they suspected STH infection was a major concern for community members, either due to inability to afford treatment or to lost income if they became unable to work if not treated. CDDs also brought up concern that religious leaders could negatively influence MDA participation if not engaged in sensitization campaigns. A paper by Theobald et al summarized the interconnectedness of gender and other characteristics that constitute barriers or facilitators for MDA programs globally, and emphasized the need to approach these issues as a whole rather than in isolation (20).

CDDs have a critical impact on the success of MDA programs via their engagement with the community and knowledge of community norms and preferences (16, 20, 32). The CDDs in our study discussed potential barriers to MDA that were common to both genders, such as concerns regarding WASH resources or religious beliefs. They also acknowledged that by providing drugs at no cost, MDA will be able to alleviate financial stressors for families with lower income. None of the gender-specific barriers or facilitators to participation identified by the community members were captured by the CDD focus groups. However, the majority of the participating CDDs in our focus groups were male, which may have influenced their perceptions of relevant facilitators and barriers. The gender of CDDs may influence MDA treatment coverage. Evidence from Tanzania suggests that female distributors are faced with more skepticism from the community than male counterparts and, due to social hierarchies, may face challenges in their outreach to older males in the community (21). Other studies support that male and female CDDs approach MDA delivery activities such as community sensitization differently and thus an awareness of the preferences and needs of each gender may be an important addition to CDD training activities (20, 33). Recruitment of both men and women as CDDs are needed in order to reach the entirety of the community and achieve high coverage. However, as this is currently a volunteer position in Benin, a more thorough training for all CDDs on the needs and preferences of both men and women should be provided to until an equal CDD workforce can be established.

These findings provide a roadmap to creating more gender equitable community-wide MDA that incorporates women empowerment into programming. The ongoing door-to-door MDA campaign may be more responsive to women's needs and priorities by allowing them more control and improved access to the distribution, while not monopolizing their time. Other programs in Benin are starting to pilot community-based MDA programs and moving away from school-based delivery. This study supports this trend. The ongoing DeWorm3 Project should be able to provide further evidence on what is needed to improve coverage and satisfaction with the MDA approach, as additional focus groups are planned in both high and low coverage clusters. While the door-to-door MDA framework may be preferable to women, Rilkoff et al found that men face more barriers in receiving information and distributed medications via door-to-door campaigns (6). While centralized distribution was recommended by this research group for men specifically (6), the success of this potential approach is unknown. Instead, an approach should be tailored in order to reach women, men, and children regardless of religion, socioeconomic status, or location within a village.

This study had several limitations. The focus group discussions took place prior to the DeWorm3 MDA, and so barriers and facilitators to MDA are discussed in relation to what participants had previously experienced (school-based programs and health-facility-based treatment of suspected or diagnosed cases). Therefore, these findings should be confirmed by subsequent qualitative research following the intervention. Another limitation is that some CDDs, especially those without school-age children, may not have experienced school-based distribution and lack that key perspective. The CDDs in this study had all worked previously on some type of MDA but had not necessarily worked on an MDA for STH. Furthermore, the topic guide used by facilitators was not originally designed to delve specifically into differences in gender perceptions around deworming. It is also unclear if these results can be generalized to other communities in Benin or other sub-Saharan African nations, as gender dynamics are intricately tied to local sociocultural norms. Additionally, the qualitative data were collected in French or local languages (Mina and Watachi) and thus some dialect-specific nuances may have been lost in translation.

Findings from this study demonstrate that perceptions of MDA and its barriers and facilitators may differ between genders, potentially impacting the success of community-wide MDA for STH, or community-based public health programs more generally. This door-to-door distribution strategy is well suited for reaching

women and children, but men will likely have lower levels of coverage. Women identified specific opportunities that will allow them to become empowered in MDA programs in order to improve their participation. These findings were not able to inform the initial round of DeWorm3 Project implementation but can inform subsequent rounds and analyses of coverage in the MDA. If men or other specific population groups experience low coverage in this MDA approach, involving women from each of the clusters in discussions about potential solutions should be considered.

**References**


1. World Health Organization. Preventive chemotherapy to control soil-transmitted helminth infections in at-risk population groups 2017.

2. Parija SC, Chidambaram M, Mandal J. Epidemiology and clinical features of soil-transmitted helminths. Trop Parasitol. 2017;7(2):81-5.

3. Ganguly S, Barkataki S, Karmakar S, Sanga P, Boopathi K, Kanagasabai K, et al. High prevalence of soil-transmitted helminth infections among primary school children, Uttar Pradesh, India, 2015. Infect Dis Poverty. 2017;6(1):139.

4. Larocque R, Casapia M, Gotuzzo E, Gyorkos TW. Relationship between intensity of soil-transmitted helminth infections and anemia during pregnancy. Am J Trop Med Hyg. 2005;73(4):783-9.

5. Ayoya MA, Bendech MA, Zagre NM, Tchibindat F. Maternal anaemia in West and Central Africa: time for urgent action. Public Health Nutr. 2012;15(5):916-27.

6. Rilkoff H, Tukahebwa EM, Fleming FM, Leslie J, Cole DC. Exploring gender dimensions of treatment programmes for neglected tropical diseases in Uganda. PLoS Negl Trop Dis. 2013;7(7):e2312.

7. Dickinson, B., London declaration on neglected tropical diseases. Sustaining the drive to overcome the global impact of neglected tropical diseases. 2012.

8. World Health Organization. Accelerating work to overcome the global impact of neglected tropical diseases 2012.

9. Asbjornsdottir KH, Ajjampur SSR, Anderson RM, Bailey R, Gardiner I, Halliday KE, et al. Assessing the feasibility of interrupting the transmission of soil-transmitted helminths through mass drug administration: The DeWorm3 cluster randomized trial protocol. PLoS Negl Trop Dis. 2018;12(1):e0006166.

10. Anderson R, Truscott J, Hollingsworth TD. The coverage and frequency of mass drug administration required to eliminate persistent transmission of soil-transmitted helminths. Philos Trans R Soc Lond B Biol Sci. 2014;369(1645):20130435.

11. USAID Economic Analysis and Data Services. Benin Country Dashboard [Available from: https://idea.usaid.gov/cd/benin?comparisonGroup=region]

12. Ibikounle M, Onzo-Aboki A, Doritchamou J, Tougoue JJ, Boko PM, Savassi BS, et al. Results of the first mapping of soil-transmitted helminths in Benin: Evidence of countrywide hookworm predominance. PLoS Negl Trop Dis. 2018;12(3):e0006241.

13. World Health Organization. PCT Databank: Benin. 2017.

14. World Health Organization. Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. 2016.

15. The World Bank. Benin Country Profile. 2015.

16. Krentel A, Wellings K. The role of gender relations in uptake of mass drug administration for lymphatic filariasis in Alor District, Indonesia. Parasit Vectors. 2018;11(1):179.

17. United Nations Development Programme. Gender Inequality Index [Available from: http://hdr.undp.org/en/content/gender-inequality-index-gii]

18. UNESCO Institute of Statistics. Benin 2018 [Available from: http://uis.unesco.org/country/BJ]

19. United Nations Development Programme. Human Development Indices and Indicators: 2018 Statistical Update. 2017.

20. Theobald S, MacPherson EE, Dean L, Jacobson J, Ducker C, Gyapong M, et al. 20 years of gender mainstreaming in health: lessons and reflections for the neglected tropical diseases community. BMJ Glob Health. 2017;2(4):e000512.

21. Krentel A, Gyapong M, Mallya S, Boadu NY, Amuyunzu-Nyamongo M, Stephens M, et al. Review of the factors influencing the motivation of community drug distributors towards the control and elimination of neglected tropical diseases (NTDs). PLoS Negl Trop Dis. 2017;11(12):e0006065.

22. Dobility Inc.. SurveyCTO. [Available from: https://www.surveycto.com]

23. Longwe S. Supporting Women's Development in the Third World: Distinguishing Between Intervention and Interference. . 1989.

24. American College Health Association. Ecological Model 2018 [Available from: https://www.acha.org/HealthyCampus/HealthyCampus/Ecological_Model.aspx]

25. Scientific Software Development GmbH. ATLAS.ti Germany 2018.

26. Musuva RM, Matey E, Masaku J, Odhiambo G, Mwende F, Thuita I, et al. Lessons from implementing mass drug administration for soil transmitted helminths among pre-school aged children during school based deworming program at the Kenyan coast. BMC Public Health. 2017;17(1):575.

27. Alaofe H, Zhu M, Burney J, Naylor R, Douglas T. Association Between Women's Empowerment and Maternal and Child Nutrition in Kalale District of Northern Benin. Food Nutr Bull. 2017;38(3):302-18.

28. Khan MT, Zaheer S, Shafique K. Maternal education, empowerment, economic status and child polio vaccination uptake in Pakistan: a population based cross sectional study. BMJ Open. 2017;7(3):e013853.

29. Woldu DO, Haile ZT. Gender roles and perceptions of malaria risk in agricultural communities of Mwea Division in Central Kenya. Women Health. 2015;55(2):227-43.

30. Nkangu MN, Olatunde OA, Yaya S. The perspective of gender on the Ebola virus using a risk management and population health framework: a scoping review. Infect Dis Poverty. 2017;6(1):135.

31. Hameed W, Azmat SK, Ali M, Sheikh MI, Abbas G, Temmerman M, et al. Women's empowerment and contraceptive use: the role of independent versus couples' decision-making, from a lower middle income country perspective. PLoS One. 2014;9(8):e104633.

32. Fleming FM, Matovu F, Hansen KS, Webster JP. A mixed methods approach to evaluating community drug distributor performance in the control of neglected tropical diseases. Parasit Vectors. 2016;9(1):345.

33. Jenson A, Gracewello C, Mkocha H, Roter D, Munoz B, West S. Gender and performance of community treatment assistants in Tanzania. Int J Qual Health Care. 2014;26(5):524-9.