STH Coalition Webinar
Feasibility of interrupting STH transmission: the DeWorm3 Project
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Background
Why are we interested in breaking transmission of parasitic worms?
- Since 2012, there has been a large investment in NTDs. Breaking transmission of intestinal worm infections would allow resources for STH control to be redirected to other priorities.
- The latest WHO guidelines released in 2017 expanded the treatment population, moving in the direction of a community-wide platform for PCT for deworming. If additional risk groups are considered for treatment without a concurrent decrease in treatments in other contexts, there may be a global shortage of deworming drugs. Most of the benzimidazole donations are through the global lymphatic filariasis (LF) elimination program. Will the STH program have sufficient drugs as LF programs end?
- The drug donation cannot be expected to continue forever, and there are concerns of resistance.

Modelling alternative Mass Drug Administration (MDA) strategies
Models show that annual community-wide deworming is the only strategy that can break transmission of hookworm.

DeWorm3 objectives and study design
The DeWorm3 project seeks to 1) define STH elimination, 2) demonstrate the feasibility of interrupting STH transmission, and 3) develop an implementation plan for scale-up. Study trial sites include Benin, Malawi, and India, with the feasibility of interrupting STH transmission in all, only some, or none of the trial sites. Findings from these comparisons will inform policy recommendations on community-wide versus targeted MDA.

The study takes place over five years, with three years of intervention and two years of surveillance. During the three intervention years, the intervention arm will receive biannual community-wide MDA and the control arm will receive biannual SAC- and PSAC-targeted MDA. A baseline census has already been performed, with be annual census, stool collection (longitudinal monitoring cohort), and coverage validation surveys conducted during the three intervention years. A cross-sectional survey (stool collection) was performed in Year 1, and follow-up cross-sectional surveys (with stool collection) are scheduled again for Years 4 and 5. A census is scheduled at the end of Year 5.

Possible resulting scenarios include 1) prevalence never falls below the threshold to break transmission, 2) prevalence falls below ≤2% six months post-MDA, but then increases above the threshold over two years of surveillance (bounce back), 3) prevalence does not fall below the threshold six months post-MDA, but falls below the threshold over two years of surveillance (transmission interruption), and 4) prevalence falls below the threshold six months post-MDA, and maintains or continues to decrease over two years of surveillance (transmission interruption).

Baseline census and surveys
Notable differences across the sites:
- The age profile was oldest in India and lowest in Malawi, with Benin in the middle. There is a dip in young adult men in Malawi because many travel for work.

Baseline census findings			
	India	Malawi	Benin
No access to a latrine	65.6%	2.4%	37.0%
Natural floor	12.4%	79.5%	17.3%

- Hookworm was the dominant species across the sites. There was very little *Ascaris* or *Trichuris* found in India or Malawi and *Ascaris* prevalence was at 1.9% in Benin. These results are based on Kato-Katz, so the PCR results will likely be higher.
- When prevalence is stratified by age group, it becomes clear that the adults are a significant reservoir of infection and that hookworm is driving the high prevalence.

The intervention: MDA
The intervention includes training (including in smart phones, as there is real-time data collection and processing), sensitization (link to DeWorm3 rap), and house to house delivery.

Coverage measures include individual treatment logs (recorded by drug distributors, intervention only), coverage survey (self-report, both arms), and urine assay. Coverage of recorded treatment and self-reported treatment were quite high- around 80% or higher.

Implementation research
In order to ensure that the findings translate into policy and programmatic action, implementation science activities are ongoing with trial to understand the operational factors that may influence ability to break transmission at scale. This work is using a variety of approaches to identify drivers of high coverage. The MDA process mapping shows every step involved in delivering MDA - there were 77 separate activities to deliver MDA, out of which 62% are leveraging the LF infrastructure. 35% of activities deviate from planned timelines.

The Swiss TPH is working with the implementation science teams to estimate the financial costs of MDA within DeWorm3, including running costs and separate activity module costs.

Collection in PLOS NTDs
Findings are published in a collection in PLOS NTDs. More papers will be added with baseline results, results from the implementation research, and impact findings.

Discussion
- Despite the improved household flooring in India, hookworm is quite high in India. Household flooring is only one factor driving transmission. 65% of the population surveyed do not use a latrine.
- It would be helpful to know which age group is driving transmission, but this study will answer the important programmatic questions around the force of infection within the adult population to understand whether adults are the major driver, which we expect is the case with hookworm.
- Representation/diversity across settings: The study includes an urban setting in Benin, two sub-sites in India (tribal setting and plains setting), and a border community in Malawi. This is a wide range of settings. Kato-Katz results ranged from 3-20%. Modeling suggests it may not be possible to break transmission in areas with higher than 20% prevalence.
- Measurement of the WASH environment at schools and homes is beginning in Benin next week and will look at whether water and soil samples can be used as an indicator of STH transmission. Amy Pickering's group at Tufts University is leading this project.