

GiveWell Donor Briefing June 22, 2022

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Elie Hassenfeld: Alright thank you everyone for joining us today. Really great to be here. I'm Elie Hassenfeld, I'm GiveWell's co-founder and CEO. Before we launch into the main event, I wanted to share a quick update on what's going on at GiveWell right now. Basically at the end of last year, you might remember that we told everyone that we expected the funding that we were in a position to raise to outpace the giving opportunities that we'd be able to find. And that was true at the end of 2021. But as we've come into 2022, the situation is different. And now we expect to be in a position where we identify more cost effective giving opportunities than we have funding to direct to them.

And that's really for two reasons. First, our research team has been incredibly effective in identifying more opportunities that need funding and have surpassed the expectations we had at the end of last year. And then also due to the fall in financial markets so far in 2022, we expect that our funding will be lower than we previously did. And so therefore, we think we're going to end the year with about \$100 million or more worth of funding opportunities that could really help people but we're not in a position to direct funding to. And so we're hoping that we, and the donors who follow our research are able to make a big dent in that and get money where it needs to go. We'll be publishing a blog post about this soon so you'll get a lot more detail on that in the near future.

I want to dive into today's event but with a focus on how we're looking for new funding opportunities. We've had a lot of success so far this year as I said, identifying new opportunities. Today we're going to be talking about our work and others' work that we evaluated that led us to make the large grant to a water program and I just want to step back for a minute and talk about how we identify those new opportunities.

They really come from two places. On one hand, we're focused on engaging with GiveWell's top charities. The organizations and the programs that we've followed and recommended for a very long time and pushing the organizations that we recommend to identify new areas that they haven't served before. To which they could bring their programs with additional funding. I think a great example of this is the Against Malaria Foundation which over the last, in the recent past has expanded its work into Nigeria, a country with just an immense malaria burden and so we're extremely excited to be able to support their work there.

Similarly, we're looking for new opportunities, ones that we haven't focused on before. And there's a few ways in which we're identifying new

opportunities to investigate. It comes from following and reading papers coming out of the academic world. We are in communication with subject matter experts about the programs that they think are most promising. So for example, people who work on care for newborn infants to reduce all too common neonatal mortality in low-income countries.

And then finally we're talking to organizations themselves about programs that they would run with additional funding that we'd be in a position to support. Just to give you a sense of scale, there are about 300 plus opportunities or ideas that we have in a long list that we are in a position to investigate or we'd like to investigate. We don't have the capacity to investigate all of them. And so currently we're actively working on about 30 of those investigations. And those investigations are looking at areas like iron supplementation for children in India. Number two, supporting the scale up of testing and treatment for syphilis and pregnancy in Cameroon and Zambia. And a third area of many is supporting vaccine incentives in promotion to increase the proportion of children in low- and middle-income countries who receive necessary immunizations.

And of the 300 or so, we're actively investigating 30. Of those 30, we think roughly half, so about 15, will eventually turn into grant recommendations that we make and we direct funds to. But today we're really focused on water, which is a program that came out of this process of looking for new opportunities over the last couple of years. And it's particularly interesting because water in general and specifically this focus, the program that we're looking at today, Dispensers for Safe Water and water quality, is an area that we had previously chosen to not recommend funding for. But on the basis of new research that others will present shortly, we changed our mind and we directed a significant amount of funding to water at the end of last year.

And so, without further ado, I want to introduce the speakers who you're going to be hearing from today. We want to go through the main aspects that went into the GiveWell decision to direct this significant funding to water at the end of last year and that covers academic research on an intervention, the thorough analysis and cost effectiveness modeling that we do. And then directly measuring effectiveness and implementation in communities themselves that Evidence Action, the implementing organization does.

So, first we're going to hear from Michael Kremer who's the director of the Development Innovation Lab at the University of Chicago. He and his team are the ones who released the meta-analysis that we relied on in this most recent evaluation. It reexamined evidence of chlorination showing that higher reductions in child mortality were occurring due to the intervention that had previously been estimated. We are extremely fortunate and grateful that Michael is here today. He was instrumental in supporting the creation of the movement and development economics focused on randomized control trials which itself was a major influence on GiveWell as we were developing. He and his co-authors ran the study on deworming which our recommendation relies on. It finds that deworming children in

childhood can have a significant effect on children's incomes later in life.

He also helped create both the Deworm the World Initiative and the Dispensers for Safe Water program at Evidence Action. And Michael, finally, he serves as Scientific Director for USAID's development intervention ventures and he's a joint winner of the Nobel Prize in Economics for his contributions to the experimental approach in alleviating global poverty.

In addition to Michael, we'll also be hearing from GiveWell's own Catherine Hollander. Catherine is a Senior Program Associate and she's going to discuss GiveWell's investigation of the meta-analysis and how we decided to fund the grant.

And then finally, we'll hear from Brett Sedgewick. He's a Senior Director of Programs at Evidence Action. We'll learn more about how Dispensers for Safe Water is implemented in communities and how Evidence Action monitors the program's ongoing impact. And after that, we'll open things up to Q&A. You can submit questions using the Zoom chat feature and we're going to try to get through as many questions as we can during the event. We are recording the event and we're happy to send out the recording shortly so you're able to share that with others. So, with that, please welcome Michael Kremer. Michael, over to you.

Michael Kremer:

Thank you so much. Very kind introduction and thanks to GiveWell for organizing the event today and more broadly for all of your work. I'd like to discuss a new meta-analysis on the impacts of water treatment on child mortality. This is joint work with Stephen Luby who's an epidemiologist at Stanford, Ricardo Maertens, Brandon Tan who are both economists, and Witold Wiecek is a biostatistician. And as you heard from Elie, we find that the impacts of water treatment on child survival seem to be very large. Much larger than we anticipated or others might have anticipated. And in fact, they're among the most cost-effective interventions for reducing child mortality.

Right, as background, over two billion people consume drinking water that's contaminated with feces each year. And so there's a lot of evidence that water treatment reduces childhood diarrhea. And there's lots of scientific reasons to think that it would do so. But there's so far been limited experimental evidence on effects on child mortality. And I think a big part of the reason for that is that child mortality is a rare outcome. And that means you need a very large sample size to measure this.

But, unlike, say, a new vaccine or a new drug, the techniques for treating water have been around for 100 years. They've been widely implemented, it's not easy to get a patent on this and make a lot of money from it. And so, you don't have this type of very large-scale funding from commercial interests that would be required to do the large studies to pick up impacts on mortality. And, knowing that they can only afford small studies, most of the studies typically have a sample size that's enough to pick up diarrhea as reported by the caregiver, the mother usually. But not a sample size big

enough to pick up effects on mortality.

And, because in the absence of this type of experimental evidence, just based on the quasi-experimental evidence, the historical evidence for example, from introduction of water treatment, a lot of the health funders don't put this on the list of the strongest evidence backed child mortality interventions. So, what we did in this paper was we decided that we would try to go back to the studies on diarrhea. And see if we could find if they still had any data available on child survival. There were few that reported this. But most of them didn't report it because it wasn't in their pre analysis plan because they knew they weren't powered for it.

So we focused on studies in lower and middle-income countries. We wanted to limit this to RCTs. We wanted to focus on children under five. That's where we think most of the mortality is likely to be. And you saw we identified 50 studies like that roughly. 40 of the authors responded and 19 had collective mortality data. But only 17 of that was the data still available. Some of these went back to 1970. So, in some cases, the data wasn't there. There were 15 that where the comparison group wasn't contaminated that we focused on although the results are robust to consider in the full set of 17.

So, the biggest individual study in this had less than 3,500 people in it. But by combining the studies, we're able to get a total sample of 24,000. And just to give a bit more of an indication of the breakdown of types of studies, 12 of these examined chlorination. So, most water that most people in the US drink is chlorinated. Two of them were looking at filtration. One was looking at spring protection. So, most of the data is on chlorination. That's the only sub case where we'll try subgroup analysis.

Here are our results. So, this is called a forest plot, for those who aren't familiar with it. This is from a Bayesian model we also report a frequent model with similar results. And each row is a study and the size of the circles represents the weight and the meta-analysis and the horizontal lines give the confidence intervals for each individual study. So the studies with small samples have wider competence intervals typically.

And so you can see that those are all of the map, pretty typically wide. They're not really all over the map. They're mostly to show reductions. So, this is done in odds ratios. So, effects estimated they're less than one means reduction in mortality here. But there are some that are on the right side, greater than one side. And in fact, this version is what you'd expect for a very rare outcome in any individual study might have one or two or three or four mortality events and just switching one from the treatment group to the comparison group moves the estimate a lot.

So, putting all the data together gives you a much tighter confidence interval. So if you look down at the bottom, this is actually the Bayesian estimate so it's not technically a confidence interval, it's an analogous Bayesian concept. But it's a 30% reduction in mortality. So this is something

that is, to be technically speaking, in the odds of under five mortalities. And not some, and we get quite similar effects when we restrict to studies of chlorination only.

So, as I noted, this is a large effect. It implies that almost one in three child deaths in developing countries could be prevented by treating water. Now, I think there's all sorts of,—happy to talk about it— reasons for caution and interpreting this, but one thing I would point out is that we combine this with a cost effectiveness analysis. And even at the low end of the confidence interval, this is still something that would be extremely cost effective. Let me just see if I can highlight a couple of both the overall estimate and the impact of when we just restrict to the chlorination studies.

I'd also note that we've done a number of sensitivity analyses and test for publication bias. I won't go into that now but, happy to answer questions on it. Also note that one of the advantages of the Bayesian approach to estimation is that it allows readers or anyone to incorporate their own prior knowledge and what's called a statistical prior in Bayesian terms, about the likely effects. And so, just as an example, treat this as a hypothetical example, we considered, suppose that you saw this data but you already thought, you had beliefs about how big the effect was likely to be. And about how confident you were on that.

Well, as a hypothetical example, if you started out and believed that the effect was not a 30% reduction but a 10% reduction, depending on exactly the details, you might wind up with an estimate of reduction in child mortality between 18% and 25%. So there are ways to formally incorporate other types of information in this.

I should also note that while I've been talking about a dilute chlorine, about water treatment in general, the program that GiveWell is supporting is based on a particular technology treatment with dilute chlorine solution. And that's something that's been done, not that we have the most evidence on but it's done very widely. It's known from the test tube to be effective against most but not all diarrhea causing organisms and because it's been used for a very long time, it's considered to be safe and it's also inexpensive.

And we took a look at cost data for Evidence Action's dispenser program and also for other approaches to distributing this including a coupon program so that mothers could pick up dilute chlorine solution to treat water for small kids. And both of these would be very inexpensive to implement. Our calculation suggests that the cost per disability adjusted life averted is under \$40 or around \$3,000 per child death averted. And that's really comparable to the most cost-effective interventions recommended by the World Health Organization. Things like childhood vaccination and malaria treatment.

So, I think that this is something that I'm excited about both from the standpoint of individual donors or effects could do but also I think it has big

implications for what governments do. I'd be happy to discuss any of that in the Q&A. Thank you very much.

Catherine Hollander: Great thank you Michael. Hopefully you all can see and hear me, I'm just going to take a moment to share my screen.

Michael Kremer: Have you unshared me?

Catherine Hollander: Right.

Michael Kremer: Yeah I got it okay. Good.

Catherine Hollander: Thank you so much. Okay. Alright. I'm Catherine Hollander, as Elie mentioned. I'm a member of the New Interventions Team at GiveWell and today I'm going to be talking about how we incorporated the evidence that Michael just presented on in our own research. So, as Elie mentioned, we had looked into water quality interventions in the past. But what we didn't have at that time was a direct estimate of their effect on child mortality which was the main benefit that we were interested in.

So, we came up with an estimate of their impact on child mortality in an indirect or roundabout way. By looking at the impact of chlorination programs on diarrhea prevalence and then extrapolating from there to get to the estimate that you see here. 3% for their reduction in child mortality. And this is quite a bit lower than the estimate that Michael just shared, as you'll note. And so, we didn't proceed with making any grants to water quality programs at that time. But we kept our eye on the literature and we actually even funded some research ourselves to help us try to get better information to answer this question of what their impact on child mortality could be. But it wasn't really until we saw the evidence that Michael just presented which as he noted was a direct estimate of the mortality effects that we revisited this program. And as you saw, it was a significantly higher estimate of the mortality reduction. So, ten times as high as what we had previously been estimating.

So we were interested in revisiting this program and when we're looking at evidence for a potential intervention that we might want to pursue, we're really looking at it from the perspective of future grants we could make. So we don't just want to take the evidence into the abstract. We want to really apply it to funding opportunities that we're aware of to understand how cost effective a grant that we might make could be.

So, in this particular case, we were familiar with Evidence Action's Dispensers for Safe Water program and that was the lens through which we were revisiting this water quality research and thinking about a potential grant to Dispensers for Safe Water. So, Michael mentioned there were 15 studies included in the meta-analysis. We pulled five of those studies out and conducted our own analysis. And we chose those five studies because they first focused on programs where water was treated with chlorine alone. Which is the intervention that Dispensers implements.

And second, we also wanted to focus on studies with longer follow-up periods. And that was to focus on larger studies and to limit potential publication bias. So, taking these five studies, we updated our estimate of the reduction in mortality from water treatment programs from 3% to 14% which is obviously a much larger number. This is a significant increase and so we wanted to think about the plausibility of that change. And ultimately we think there is a plausible story for what that earlier 3% estimate that we had might have been missing. And that 3% estimate just counted deaths that were due to diarrhea. And, when we were thinking about the plausibility of this higher number which is looking at reductions in all-cause mortality for children under five, we thought that it would be plausible because deaths often have multiple causes. So someone might die of a secondary infection that's contracted after their system is weakened by diarrhea. And we also thought it was plausible based on a substantial body of historical evidence from the United States and Europe looking at how water quality improvements there led to reductions in non-water borne diseases like respiratory illness.

So, there was a story that was emerging that was basically just focusing on deaths caused by diarrhea alone might miss some of the picture if people are dying of causes that are related to poor water quality but are not diarrhea. So, taking this 14% estimate that we have and applying some additional adjustments to account for the differences between the programs in the studies that we were using for that estimate and the way that Dispensers for Safe Water would implement their program, things like looking at the local diarrhea rates in the context where the Dispensers for Safe Water program would be implemented and looking at the specific ways in which the Dispensers program would be implemented compared to how the interventions and studies were implemented, we made some additional adjustments to come up with an estimate of 6-11% mortality reduction from the Dispensers for Safe Water program.

And when we combined that estimate with the other benefits that we saw of the program. So, I mentioned the 6-11% focuses on this main benefit of reducing under five mortality but we also think that the Dispensers program has benefits like reducing over five mortality, potentially leading to increases in later in life income for children who have access to improved water quality and averting medical costs. So, saving money that would have otherwise been spent on treatment for diarrheal illnesses. We take all of those benefits into account. We came up with a cost effectiveness estimate for the Dispensers for Safe Water program of between 4-8 times as cost effective as cash transfers in the areas where Dispensers for Safe Water would be operating. And looking at that high-cost effectiveness estimate, the 4-8 times cost effectiveness cash transfers, and combining that with our understanding of Evidence Action's strong track record of implementing programs as well as their plans for monitoring and evaluation. We thought that this great opportunity looked really strong and so we made a grant of up to \$65 million to support the program at the end of last year. And we're really excited about this grant and the impact that it can have. Doesn't

mean that we don't have any open questions that remain. I mentioned we think our mortality analysis is plausible but it also implies that for every diarrhea death averted, 2.7 deaths are averted from other causes and this is a somewhat surprisingly high number. And something that we want to keep digging into in the future.

But the open questions do not temper our enthusiasm for this program and water quality interventions in general which are one of the most promising areas that we see in our research pipeline right now. And so, one of the most promising programs that we see in our research pipeline right now. And so, that combined with the fact that we think there are real funding gaps for these programs, our understanding of the current funding space is that other funders tend to be more interested in supporting increasing access to water rather than improving its quality, lead us to think that this is an incredibly promising area for us to be considering.

And I just want to close by saying, stepping back in reflection on this grant is that it was a really great encapsulation of the type of impact we think we can have when we combine strong academic evidence with a great implementing partner like Evidence Action. And finding such a highly cost-effective opportunity in this way suggests to us that there might be other potential places where we can find significant impact by looking at this model of identifying funding opportunities and so we're just really excited about the grant that we made and also what it might suggest for potential future funding we could support going forward. With that, I want to turn things over to Brett at Evidence Action to talk more about the Dispensers program. Thank you.

Brett:

Thanks Catherine. One second while I share my screen. Okay and I think that's working. So, thanks everyone, thanks Elie and GiveWell and Michael and Catherine for joining us and for GiveWell for setting this up. I think Michael and Catherine did a great job covering the importance of safe water and the evidence. So I'd like to spend my time on Dispensers for Safe Water as an intervention.

And this is really a focus on the 80% of people without basic water services who live in rural areas. These communities have access to water through boreholes and wells. For these communities who are off grid, ensuring their water is safe to drink and they can therefore benefit from its impact, is a critical step. Dispensers for Safe Water provides both an engineering and a delivery solution for rural communities to access chlorine at their existing water points. The dispenser is designed to deliver a precise dose of chlorine to users and our model is simple: a user goes to their usual water source, places their bucket under the dispenser, turns the valve to dispense the correct dose of chlorine, and fills their bucket with water as they normally would. The chlorine disinfects the water during the walk home and by the time they arrive it's safe to drink for up to three days.

So, why does this work? We have a human centric design with bright blue dispensers that are installed next to water sources. This makes it easy for

people to remember to use them and helps them build safe water practices into their routine. There's community partnership. We engage closely with communities who elect a volunteer promoter who guides and encourages dispenser use and who lets us know when chlorine refills or dispenser repairs are needed.

There's also a last mile service delivery with an incredibly robust supply chain and maintenance plan that ensures dispensers are stocked and working. Issues are addressed within 72 hours and local staff use motorcycles to reach remote locations. And it's free to use. Research shows, including some of Michael's research, that the use of preventative health products declined rapidly with even marginal costs. So, providing chlorine for free ensures that people don't have to make difficult tradeoffs.

All of this adds up to this dispenser product that has adoption rates that are really over five times many of the other chlorination technologies we looked at. On top of all this is an incredibly robust M&E approach and adaptive learning process. So, we use evidence and data collection throughout the program life cycle. And we find at Evidence Action that even with effective interventions that we design, the design and operational efficiencies over time can be improved to drive much greater impact. What does this look like? Shifting from clunky, metal dispensers to easier to use and maintain plastic dispensers that reduce cost and increase adoption. Or, shifting from full size delivery trucks to a network of motorbike deliveries for chlorine and other supplies reducing transport costs by four times.

And our M&E in particular allows us to continually improve the program and identify gaps. So, for instance, a while ago we noticed based on the data that we were collecting that adoption rates in Uganda were going down rapidly and because of our real time data we need to engage. We mobilized our community service team to understand what was going on. And they actually found that there were rumors in Uganda that were spreading that chlorine caused male sterility and that was suppressing our adoption rates.

So, we were able to use our promoter network which works in the community and also engage key government officials to address the issue on the radio and we're able to watch our adoption go up from 39% to 59%. And this is a particularly sensational anecdote but it is what our teams are living day to day, month by month. Seeing this data coming in, analyzing it and seeing where they can make changes and improvements or see where there are gaps that need to be addressed.

So, what is our impact today? Currently we reach over four million people with access to safe water across rural communities in Uganda and Malawi. At a cost of \$1.50 per person per year. This network of over 28,000 dispensers is critically supported by 54,000 community volunteers and a staff of about 200. All of whom are locally hired.

For our expansion that we're discussing under this announcement, it is incredibly exciting. And through the new investment from GiveWell and

Open Philanthropy, we will be approximately doubling the size of the program to reach over nine million people with access to safe water by the end of 2023. That expansion will take place in Uganda and Malawi while maintaining a presence in Kenya. And in Uganda and Malawi we'll be installing a combined total of 24,000 new dispensers. That's reaching over 10% of Uganda's population and over 15% of Malawi's population with access.

With this grant, we'll also be exploring expansion to other countries and modeling what that would look like for further expansion. This is obviously an enormous logistical undertaking and one that we've been preparing for for a while and we're really excited to embark upon. This grant is only a few months old and we've already received government approval to work in all of our targeted expansion districts. We've actually almost completed hiring staff in country, secured new warehouses and offices and are excited to have a manufacturing process set up in all three countries.

So, just to quickly wrap up, I'd like to go back to these numbers. Nine million people across Uganda and Malawi and Kenya. 10% of Uganda and 15% of Malawi will have access to safe water as a result of this investment. These are population level impacts and they're just incredible. We're so appreciative of GiveWell and Open Phil, Michael, his team and all of the other researchers who have influenced the design of this program and the many donors who have contributed to ensuring the program was able to continue delivering impact over the last ten years. It's incredibly exciting to understand the extent of Dispensers' impact on reducing child mortality. But also to be a part of the shift in thinking that could drive a whole lot more. So, thanks very much and happy to take questions.

Elie Hassenfeld:

Great. Thank you so much Brett and Catherine and Michael for sharing. We're going to turn now to Q&A. I just want to briefly introduce and welcome two more people. I want to welcome Stephan Guyenet, he's a senior researcher at GiveWell. He focuses on technical analysis of new interventions for potential funding. In addition, he's a neuroscience and obesity researcher who's the author of the book *The Hungry Brain*. And then also joining us is Witold Wiecek. He's a researcher in biostatistics and Bayesian methods. He's a co-author on this study that we discussed. So, welcome both and we are going to dive into questions. I want to kick off with a question for Michael especially. You mentioned a bit about the reason for insufficient funding for a study like this. I'm curious if you could say more about why that funding didn't exist? It seems that water is a very well-known problem. There should be funding to run studies that assess its impact on mortality. And so, curious both about your thoughts on why this study hadn't been funded before. And then also what was the catalyzing event that led you to run this study when you did.

Michael Kremer:

So, I think that the first factor I'd point to is the one that I'd mention which is there's not a big commercial interest in supporting this type of study because you can't get a patent on chlorination. It's been around for a long time. And so no company is going to invest the millions of dollars that are

required to do a study of the size that we artificially put together here. And, I think this is a more general problem. I think there are all sorts of, if I'm talking to the effective altruism community more broadly, there are, and I'm not an expert in this area, but there are a bunch of things that are not patentable. For example, because they're generic drugs already that might be effective against other conditions. And so I think there's a funding gap of this type that goes beyond this particular example.

I do think there's a second problem which is things that are going to be primarily relevant for lives of low-income people in low-income countries. There's an additional funding gap. If as many kids were dying from diarrhea in the United States, I think the NIH would have come up with the money for the study. What we did in this case was, and it is second best in various ways. We put together, we went to the authors of all the small studies and artificially were able to put together a sample by combining them. And why did we do this now? Well we only had the idea recently. It took a while to put it together but obviously it would be nice to do this to get additional evidence as well.

Elie Hassenfeld: Got it. Thanks, that's really helpful. I want to turn a question over to Stephan from GiveWell. And Michael and Witold jump in if you have answers too. We're focusing so much on the question of child mortality in discussing the impacts of water and a few people asked—Salim, Sonya, Anka—what about impacts beyond child mortality? What about impacts like improving childhood health that could lead to improved development over time? What about reducing medical costs of bringing children to treatment? What about impacts on adult mortality? So, Stephan, why don't you kick us off and I'm curious how GiveWell thought about that and then if others have thoughts, please jump in.

Stephan Guyenet: Absolutely. So, yes we do include other benefits in our cost effectiveness analysis. We talked a lot about under five mortality but we also estimate that water treatment reduces over five mortality a little bit, between one and 4% depending on location. That is compared to our estimate of 6-11% in under fives. Although adults in places with unsafe water die of water borne disease a lot less often than children, they do die sometimes, so we try to take that into account. And it's not negligible because there are a lot more adults than there are children.

In addition, we include benefits from reducing morbidity or illness although that only makes a small contribution to cost effectiveness. We include what we call development effects which is the concept that improving a young child's health helps them grow up into more effective adults. We don't have direct evidence on that for water but we do have it for other interventions like malaria and deworming and so we think that it's probably a general phenomenon.

We also include medical costs averted as a result of water quality improvements. So basically if you are a parent and your child is not developing serious diarrhea, which is a common thing in settings with

unsafe water, then you are going to be saving money on medical treatments either for outpatient or inpatient types of scenarios. Our initial estimate, which is in the public CEA, suggests that medical costs averted makes a surprisingly large contribution to cost-effectiveness and we have work ongoing to refine that and explore how it may apply to other interventions.

Elie Hassenfeld: Great thanks Stephan. I want to ask Brett a question about scaling up Dispensers and this is something that we at GiveWell have talked to you at Evidence Action about a lot over the past year. You mentioned the scale which Dispensers has reached in Uganda and in Malawi, 10-15% of the population is reached through the intervention which is amazing. But to ask the question, maybe an unreasonable question, what are the barriers to reaching everyone who needs the program beyond funding. So let's take funding as obviously a necessary condition but beyond that, are there any meaningful obstacles to expansion that prevent this amazing intervention from reaching more people who need it as quickly as possible?

Brett Sedgewick: Sure thanks. That's a good question. I think that, so, Dispensers is a very specific intervention that had been designed over time in those three countries. And as I think, so, and it's pretty logistically heavy. And so we're still learning about how rapidly we can scale and build that infrastructure to scale them quickly. So like, Coke can do that real quickly. We haven't done it for a while so we know theoretically we can do it quicky but the investment in infrastructure both at a leadership level and management level for Evidence Action is really important. So, one thing is that infrastructure at an organizational level and then the other piece is that design and how that design changes as we move into new geographies. So I think those are the real constraints that we've been thinking about quite a bit.

Brett Sedgewick: I do think that as your background on the question is the implication that there is an absolutely massive unmet need. And when we look at the data, when DSW came in or right now. Like Uganda, Malawi, and Kenya are not particularly unique in their qualities of being ripe for DSW. So, the volume of potential communities that could really benefit from DSW or like a robust chlorination program I think is just immense.

Elie Hassenfeld: One quick follow-up: I mean just for those of us who aren't as close to the program implementation as you, can you give an example of a way in which the design of the program may need to be different in one context versus another?

Brett Sedgewick: Sure. So, right now we are working with moderately dense rural populations so they are not urban, they are definitely rural. But they are moderately close together and so the efficiency of our network of motorcycle drivers who go and deliver chlorine and do M&E and engage with communities has been sorted out and figured out. As we go into geographies where that density might be different, we'll have to be modifying those plans of how that transport works.

In Malawi for instance, we have more density, we also have a different relationship with the government where they are very able to support us in a lot of our supply chain work and so that requires just a different management approach and a different engagement. And so as we move into new geographies we'll have to look at that context. And that's a real roll up your sleeves and how it actually works mile by mile on the delivery of the program.

Elie Hassenfeld: Thanks. Michael, did you want to jump in?

Michael Kremer: Yeah. I thought I would just add, really picking up on some of the things that Brett mentioned and on the questions in the chat. There is an immense unmet need and I'm excited about Dispensers and full disclosure I was involved, not involved in the current work but I was involved in helping develop the concept. But if you think about other areas for example, with different density populations. If you think about how things could be scaled up very rapidly, what is the equivalent of Coke that already has a network? There are, the public health systems in a lot of countries there are clinics that most mothers are delivering their kids in clinics right now in most of the developing world. And there is a system for giving away essential health codes. Whether that's vaccinations, whether it's mosquito nets. And one of the areas that I'm very excited about is—I think you need a portfolio of different delivery methods—providing coupons to mothers when they come into the clinic for delivery, for immunizations for their children. Coupons that would allow them to pick up small bottles of water, treatment solution which are already socially marketed in many countries. But with very low take up.

So, those would be targeted to the people with the highest mortality: young kids through their mothers. And I've done work with Pascale, Alex, and Vivian Hoffman. Not quite as high take up as Dispensers but you can still reach a lot of people very very cost effectively and I think that's something if we could get to the point where I think it's a ways off before governments are going to pay for it. But I think you can easily imagine governments saying we will integrate this into our systems because it dovetails, it's not a matter of what we got to hire a bunch of people to ride on motorcycles to redeliver things to water points and Evidence Action knows how to do that but that's not what ministries of health typically do. They work through clinics.

So, I think that might be a scalable, another scalable approach. And then, many people, including Amy Pickering at Berkeley, are working on what's called in-line chlorination. As the world gets richer, more and more people are getting their water through a pipe, say a standpipe that serves many households in a slum or in a rural area. And one exciting possibility is to be able to have small devices that add chlorination to that. And that could obviously really boost take up a lot.

Brett Sedgewick: Yeah absolutely just wanted to reiterate that. I agree. The portfolio of need, I think what's so exciting about this research is that it's proving the need. DSW can reach a large population. There's a significant population it can't

reach where it might not be the most effective or efficient. And we're also working hard to scale up ILC shortly. We hope in-line chlorination, shortly we hope and I think I agree, that the messages about safe water is really an underinvested area. We have some solutions, we do not have all the solutions, there's a lot more work to be done to scale up additional interventions as well.

Elie Hassenfeld: Great thanks Brett and Michael. It's a good segue to the next question that came in for Catherine which is: Michael and Brett and have talked a lot about the unmet need, the potential opportunities to bring water programming to scale of various kinds both this program and others. And I'm curious if you could address this question, what are GiveWell's plans with respect to water evaluation and recommendation going forward both for this program and potentially others?

Catherine Hollander: Yeah thanks, it's a really good question and as I mentioned earlier, water quality programs in general are one of our high priorities in our research pipeline right now so we are planning to invest in other funding opportunities beyond the Dispensers grant that we made earlier this year. That includes in-line chlorination which Michael mentioned and which Evidence Action works on and we think that's a particularly exciting program because as Michael said, the chlorination device is installed with the pipe, so the water treatment is happening automatically. That's in contrast to Dispensers for Safe Water where people turn a knob to dispense chlorine prior to filling a water container and we think this more automatic process has a lot of promise and it's something we're excited about and looking into further.

We're also interested in potentially funding additional research into water quality. I mentioned that's something we have done in the past and it's something we do in general when have open questions about an intervention and think here I mentioned that the mortality analysis we did, did have some surprising results to us and so, the ability to have more direct evidence on the mortality effects of water would be particularly exciting to us. So I think those are a few areas that we're looking into but overall, stay tuned this is definitely an area we're interested in doing more work in.

Elie Hassenfeld: Great thanks, Catherine. And thanks everyone for all the questions you're submitting. You can keep submitting them. We're low on time so we're not going to get to all of them but we are going to aim to follow up with everyone over email to answer your questions after the event. So, feel free to keep throwing the questions in. I wanted to ask another question. Maybe I'll put it to Michael first if you can answer, then Stephan to jump in too. We're talking a lot about water chlorination. We mentioned, we've talked about filtration. I'm also curious about other water interventions and how you thought about them either from the perspective of the any necessary additional research or potential promising interventions. Also, from GiveWell's perspective, how promising do they seem to us? So these include chlorination, filtration, water, infrastructure programs to increase the quantity of water available and then, sanitation which is often combined

with water as a combined program. I'm curious about your thoughts on that group of programs overall. So, Michael if you're up for it we'll start with you and then Stephan add anything you'd like.

Michael Kremer: Sure. There are a bunch of technologies out there. There's filtration, there's reverse osmosis, there's just municipal chlorination of delivering the water through pipes the same as would be in the United States from a water plant to your house. Or most high-income countries in general. So, I think that one thing about chlorination and probably the reason, one of the biggest reasons why we've talked so much about it is that it's incredibly inexpensive. Just as, I would recommend you not do this at home. But a bottle of bleach has enough chlorine in it to treat 70,000 liters of water. And you should manufacture it to get the chlorine concentrations more carefully controlled than in bleach and rather diluting it at home.

But I do think these other things have potential. One thing, but I think it's probably somewhat higher income people who are going to typically be going for some of the more expensive solutions. One thing that I think might be another, to be clear, this is a very speculative statement, one thing I think might have potential to be very cost effective is to find ways to work with governments to make their existing piped water systems more effective. Because what often happens is that the water that's come out of the pipe is supposed to be free of microbiological contamination. It's chlorinated in a plant but maybe the chlorination doesn't always happen. Maybe it happens but there's what's called negative pressure in the pipes. So, other things seep into the pipes. Chlorine reacts with that. That uses up all the chlorine. And then the water is no longer safe.

So, potentially, India is trying to bring piped water to every household. So, again I think there's a more general lesson than just with water. If you can find ways to make government programs, they're spending a ton of money on this. If there are ways to make government programs more cost effective or more impactful, I think that could potentially be a very good use of funds. I don't know the research on this area well enough to recommend anything to GiveWell at this point.

Stephan Guyenet: So just to flush that out a little bit from the GiveWell perspective. We think chlorination is great and we're interested in ways to do it even more cost effectively. Hence, our interest in in-line chlorination, which is potentially more cost effective. Filters are effective for improving water quality. So, from our perspective it comes mostly down to how much they cost relative to chlorination and what giving opportunities are available. And that's something that we're currently investigating.

As Michael mentioned, infrastructure like piped clean water can be very effective at improving water quality but it's expensive so, installing it is not something we've paid much attention to so far. But we're certainly open to getting opportunities if there's something in that area that looks cost effective. For example, the idea that Michael just mentioned about increasing the quality of piped water is an interesting one. As far as

sanitation, we've looked into hand washing interventions and judged them not to be cost effective enough for our standards. Although we may want to revisit some of that in light of the new evidence that we've been discussing. And I'm not aware that we've looked into other sanitation interventions at this point.

Elie Hassenfeld:

Great, thanks both. We're at time so we're going to wrap up. Really appreciate all the panelists for joining and sharing your thoughts. This was great. Thank you so much and thank you also to everyone who joined this in the audience, for your participation, your general support of GiveWell and our work. And then of course the great questions that came through in this presentation. We're planning to follow up with you to answer them over email but just really appreciate the deep engagement with our work. It's really great. Thank you so much and enjoy the rest of your day.