Local perceptions of an integrated school health and nutrition programme involving WASH, school feeding and deworming in southwest Ethiopia

Emily Keating^{1*}, Gemechu Tadesse², Nigussie Geletu Dejene³, Elodie Yard³, Laura J Appleby³, Jacqueline M Cardwell⁴

¹ London School of Hygiene and Tropical Medicine, London, UK

² Ethiopian Public Health Institute, Addis Ababa, Ethiopia

³ Partnership for Child Development, Imperial College London, London, UK

⁴ Department of Pathobiology and Population Sciences, Royal Veterinary College, London, UK

*Corresponding author

E-mail: emily.keating@doctors.org.uk

Abstract

Introduction. The ‘Enhanced School Health Initiative’ (ESHI) targeted 30 primary schools in southern Ethiopia and aimed to improve the health and educational outcomes of school children through an integrated package of school feeding, deworming and the provision of improved water sanitation and hygiene (WASH). This study investigated parental perceptions of this integrated school health and nutrition programme.

Methods. The data was collected through group interviews with parents of children at schools targeted by the programme. Ten schools were purposively selected to represent geographical diversity. A team of two trained facilitators led the group interview in each school. All interviews were conducted in local dialects and then directly translated into English and transcribed. The transcripts were analysed using thematic analysis. Findings are structured around key themes identified from the discussions.

Results and Discussion. Three main themes are identified from the interviews. The first relates to the perceptions of equity and opportunity generated for the children and the parents as a result of the programme. The second theme identifies the dissemination of learning throughout the community reported by parents. This includes the use of children as messengers, particularly for good hygiene practices and importance of deworming. The final theme explores concerns about ownership and sustainability of the programme within the communities. When probed on the topic of sustainability, parents raised conflicts surrounding ownership, and their ability to sustain the programme without further external input.

Conclusions. The findings highlight the parent’s perceptions of this integrated school health and nutrition programme, and the multiple mechanisms through which it has an

impact on the wider community. They also highlight what aspects of the programme are felt to be sustainable without further input, particularly behaviour change.

Introduction

Schools provide an effective and efficient platform from which to address multiple health issues that can impact on education in what is known as school health and nutrition (SHN)^[1,2]. SHN programmes are now ubiquitous in government policies and plans, and the sustainable adoption of such interventions by target populations is recognised as an essential goal ^[3,4,5]. With the advent of the Sustainable Development Goals, interventions are now being designed to ensure equity, full community engagement and support, empowerment, inclusivity, and participation. These factors are recognized as fundamental to community acceptability and uptake ^[6] and the importance of exploring them to identify barriers and improve successful implementation is widely recognised ^[4,7]. Such research is often described as community acceptability research, and is substantially under-explored in public health ^[8,9].

In particular, the acceptability of deworming programmes is poorly understood despite school-based deworming comprising one of the largest public health donation programs world-wide ^[1]. A large-scale evaluation of schistosomiasis control in Uganda in 2003-2006 was able to contribute to understanding of local perceptions and highlighted issues that needed to be further addressed such as increased health education to raise awareness and reduce fears of the medication ^[10]. A study exploring the implementation of national schistosomiasis control in 2006 in Burkina Faso, Mali and Niger identified that

community involvement was a major factor determining success and sustainability, and that re-enforcement of existing community structures was key to improving local acceptability [⁵]. Acceptability of school feeding and building of WASH infrastructure has been poorly explored in academic literature and no work was identified exploring the local acceptability of a school-based programme integrating deworming with other school-based interventions.

Qualitative research is a useful tool to explore the complexity of factors that affect how an intervention may or may not become embedded locally, particularly what makes it acceptable, available and used appropriately by those who need it.

Setting

This sub-study is part of a larger impact evaluation of the Enhanced School Health Initiative (ESHI), a four-year integrated pilot programme designed to provide evidence for informed decision-making on SHN in the Ethiopian context. The programme targeted 30 primary schools, with a combined enrolment of over 30,000 students in Southern Nations, Nationalities and People's Region (SNNPR) in southwest Ethiopia.

SNNPR is a largely rural area, with poor socio-economic and development indicators with 96% of households involved in subsistence agriculture. Primary school enrolment is 62% and 56% for boys and girls respectively [¹¹]. A baseline survey in the 30-targeted primary schools found 23% of children tested positive for at least one parasitic infection, with a prevalence of 4.8% for *Ascaris lumbricoides*, 18% for hookworm, 0.3% for

Schistosoma mansoni and 0.6% for *Trichuris trichiura* [¹²]. Full detail of the baseline sanitation and hygiene is described elsewhere, as well as a map for location of each school [¹²]. In short, at baseline all schools had poor levels of WASH, with evidence of open defecation in 43% of schools and no access to safe water sources in over 66% of schools [¹³].

The programme was designed to address some of the burden of under-nutrition and infection in the area, and implemented by multiple coordinating partners with monitoring and evaluation conducted by the Partnership for Child Development (PCD) Imperial College London in collaboration with the Ethiopian Public Health Institute (EPHI). The full umbrella report is available elsewhere [¹³].

All 30 schools received a school-feeding package by the World Food Programme (WFP). In this model students were provided with a daily hot meal via home grown school feeding (HGSF) [¹⁴], a programme which procures food from local farmers and sets up a sustainable supply chain for providing locally sourced, nutritious meals in schools. School meals in this set up consisted of one hot meal a day, cooked on site by locally trained cooks. Utensils for eating were provided to the schools including plates, spoons and pots. HGSF tries to reach a third of recommended daily allowances of energy and nutrients. The rations provided are close to achieving this minimum standard although vitamin A is consistently suboptimal [¹⁴].

In addition to the daily school feeding, all school children were treated with 400mg of albendazole or 500mg of mebendazole for STH and 40mg/kg of praziquantel for schistosomiasis where applicable once a year following parasitological surveys.

Alongside the deworming and school-feeding programme, the Stichting Nederlandse Vrijwilligers, (Netherlands Development Organisation, SNV) facilitated the provision of improved water, sanitation and hygiene facilities (WASH). Following a needs assessment in each school, a WASH package was provided in 15 of the 30 schools. This was to enable the broader project to generate evidence regarding combined school health and nutrition intervention. WASH construction was locally hired out. Where functioning latrines were not already present in a school, basic pit latrines, for males and females, were built, and water was piped to the school where feasible, including lengthening existing pipes and/or repairing existing community pipes. In some areas where piped water was not a feasible option, rainwater harvesters were installed. All schools had satisfactory latrines for boys, girls and teachers by the end of the construction period.

Material was provided to schools to form a WASH club. The WASH club involved weekly meetings between students of mixed gender and teachers coordinating hygiene promotion and campaigns to the school community. Club members conducted open discussion with female students on menstrual hygiene. Campaigns included the importance of hand washing and use of latrines.

The sub-study presented here aimed to explore how well the over-arching goals of the programme were understood, and the perceived impacts across the whole community. It aimed to explore the programme's integration into community life, and local perceptions of ownership and value. Understanding the broader impacts and acceptability of such a programme on the local community should help guide future policy and scale-up.

Methods

Ethical approval. This study was given ethical approval through the University of London (reference M2014 0027) on the 30th April 2015, and falls under the ethical approval provided for ESHI from the Ethiopian Health and Nutrition Research Institute Scientific and Ethical Review Committee (SERC) on 30th May 2013. It also has approval from Imperial College London under the Schistosomiasis Control Initiative (reference SCI ICREC_8_2_2) granted on 18th July 2008.

School selection. Fifteen of the 30 ESHI schools were shortlisted for group interview based on the criterion that each had received all three interventions (deworming, WASH and home-grown school feeding). This was to ensure that all aspects of the initiative could be discussed with participants. Three of these schools were in Kokir Gedabano region, an area the team was unable to visit due to political unrest. Of the remaining schools, ten were then purposively selected to represent geographical diversity. Schools were selected from each of the zones (a zone is an administrative area within a region, itself made up of several smaller districts) targeted by ESHI. Four schools were selected

in the Konso zone, two in Welayita, two in Selti, and two in the Gurage zone (Supporting Information File 1: full list of schools and locations).

Data collection. Data collection took place over 14 days in May to June 2015. Two trained facilitators, who were recruited by EPHI from local bureaus, conducted the interviews. The facilitators were nurses, unknown to the communities involved and independent from all aspects of design and implementation. They were familiar with local languages in areas where communities did not speak Amharic, for example Kosinga and Silteigna. Prior to the project they had a day of refreshing qualitative interview techniques and data collection at EPHI. They were given scenarios to practice amongst themselves in facilitating group interview with the opportunity to ask questions during this session.

On arrival at each school, the headmaster was asked to select 12 children to invite both their parents to come to school the next day to take part in a group interview. Due availability and willingness to be involved, this resulted in mixed gender groups ranging from nine to 12 participants.

Written consent was not possible due to literacy rates. As such, ethical approval was attained for a verbal consent process. Following reading of the consent (including consent to record the interviews using a digital audio recording device) and explanation of the study aims and objectives, participants were given the opportunity to withdraw from the

interview. If participants didn't withdraw, this was taken as verbal consent and the names of the participants were recorded at the time and then discarded for confidentiality.

A guide sheet was used to ensure all interviews followed a similar framework (Supporting Information File 2). The guide was designed to explore local health priorities by probing on local childhood illnesses, the cause of such illnesses and how treatment is routinely sought; to understand the value of the programme to the community; and its perceived impact and sustainability.

Group interviews took between 60 and 90 minutes to conduct. Members of the management team were not present during interviews. Interviews were recorded, and then immediately afterwards audio recordings were translated by facilitators and transcribed by a member of the management team. Translations were double-checked for accuracy and completeness by both facilitators and a manager. No names or personal identifiable data were transcribed. Full transcripts are available in Supporting Information File 3.

All ten group interviews were completed and translated. Two of the completed interviews were in Amharic, the rest were carried out in local languages.

Data analysis. A thematic approach was used to analyse the data using coding techniques described by Saldana (2009) [15]. All transcripts were included. Initial coding was a descriptive process whereby the text was scrutinized line by-line and topic coded by

applying a label that described what was being said. This was an iterative process whereby codes were reviewed and re-coded by merging and sub-dividing initial codes. EK completed the coding. It was then reviewed by JMC and LJA. Using final codes, themes were then identified by EK, representing implicit topics organizing groups of repeating ideas [¹⁶]. The final list of themes and codes are available in Supporting Information File 4.

Three key themes are identified in the data. The first involves the equity and opportunity generated as a result of the programme, both for children and community members. The second theme highlights how learning was disseminated throughout the community, as a result of the programme, particularly from children to parents. The final theme involves ideas of parents regarding sustainability and ownership. The framework identified is available in Figure 1. A blue arrow represents each theme and its main codes. The themes are displayed as arrows to present how they interlink the project, the children and the community. The theme ‘equality and opportunity’ is represented by two arrows one leading to the children and one to the community, to show the relevance to both groups.

Results

Equity and opportunity

There was a general consensus about the positive impacts of the project on school children and communities as a whole. Of particular note was the perception of equity, with the initiative allowing children from lower income households to benefit from education as much as higher income families. This was evident from statements such as

'In our homes, the feeding practice of the children is not equal. At school all children are now equal' Goto Mandifa School, and 'Students who have a financially weakened family are helped by the programme because they won't drop out from the school. It helps these families' Udasa Rape School. Support for girls was discussed as an important aspect of WASH. 'WASH helps female students keep their personal hygiene during menstruation by giving them ways to clean their clothes' Arfaide School.

Overall, many parents reported that they felt child health was improving. *'Even their skin is glowing now. I don't know what is in the food. Children are not even getting sick' Weito School.* On the topic of improved child health as a result of the project, there was no disagreement.

The communities felt that the tight integration of health and nutrition intervention with education was a positive development as it was improving the opportunity for children to benefit from education. *'The best change in the community is the student motivation to attend school' Wotanbo Gobe School.* The project was also seen as improving educational ability *'The value [of the project] is that my child's learning ability is increased' Eyanu School.* One parent explained: *'There was a drought before the programme and when the students were hungry they dropped out of school, but now due to food supplements more students succeed and pass to higher school.'* Kemale School.

Parents discussed that a major benefit of the project was that as a result of their children receiving support, they had been supported too. One example given was that the amount

of food needed at home for the children was reduced, increasing the food available for other family members. Families were also supported as children had more opportunity to help in the fields *'In summer there is no food, but my child can get food from school and work in the field after school to help us'* Goto Mandifa School. Equally, the benefit of the deworming on household expenditure was discussed. *'The deworming programme saves our money that we are supposed to pay for medication when our children are sick'* Mundena School.

Parents described that the deworming programme and improved WASH had the knock on effect of reducing parasite prevalence for the whole community. In one interview, one parent suggested this was the result of the deworming programme. *'My children are saved from intestinal parasites and indirectly I am also safe from the diseases which I might be exposed to from them. Even if re-infection is present my children are treated when they take the deworming drug during the programme'* Udasara School. Another explained, *'Because there is nothing more important than my child. I will pay for the cost of the tablets because it saves my child's life as well as to decrease the transmission and the prevalence of the disease in the community'* Udasara School. Perhaps the deworming activity was not fully understood by this community member, alternatively, the literal translation of this sentence from the native may have misconstrued the meaning of *'saved my child's life'*.

Dissemination of learning

Parents discussed the new learnings in the community and the transfer of knowledge as a result of the programme through children as messengers. For example, through knowledge transfer, parents had learnt how to prepare new foods in the home, and how to vary the diet. *‘When I ask my children what they are eating at school they tell me they are eating something which is a mix of different cereals. We have learnt from this and we have started to mix the different varieties of cereals and after milling we now serve this in our home’ Wotanbo Gobe School.*

Processes of project-related knowledge transfer from the programme appeared to have become embedded into community customs. The participants made reference to being taught by their children during ‘coffee ceremonies’ - a traditional part of Ethiopian everyday life and a time for communities to come together.

One parent stated a benefit to parents was through learning from child-behaviour change. The behaviour change discussed included eating with utensils, hand washing before eating, boiling water to prevent disease, and defecating and urinating in latrines. *‘The families are also benefiting because the children have brought a behaviour change. Because of the behaviour change, our health is also improving gradually. We are safe from exposure indirectly through the children’ Udasa Rape School.* It was evident that parents perceived the school-based WASH intervention as promoting a behaviour change within the communities, *‘Now, no one defecates on the walls or in the bush. Our environment is cleaner’ Edanaba Agawo School.*

Other community-level benefits of the WASH intervention were highlighted. Parents reported they used WASH interventions at schools as models and communities had learnt how to build a latrine by observing the school latrine construction. *‘Especially the latrine construction has become a model for the community to learn to build latrines. We have constructed similar latrines in the village to those in the school’ Goto Mandifa School.*

Despite these benefits however, it did emerge that this participant wanted the parents to be more directly addressed by the initiative; *‘The project has no impact on me. If the project wants to include the parents in their plan then we can benefit from it at that time’ Arfaide School.*

Concerns about sustainability and ownership

When participants were probed on their thoughts behind continuing the programme without further external input it became clear that the community felt reliant on external support for continuation of many aspects of it.

Some community members did not feel they had the knowledge to continue the programme. *‘Because the food is made up of different nutrients which is studied by educated persons, it is difficult to prepare it at home, so we can’t prepare it’ Weito School.* This parent clearly did not feel that the use of local agricultural products through the HGSF programme had enhanced their ability to prepare the meals provided. A lack of financial resources was also perceived as a constraint: *‘We are poor, I cannot afford to pay for the drugs’ Edanaba School.* One parent explained that despite what they had

learnt, they could not implement it in the home, *‘The children are trying to teach what they have learnt about WASH at home but our economic status prevents us to be able to apply it in the manner they tell us’ Oidu Chama School.*

Statements made during the interviews underlined participants’ sense of dependence on external support. *‘[If the programme were to end] In collaboration with the government we must seek another organisation to help us’ Goto Mandifa School.* Should current donors withdraw, one assumption was that other donors would step in to fill the gap. *‘We expect other development partners could come in and support us for sustainability’ Mundena School.*

Some individuals in the community did not feel ownership of the initiative. One parent stated *‘The negative impact of the programme is that we are being helped by the NGO and other foreign country projects. This is negative because we have to learn help and stand up for ourselves. This is not a self-developed programme.’* Other parents during this interview were in agreement: *‘What [the speaker] explains is correct. The community needs to stand by itself’ Wotanbo Gobe School.*

However, despite the concerns that were raised about sustainability without external inputs, parents revealed that they believed behavioural changes achieved over the last three years could continue. The behaviour changes were the result of knowledge absorbed by the community, through children as messengers. The data revealed that parents felt that social networks had been used to make change within the community,

resulting in absorption of a mass of knowledge at the community level. For example: *‘Once we have learnt how to make our clothes clean and wash our hands why would we stop? The behavioural part of the programme will continue’ Edanaba Agawo School.*

Equally, some parents suggested that they would continue to pay for the deworming tablets if they could because of the high value they place on the impacts of the medication. *‘There is nothing better than our children. I will be healthy when my children are healthy so I would be happy to pay for the [deworming] drug’ Udasra Rape School.*

It was clear that many individuals felt motivated towards contributing to the programme, because they felt it was achieving something important *‘Since the programme is giving the community a necessary service, if it stops in case of something I will try to keep it on as before by helping in a way that is expected of me’ Udasra Rape School.*

Discussion

The results presented above highlight the ways in which the parents felt the programme was benefiting the children, but also the community. It describes, from the parents’ point of view *how* change may have occurred in the community. Fig 1 describes the pathways perceived by parents as generating change. Such data is infrequently captured.

The sense of equity and opportunity for the household generated through the programme was strong, and reflects an overall theory of schools as platforms for health by ‘levelling the playing field’ [1]. The recognized benefits of school-based health interventions

include the access to school services for all children, reduction of gender-based vulnerability, improving school attendance and improving educational ability [^{17, 18, 19}]. Together these can have large impacts that spread beyond the school-age child, and evidence suggests that school-feeding programmes have a benefit per household of more than 10% of household expenditures [¹⁷].

It is clear from interview transcripts that many parents reported noticeable reduced parasite prevalence across the communities. Some comments- such that those linking worm infection to acute mortality may be indicating a misunderstanding regarding the benefits of deworming, and highlights areas where additional community sensitization may require strengthening.

The Ministries of Education and Health in Ethiopia are already taking steps to transition from the donor-driven and disparate health interventions to a model of national ownership and coverage for all school-aged children. The government is now developing a multi-sectoral National School Feeding Strategy to scale up school feeding [²⁰]. As part of the 2016 National Neglected Tropical Disease Masterplan, there is now a national deworming programme that targets school-age children, reaching over 16.5 million children, with plans to scale up to 27.3 million school-age children by 2020 [²¹]. The One WASH National Programme [²²] is part of the Government of Ethiopia's plan to deliver safe water and sanitation throughout the country with support from implementing partners in an integrated and coordinated fashion. Schools are included in the guidelines for scale-up under 'institutional WASH'. One component of this is educational, and

harnessing students as ‘agents of change’, taking their knowledge and experience home to their families. The data in this study suggests that parents feel that this is happening in an organic fashion through children as messengers and that this strategy of disseminating important health messages could be harnessed by other programmes for greater, long-term impact.

In terms of sustainability, what was clear in this study was that parents perceived the costs of financing this programme to be high. Fears expressed by community members related to lack of ownership of the programme, and inability to sustain it, might perhaps reflect frustrations of previous programmes with finite time frames, or feelings of disempowerment.

Importantly, interviews revealed how highly the project was valued by parents, both for their children and for the communities. Some parents, perhaps the more well off, discussed being happy to pay for the deworming drugs. Parents identified the benefits of prophylactic healthcare in all three aspects of the programme, and the benefits of school feeding as a means to encourage children to stay in education.

In order achieve positive impacts, behaviour change related to sanitation and hygiene must be maintained [²³]. It is encouraging to hear many parents feel confident about maintaining behaviour change. If practiced and maintained, such behaviour change may lead to larger impacts on STH and schistosomiasis infection [²⁴], and NTDs and health more broadly [²⁵].

Reflections

This study initially aimed to carry out focus group discussions, a concept which was new for both the participants and facilitators. The guide was designed to probe participant-led discussions, however, moving away from the group-interview format was challenging, with limited expansion of discussion topics. The guide sheet introduced a framework, whereby the data gathered reflects the priorities of the researchers. As such, courtesy bias is inevitable. An attempt to minimize this was through having only local data collectors present during the time of group interviews.

Due to this project's timing and funding restrictions all fieldwork was completed within two weeks. Demographics of group members including basic household data were not collected, the authors recognise this would have provided important context. Equally, mixed gender groups were selected for. This is likely to have had an impact on responses particularly surrounding hygiene.

Translation was a challenge and subsequently the data varied across the interview transcripts. The results reflect a basic analysis of limited discussions. Comparing across interviews to find commonalities and differences was not completed due to varying quality in data across each interview. Despite these reflections, the transcripts and subsequently the findings share the ideas and concerns of individuals from a remote and rural population on an important topic. The authors feel these results are still valuable and provide unique information when taken with these caveats in mind. In qualitative studies

such as this, the intention is to understand more about the specific context rather than to extrapolate findings to other contexts.

Conclusion

This study has identified some of the perceived community-level impacts of a school-based programme that integrates multiple interventions. Parents' overriding perceptions were that using schools as a platform for delivery can bring positive change across whole communities.

Qualitative research is an essential component of the evidence base required to guide governments in developing sustainable and scalable health intervention programmes. The engagement and commitment of the community are critical to the uptake and success of any programme. The perceptions presented and discussed here and described in Fig 1 shed light on important mechanisms by which the whole community has benefited from such a programme.

Acknowledgments

We would like to acknowledge the time and input of all group interview participants, without whom this study would not have been possible. We would like to thank the team of data collectors for their work facilitating and translating the interviews. We are also very grateful to the head teachers, students, and all members of the community for accommodating this end line survey, and for their active engagement in this project.

References

1. Child and Adolescent Health and Development. In: Bundy DAP, De Silva N, Horton S, Jamison DT, Patton G, editors. *Disease Control Priorities*. 8. third edition ed. Washington, DC: World Bank; 2017.
2. Sarr B, Fernandes M, Banham L, Bundy D, Gillespie A, McMahon B, et al. The Evolution of School Health and Nutrition in the Education Sector 2000–2015 in sub-Saharan Africa. *Frontiers in Public Health*. 2017;4(271). doi: 10.3389/fpubh.2016.00271.
3. Molyneux D. “Neglected” diseases but unrecognised successes—challenges and opportunities for infectious disease control. *The Lancet*. 2004;364(9431):380-383.
4. Chopra M, Sanders D. Asking "how?" rather than "what, why, where, and who?". *BMJ*. 2000;321(7264):832.
5. Garba A, Toure S, Dembele R, Bosque-Oliva E, Fenwick A. Implementation of national schistosomiasis control programmes in West Africa. *Trends in Parasitology*. 2006;22(7):322-326.
6. UNESCO, UNICEF, WHO & World Bank. *Focusing Resources on Effective School Health: a FRESH Start to Enhancing the Quality and Equity of Education*. Washington DC: World Education Forum; 2000.
7. Mark Nichter: *Global Health: Why Cultural Perceptions, Social Representations, and Biopolitics Matter*: University of Arizona Press, 2008, 320pp (ISBN-10: 0816525749, ISBN-13: 978-0816525744, paperback). eScholarship, University of California; 2009.
8. Sanders D, Haines A. Implementation Research Is Needed to Achieve International Health Goals. *PLOS Medicine*. 2006;3(6):e186.
9. Allotey P, Reidpath D, Ghalib H, Pagnoni F, Skelly W. Efficacious, effective, and embedded interventions: Implementation research in infectious disease control. *BMC Public Health*. 2008;8(1).
10. Fleming F, Fenwick A, Tukahebwa E, Lubanga R, Namwangye H, Zaramba S et al. Process evaluation of schistosomiasis control in Uganda, 2003 to 2006: perceptions, attitudes and constraints of a national programme. *Parasitology*. 2009;136(13):1759.
11. Central Statistic Agency & The World Bank. *Ethiopia Rural Socioeconomic Survey, Survey Report*, 2008.

-
12. Grimes JET, Tadesse G, Gardiner IA, Yard E, Wuletaw Y, Templeton MR, et al. (2017) Sanitation, hookworm, anemia, stunting, and wasting in primary school children in southern Ethiopia: Baseline results from a study in 30 schools. PLoS Negl Trop Dis 11(10): e0005948. <https://doi.org/10.1371/journal.pntd.0005948>)
 13. Appleby LJ, Tadesse G, Wuletawu Y, Dejene N, Grimes, JET, French MD et al. Integrated delivery of school health interventions through the school platform: investing for the future. Forthcoming
 14. World Food Programme. Home Grown School Feeding: A framework to link school feeding with local agricultural production. Available from http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp204291.pdf?_ga=1.132507214.1906077918.1488466061.
 15. Saldana, J. The Coding Manual for Qualitative Researchers, London: SAGE Publications, 2009: 1-31.
 16. Ryan GW. Techniques to identify themes in qualitative data [cited 31st Jan 2017] [Internet]. Available from: <http://www.analytictech.com/mb870/readings/ryan-bernard-techniques-to-identify-themes-in.htm>
 17. Bundy, D. Rethinking School Health: A Key Component of Education For All Washington DC: The International Bank for Reconstruction and Development/ The World Bank, 2011.
 18. Hotez PJ, Bundy D, Beegle K, Brooker S, Drake L, de Silva N, et al. Helminth Infections: Soil-transmitted helminth infections and schistosomiasis. In: Jamison D.T., Breman J.G and Measham, A.R. editors, Disease Control Priorities in Developing Countries, 2nd ed., Washington DC: World Bank; 2006. pp. 467-482.
 19. Kazianger H, de Walque D, Alderman H. Educational and Health Impacts of Two School Feeding Schemes. Evidence from a Randomized Trial in Rural Burkina Faso. Policy Research Working Paper, The World Bank 2012. Available from: www.hkazianga.org/Ppapers/KaziangadeWalqueAldermanEducation.pdf
 20. The Federal Democratic Republic of Ethiopia Ministry of Education. Education Sector Development Programme V (ESDP V) 2008 – 2012 E.C. 2015/2016 – 2019/20 G.C. <http://www.globalpartnership.org/content/education-sector-plan-2016-2020-ethiopia>, accessed 23 March 2017.
 21. Federal Democratic Republic of Ethiopia Ministry of Health. Second Edition of National Neglected Tropical Diseases Master Plan, 2016. Available from

<http://www.moh.gov.et/documents/26765/0/National+Neglected+Tropical+Diseases+Master+Plan/206f336c-772c-486e-902f-007e63c18e9d?version=1.0> Accessed 22 March 2017.

22. Open WASH. Ethiopia' s One WASH National Programme [Internet]. The Open University UK/World Vision Ethiopia/ UNICEF; 2016. Available from: http://www.open.edu/openlearncreate/pluginfile.php/172415/mod_resource/content/1/Ethiopias_One_WASH_National
23. Dreibelbis R, Winch P, Leontsini E, Hulland K, Ram P, Unicomb L et al. The Integrated Behavioural Model for Water, Sanitation and hygiene: a systematic review of behavioural models and a framework for designing and evaluating behaviour change interventions in infrastructure-restricted settings. BMC Public Health. 2013; 13(1).
24. Grimes J, Croll D, Harrison W, Utzinger J, Freeman M, Templeton M. The relationship between Water, Sanitation and Schistosomiasis: A Systematic Review and Meta-analysis. PloS Neglected Tropical Diseases. 2014;8(12):e3296.
25. Freeman M, Ogden S, Jacobson J, Abbott D, Addiss D, Amnie A et al. Integration of Water, Sanitation and Hygiene for the Prevention and Control of Neglected Tropical Diseases: A Rationale for Inter-Sectoral Collaboration: Plos Neglected Tropical Diseases. 2013;7(9):2439.

Supporting information

S1 File. Full list of school names and locations

S2 File. Group interview guide

S3 File. Group interview transcripts

S4 File. List of final codes

Figures

Fig 1. Framework of key themes identified from group interviews. A blue arrow represents each theme and its main codes. The themes are displayed as arrows to present how they interlink the project, the children and the community. The theme ‘equality and opportunity’ is represented by two arrows one leading to the children and one to the community, to show the relevance to both groups.