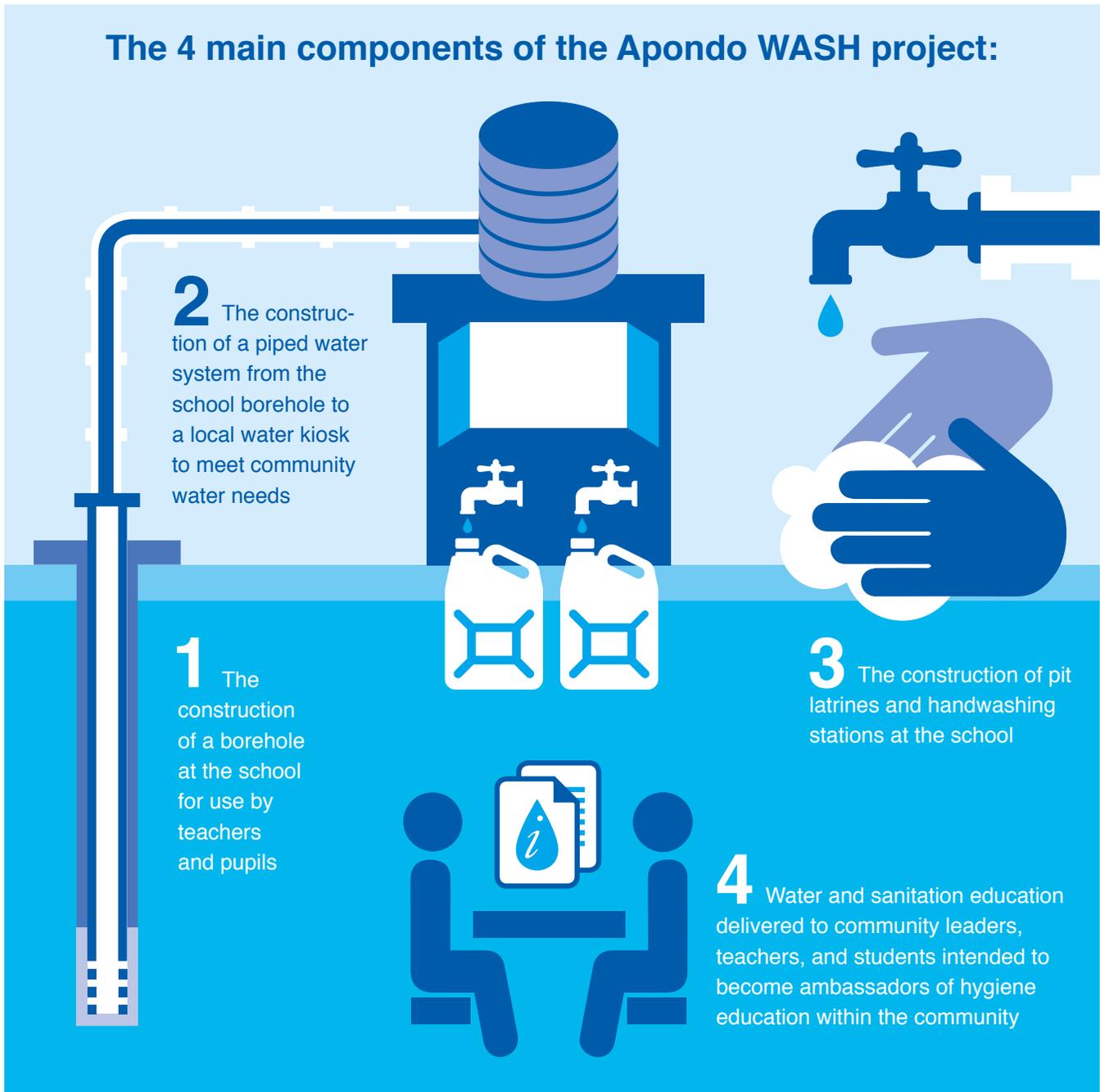**GLOBAL PARTNERS**
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Local Needs. Global Partnerships.

Kasipul Constituency WASH Project
Final Evaluation Report Summary

The 4 main components of the Apondo WASH project:

2 The construction of a piped water system from the school borehole to a local water kiosk to meet community water needs

1 The construction of a borehole at the school for use by teachers and pupils

3 The construction of pit latrines and handwashing stations at the school

4 Water and sanitation education delivered to community leaders, teachers, and students intended to become ambassadors of hygiene education within the community

Introduction

Access to clean water is a major public health issue affecting populations around the globe. In the last decade, there has been a surge in global funding and interest in water, sanitation, and hygiene (WASH) interventions to increase access to clean water and reduce water-borne diseases. It is therefore especially important for organizations to be intentional about the design, implementation, and evaluation of WASH projects based on rigorous evidence of effectiveness in varying contexts. This report provides an analysis of the impacts of the Kasipul Constituency Water, Sanitation, and Hygiene (KC WASH) project at Apondo Primary School in rural western Kenya. Funding and implementation partnerships for the project existed between Global Partners for Development, the Constituency Development Fund, the Society Empowerment Project, and Apondo Primary School.

Methodology

The evaluation uses a difference-in-difference methodology to evaluate the effects of the WASH project on child education and health. This evaluation compares baseline data collected by local enumerators in September 2014 to midline data collected in April 2015 and final data collected in April 2016. The evaluation compares the results of data gathered from surveys of students' primary caregivers at Apondo Primary School (intervention school) and Obisa Primary School (control school that received no intervention).

Results

One-and-a-half years after the WASH project began, children were:

40 percentage points

less likely to have experienced diarrhea in the last two weeks (p<0.01), as compared to the children at Obisa Primary School.

24 percentage points

more likely to spend one more hour on homework per night (p<0.05), as compared to the children at Obisa Primary School.

Other positive impacts were found but were not statistically significant. The results of this analysis suggest that Global Partners' KC WASH project at Apondo Primary School had significant health and education impacts for students. Though there were some limitations to this study, the results provide encouragement for continued funding of WASH projects at schools in this region.

The full report is available online at **www.gpfd.org***.*
Contact Amy Holter at **aholter@gpfd.org** *with any questions or comments.*

Kasipul Constituency Water, Sanitation, and Hygiene Project: Final Evaluation Report

Access to clean water is a major public health issue affecting populations around the globe. In the last decade, there has been a surge in global funding and interest in water, sanitation, and hygiene (WASH) interventions to increase access to clean water and reduce water-borne diseases. It is therefore especially important for organizations to be intentional about the design, implementation, and evaluation of WASH projects based on rigorous evidence of effectiveness in varying cultural and geographical contexts.

This report provides an analysis of the impacts of the Kasipul Constituency Water, Sanitation, and Hygiene (KC WASH) project at Apondo Primary School in rural western Kenya. Funding and implementation partnerships for the project existed between Global Partners for Development, the Constituency Development Fund, the Society Empowerment Project, and Apondo Primary School. The evaluation uses a difference-in-difference methodology to evaluate the effects of the WASH project on child education and health. This evaluation compares baseline data collected by locally trained enumerators in September 2014 to midline data collected in April 2015 and final data collected in April 2016 by the same group of enumerators. Findings suggest that the WASH project at Apondo Primary reduced rates of diarrhea and parasitic and respiratory infection for Apondo students, as well as giving them the ability to spend significantly more time on homework.

I.   Introduction

Access to potable water and hygiene facilities remains a key public health issue around the globe. An estimated 748 million people lack access to clean water and 2.7 billion people lack access to improved sanitation facilities[1]. Though the number of people with access to sanitation facilities and improved water supply[2] has steadily increased for the past decade globally, these improvements are not on track to meet the Millennium Development Goals (MDGs) in Kenya. The goals for Kenya were for 78 percent of the Kenya's population to have access to clean drinking water and 77 percent of the population to have access to improved sanitation facilities. In 2005, 56.5% of Kenyans had access to an improved water source compared to 53.3% in 2013. More optimistically, 48% of Kenyans had access to improved sanitation facilities in 2005 with an increase to 66.7% in 2013.

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[1] Defined by the World Health Organization (WHO)/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation as flush toilets, piped sewer systems, septic tanks, flush/pour flush to pit

[2] Defined by the JMP for Water Supply and sanitation as piped water into a dwelling or yard/plot, public tap or standpipe, tube well or borehole, protected dug well, protected spring, or rainwater collection.

Inadequate access to proper water, sanitation and hygiene (WASH[3]) is linked to serious health problems including diarrhea, hepatitis A, cholera, typhoid, dysentery, intestinal helminthes, malaria and trachoma. In addition to health risks, vulnerable populations are also burdened by the severe economic and social costs associated with lack of access to water. In 2011, the World Health Organization attributed global economic losses of USD$260 billion to the reduced productivity of disease-affected populations and the opportunity costs of time spent collecting water. Meta-analyses of WASH projects have consistently reported positive effects, particularly in reducing childhood rates of diarrhea.

The Kasipul Constituency is a poor, rural area in western Kenya. The population has very limited access to formal employment opportunities, and most livelihoods are based on subsistence farming, petty trading, and livestock rearing. Lack of formal economic activities combined with the health and time burdens of limited access to clean water contribute to problems such as high unemployment, food insecurity, poor health and sanitation, and low school enrollment rates. According to the Kenyan National Bureau of Statistics, only 48 percent of rural communities, such as the Kasipul Constituency, had access to clean water in 2014. Problems accessing water include long distances to water sources, water scarcity during dry seasons, and inadequate water storage facilities at the household and institutional levels.

The KC WASH program targets schools in the constituency that have little to no access to water infrastructure. The ultimate goal of the KC WASH project is to increase the supply of clean water to schools and communities with the expected outcomes of improving child health, increasing school attendance rates, and reducing the time burden of collecting water to allow adults to spend more time on income-generating activities and to allow children to spend more time on education-related activities.

The project was initiated through a request from Apondo Primary School for improved WASH infrastructure. The KC WASH initiative is funded by Global Partners and the Constituency Development Fund of the Kasipul Constituency. Implementation and evaluation partnerships existed between Global Partners, the Apondo Primary School management committee, and the Society Empowerment Project, a local community development organization in Oyugis, Kenya.

This evaluation measures the impacts of the KC WASH project at Apondo Primary School. The four main components of the Apondo WASH project are as follows:

- Construction of a borehole at the school for use by teachers and pupils

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[3] Defined by the WHO as the provision of safe water for drinking, washing and domestic activities and the safe removal of waste (toilets and waste disposal) in addition to promoting activities to promote protective behavioral practices amongst populations exposed to unsafe water and inadequate sanitation facilities

- Construction of a piped water system from the school borehole to a local water kiosk to meet community water needs
- Construction of pit latrines and hand washing stations at the school
- Water and sanitation education delivered to community leaders, teachers, and students intended to become ambassadors of hygiene education within the community

Apondo Primary School WASH will be followed by a WASH project at Obisa Primary School, and Obisa served as the control group in this analysis. Due to non-randomized assignment of treatment and control schools, this evaluation uses a difference-in-difference methodology to estimate the impact of the Apondo WASH project on child heath and child education. The difference-in-difference methodology, which compares differences between schools before treatment with those found after treatment, will isolate the impacts that can be attributed the project by controlling for any time-invariant characteristics and unobservable differences between groups.

II. Description of Area & Population

Access to clean water is a serious problem in the Kasipul Constituency. At baseline, the vast majority of respondents reported that natural sources (streams, ponds, rivers, lakes, etc.) were their primary source of water. These water sources are unprotected and pose a high risk of contamination. Risk of water contamination is especially relevant given the sloped topography and concentration of livelihoods based in agriculture and livestock rearing, causing contaminants to enter the water via runoff from fertilizer and animal waste. The regional government has identified water scarcity and water-borne illnesses as key problems in this region. Site visits and interviews conducted by Global Partners' staff revealed that local people consider water scarcity and quality to be a major barrier to improved health and educational attainment.

Unsafe water consumption practices compound the risk of contracting water-borne illnesses. At baseline, 50 percent of respondents reported that they drank water right away without boiling it, using chlorine, or using water guards (a chlorine-based point-of-source water decontaminant). Baseline data suggest health issues associated with the consumption of polluted water. Diarrhea was highly prevalent at baseline with reports of child diarrhea in the past two weeks from 62% of respondents. Reports of other water-related diseases, including stomachache and parasitic infections, were also high at baseline.

In addition to the health risks raised by consuming contaminated water, water collection puts a considerable time burden on the population. The majority of respondents reported that someone in their family collected water every day. Of respondents, 40% reported spending between one and three hours per week collecting water. It should be noted that this number could be underestimated in

cases where more than one family member is collecting water at the same time. Furthermore, the fact that the overwhelming majority of respondents reported that school-aged girls were primarily responsible for water collection is troubling for goals of gender equity. A study in Tanzania reported that reducing the distance to a water source from 30 to 15 minutes increased girls' attendance rates by 12 percent.

Before project implementation, Apondo Primary used a shallow, open well that was often contaminated. From October to January, the well went dry and the school sent students to gather water from a river that is roughly two kilometers away. Though teachers were supposed to treat water with waterguards, interviews with the head teacher revealed that this was not often practiced. At Obisa Primary, students were instructed to bring in their own water each day for cooking and cleaning purposes. Students were sent to a natural spring three kilometers away when additional water was needed.

Apondo Primary had three sets of latrines - one for boys, one for girls, and one for faculty. All of the latrines were in dire shape with cracked floors, doors hanging off the hinges, and unstable foundations. Obisa Primary has two pit latrines, three stalls for boys and three stalls for girls, which were built by the Community Development Fund in 2012. These latrines were poorly constructed and the structure is currently sinking as it was built on a weak foundation, threatening groundwater contamination. Additionally, there is a serious problem with potential contamination from latrines as there are no screens on the windows or latches on the doors to reduce contamination from flies. Neither school had handwashing stations and hygiene education was not taught. Obisa Primary will receive a WASH intervention once adequate funds are raised and the final evaluation is complete.

III. Project Design & Theory of Change

Global Partners funded the construction of a 465-foot borehole well, complete with an electric pumping system and two reserve water tanks at the school. New bathrooms and hand washing stations were built for the school of 456 children. A kiosk with piped water from the well will be constructed to make clean water accessible to all households in the surrounding village. In addition, the children, parents, and teachers will receive hygiene education to teach them the value of hand washing before eating and after using the latrines. A water committee comprised of members of the school management committee will also receive management training.

Global Partners considers local "ownership" of project activities to be key to the successful implementation and sustainability of project activities. Labor and monetary contributions from the Apondo community and the Constituency Development Fund made up 31% of the total budget for the Apondo WASH project. A water committee was established within the school management committee to collect water fees from community members at the kiosk in order to maintain the water system over time and pay for electricity to the borehole's electric pump. The

school management committee, made up of 14 people (7 from the local water committee, 4 from the school administration, and 3 from the community), decided on the location of this kiosk. Once the public tap is operational, community members can buy 5 liters of water for 1 Kenyan Shilling, roughly .01 USD/5 liters.

There are several expected outcomes associated with the school-based interventions. In the short-term, increasing the water supply at the school should lead to less consumption of contaminated water. Children with a consistent supply of clean water are expected to have fewer water-borne illnesses. Provision of sanitation infrastructure is expected to increase sanitary practices such as washing hands, and latrines with doors and screens can reduce the number of flies carrying fecal contamination. Finally, teaching WASH education at school should increase child knowledge and adoption of safer water practices. These three interventions together should contribute to better learning outcomes, as healthier children are able to attend school more regularly and participate more fully. In the longer-term, children are expected to translate their knowledge of safe water practices to adults to increase preventative practices at home, thereby improving health outcomes at the community level.

Building the community kiosk is expected to result in time-allocation changes and further improvements in child health outcomes. As adults and children spend less time collecting water and have fewer health problems associated with water-borne diseases, greater amounts of time can be allocated to income-generating activities and educational attainment. In the long-term, a healthier, more productive, and more educated population is expected to increase the overall wealth and self-sustainability of the area at large.

IV. Data Collection

Global Partners' staff developed a questionnaire to evaluate respondent's household characteristics as well as project impacts on water collection and treatment, health, education, household income, and time allocation.

Global Partners for Development staff trained ten local young women in best practices for administering the questionnaire and used their input to make cultural and language-based adjustments to the survey. See Appendix A for the training outline.

Using local enumerators was considered essential to making the questionnaire relevant to local conditions, overcoming language barriers, creating a comfortable environment for respondents, and respecting cultural norms. The questionnaire was translated and administered in the local language of Luo. See Appendix B for the full questionnaire in English.

Students from Obisa (n=125) and Apondo (n=116) Primary Schools were chosen randomly from the school rosters. Selection was stratified across grade levels to get

a representative sample of students. The head teacher of both schools mobilized the primary care givers (PCGs) of selected students to come to their respective schools to take the questionnaire at baseline, midline, and endline. PCGs were chosen as the respondents because they were assumed to have the most intimate knowledge of children's health and daily activities. Enumerators visited the homes of those PCGs who did not come to the school to ensure that there was no bias based on parental engagement in the evaluation process.

PCG turnout was markedly lower at Apondo. Local enumerators visited 72 homes to complete questionnaires for Apondo and only 29 homes to complete questionnaires for Obisa at midline. At endline, 103 PCGs were interviewed at Obisa and only 50 were interviewed at Apondo. This low turnout at the endline survey may threaten the external validity of the data, but every effort has been made to maintain the validity and reliability of the data in other ways.

Respondents were informed that their answers would be kept confidential and that their answers would not affect the likelihood of Global Partners implementing projects in their community. Enumerators were asked to note any anything that might affect the quality of the data recorded such as respondent confusion about the questions. Most enumerators reported no problems administering the questionnaire or respondent understanding of the questions at baseline.

V.   Baseline Findings

Baseline characteristics are presented in Table 1. As expected, there are significant differences between the treatment and control groups. Anywhere numbers in the column, "p-value," are marked by asterisks, there is a statistically significant difference in that variable between the two schools. Compare the coefficients found in the columns marked "control" and "treatment" to determine the nature of the differences between schools for the variables listed.

The two schools were significantly different in their sources of water, water treatment practices, rates of water-borne disease, number of absences from school, and sufficiency of household income. Students from Obisa were more likely to drink water from a natural, open water source, more likely to have had typhoid or a parasite in the two weeks before the survey, and missed more days of school in the last two weeks due to diarrhea and otherwise. Apondo respondents were less likely to report income "never" meeting their basic needs and their children were less likely to work than those at Obisa. The biases created by these differences between schools were mitigated using the difference-in-difference method described in the next section. In addition, all significantly different baseline characteristics were used as control variables in the regression.

Table 1 – Baseline Characteristics

	Sample			
	Total	Control	Treated	P-value
Household Characteristics				
HoH gender	0.697	0.664	0.733	0.248
	0.030	*0.041*	*0.042*	
HoH education grade	7.917	7.696	8.155	0.254
	0.201	*0.303*	*0.265*	
No. of HH members bringing in income	0.755	0.792	0.716	0.490
	0.055	*0.081*	*0.076*	
Income never covers basic needs	0.357	0.824	0.716	0.045**
	0.031	*0.046*	*0.042*	
Child Characteristics				
Grade	5.689	6.416	4.905	0.002***
	0.248	*3.203*	*4.245*	
Age	10.199	9.664	10.776	0.015**
	0.228	*0.305*	*0.330*	
Child never works	0.896	0.928	0.862	0.094*
	0.020	*0.032*	*0.023*	
Taught WASH	0.880	0.864	0.897	0.440
	0.021	*0.028*	*0.031*	
Water Collection				
Distance				
1-2	0.386	0.376	0.397	0.745
	0.031	*0.046*	*0.043*	
3-4	0.336	0.320	0.353	0.585
	0.030	*0.045*	*0.042*	
Frequency/week				
Every day	0.676	0.616	0.707	0.138
	0.030	*0.042*	*0.043*	
4 to 6 times	0.104	0.112	0.095	0.664
	0.020	*0.027*	*0.028*	
Time/week (hours)				
7 or more	0.249	0.224	0.276	0.354
	0.028	*0.042*	*0.037*	
Primary Responsibility				
School-aged girls	0.552	0.496	0.612	0.071*
	0.032	*0.045*	*0.045*	
Treatment				

Do nothing	0.502	0.552	0.448	0.108*
	0.032	*0.046*	*0.045*	
Source				
Natural	0.826	0.888	0.759	0.008***
	0.024	*0.040*	*0.028*	
Child Health				
Last 2 weeks				
Diarrhea	0.618	0.640	0.595	0.473
	0.031	*0.046*	*0.043*	
Typhoid	0.440	0.552	0.319	0.000***
	0.032	*0.043*	*0.045*	
Cholera (stomach-ache)	0.174	0.176	0.172	0.942
	0.024	*0.035*	*0.034*	
Parasite	0.660	0.728	0.586	0.020**
	0.031	*0.046*	*0.040*	
Greatest Health Problem				
Water Quality	0.784	0.816	0.750	0.215
	0.027	*0.040*	*0.035*	
Illness	0.058	0.048	0.069	0.489
	0.015	*0.024*	*0.019*	
Child Education				
No. of days missed in last 2 weeks	1.705	3.024	2.517	0.058**
	0.114	*0.161*	*0.160*	
Missed because of diarrhea	0.585	0.656	0.509	0.020**
	0.032	*0.047*	*0.043*	
Hours spent on homework/night	2.385	2.283	2.147	0.343
	0.116	*0.143*	*0.180*	
Limited attendance because of illness	0.822	0.856	0.784	0.149
	0.025	*0.038*	*0.032*	
Adult Employment				
Always satisfied with number of hours worked	0.411	0.432	0.388	0.489
	0.032	*0.045*	*0.044*	
Number of households	**421**	**125**	**116**	

VI.   Methods

The control and treatment schools for this project were determined based on recommendations from community leaders in the constituency, though both Apondo and Obisa communities suffered from water scarcity, poor health and sanitation, low enrollment rates, and dilapidated infrastructure.

A randomized control trial was not possible for this evaluation. In the absence of randomized allocation into treatment and control groups, this evaluation uses a difference-in-difference (DID) method to mitigate problems associated with selection bias. Using a DID method controls for unobservable, time-invariant differences between schools to evaluate project effects.

At baseline, there were significant differences in key variables related to expected project outcomes. Because of the unbalanced counterfactual, we initially planned on using propensity score matching (PSM). Propensity score matching constructs a statistical comparison group that mimics the treatment group by "matching" respondents in the treatment and control group based on characteristics that influence the probability of participation in the treatment group. However, due to high attrition and the resulting lack of appropriate matches between schools, the midline sample would have been underpowered and any effect size from the matched sample would be too small to detect.

The difference-in-difference equation is written below where alpha (∂) is the average treatment effect calculated by the change in outcomes over time in the treatment group minus the change in outcomes over time in the control group. Using the DID estimate enables the isolation of project impacts (∂) by subtracting the "first" difference, the difference in outcomes of the treatment group between midline/endline (T_1) and baseline (T_0), from the "second" difference, the change in outcomes for the control group (C) over time.

$$\partial = (T_1 - T_0) - (C_1 - C_0)$$

The difference-in-difference modeling estimates the average treatment effect based on an unmatched sample.

VII. Midline Results

The midline evaluation was only expected to have significant effects on child health outcomes and attendance rates because the public tap had not yet been built at the time of the survey. Outcomes on child health and education are expected to be larger at endline when complementary interventions of WASH education at school and access to water at the community water kiosk add to existing benefits gained from the supply of clean water at school.

Attrition was extremely high for this follow-up survey, particularly among the treatment group. Obisa had an attrition rate of 16%, while Apondo had an attrition rate of 36.2%. It is important to test whether this attrition was somehow systematic such that there were common characteristics among those who did not take the second survey. Systematic attrition would bias the sample towards those with the characteristics of people who did not drop out.

In order to test whether attrition was systematic, four categories of variables that would likely affect the respondent's ability to answer the questionnaire at midline were examined. Income levels, education levels, water collection characteristics, and access to transportation were examined to determine if any of these factors made attrition more likely.

There were no significant differences in these variables between those who remained in the sample and those who dropped out. Given that there were no systematic differences that affected participation, we can assume that attrition was random and that the results will not be biased due to attrition.

The results of the DID analysis reveal consistent improvements in the frequency of common water-borne diseases at Apondo Primary School. Some of these results are statistically significant, meaning that the difference between groups is statistically greater than it would have been without the project. For the purposes of this evaluation, a coefficient is significant if its p-value is less than 0.10. See Table 2 for full DID results.

Children at Apondo were 6.6 percentage points less likely to have experienced upper respiratory symptoms such as cough in the last two weeks compared to the children at Obisa (p<0.10). In addition, children at Apondo were 26.3 percentage points less likely to have had a parasite in the last two weeks compared to children at Obisa (p<0.01). In terms of educational indicators, children at Apondo spent more time on homework and missed fewer days of school, but these findings were not significant.

Table 2: Difference-in-Difference Estimates - Midline

	Coefficient	Standard Error	P>t
Child Health in Two Weeks Before Survey			
Cough	-0.066	0.038	0.087*
Cholera (stomach-ache)	-0.047	0.044	0.291
Parasite	-0.263	0.040	0.000***
Diarrhea (at all in last two weeks)	0.029	0.054	0.599
No. of time child had diarrhea in last two weeks	-0.011	0.015	0.470
Education			
Hours spent on homework/night	0.004	0.014	0.800
School days missed in the past two weeks	-0.006	0.010	0.565
Reason Missed			
Diarrhea	0.038	0.048	0.432
Cough	0.023	0.065	0.726
Note: *** denotes significance at the 99% level, ** at the 95% level, and * at the 90% level			

VIII.   Endline Results

One-and-a-half years after the WASH project was begun, children at Apondo Primary School were 40 percentage points less likely to have experienced diarrhea in the last two weeks compared to the children at Obisa (p<0.01). In addition, children at Apondo were 11 percentage points more likely to have had one less episode of diarrhea in the last two weeks compared to children at Obisa (p<0.05), thus validating the previous finding of a reduction in diarrhea for children in the treatment group. Changes in parasitic infection rates that were seen at midline are no longer seen at endline, but the cause of this shift is unknown. In terms of educational indicators, children at Apondo were 24 percentage points more likely to spend one more hour on homework per night (p<0.05).

This reduction in reported cases of diarrhea represents a large improvement from the midline survey. At midline, clean water was only available at the school and was not available for home use from the community kiosk. Therefore, children were still likely consuming contaminated water at home. The endline results suggest that it was only when clean water was also available at the household level that symptoms of waterborne disease improved. A positive result in the number of hours spent on homework may also be attributed to the accessibility of the community kiosk because students no longer had to spend so much time walking to fetch water before and after school.

Table 3: Difference-in-Difference Estimates - Endline

	Coefficient	Standard Error	P>t
Child Health in Two Weeks Before Survey			
Cough	-0.033	0.113	0.77
Cholera (stomach-ache)	0.108	0.082	0.19
Parasite	0.019	0.082	0.82
Diarrhea (at all in last two weeks)	-0.401	0.158	0.01***
No. of time child had diarrhea	-0.106	0.054	0.05**
Education			
Hours spent on homework/night	0.243	0.121	0.05**
School days missed in the past two weeks	0.047	0.117	0.68
Livelihoods			
Work days missed in the past two weeks	-0.067	0.152	0.66
Note: *** denotes significance at the 99% level, ** at the 95% level, and * at the 90% level			

IX.   Limitations & Recommendations

This evaluation had several limitations. The greatest limitation was the level of attrition from baseline to midline and endline. Even though there was no systematic attrition based on specific respondent characteristics, the number of participants in the final survey may make the results less representative of the project's total impact.

Many respondents also had limited access to medical care for specific diagnoses of symptoms and often referred to having symptoms of a disease as actually having the disease. For example, respondents often used the words for "stomachache" and "cholera" as well as "headache" and "malaria" interchangeably. Therefore, outcomes related to these specific diseases must be interpreted with caution. Discussions with the local hospital director confirmed that there had been no recent cholera outbreaks. Therefore, all positive responses to the question of whether a child had cholera should were interpreted as that child having a stomachache. Without biolomedical validation of claims, self-reported data on health outcomes will always be vulnerable to differing understandings of health terminology and symptom severity.

An additional threat to data accuracy was respondent knowledge of the KC WASH project. Global Partners has been working in the Kasipul Constituency since 1990, and their projects are well known in the area. Though enumerators read a statement that that Global Partners' projects would not be influenced by the results of the study, it is still possible (and even likely) that results may be skewed by respondent interests in encouraging Global Partners of their need for water. This could mean that Obisa respondents overestimated their problems at baseline. The impact on Apondo respondents is less clear. Apondo respondents may have been interested in providing proof that the program helped them and underestimated their continuing problems or they may have wanted to show that they are still in need in case of the possibility of more help and overestimated their continuing problems. It is hoped that the sample size was large enough to mitigate these possibly competing biases, though the sample size dwindled at endline.

A final, more general issue in evaluating interventions is enumerator accuracy and consistency in completing the questionnaire according to respondent answers. Though the evaluation put considerable effort into making the questionnaire culturally relevant through extensive consultation with local contacts, enumerator feedback, and training enumerators, it is not possible to rule out data inaccuracies. For example, several of the enumerators struggled with the skip patterns in the survey, though none of these problems affected the data presented here.

Future studies should not make the surveys anonymous based on feedback that the subject of the questionnaires was not uncomfortable or embarrassing for respondents. Having anonymous surveys that were only labeled with phone numbers made it difficult to ensure that the same PCG was interviewed at each

follow-up and that the PCGs were referring to the same child at both sessions. Finally, to combat attrition, it will be important for additional incentives to be offered to parents for their attendance.

X.   Conclusion

Inadequate access to clean water, sanitation facilities, and hygiene education plagues rural communities across East Africa. Rural Kenyan communities suffer from a high waterborne disease burden and lose valuable time each day to the search for potable water. The KC WASH program is designed in partnership with rural communities outside of Oyugis, Kenya. The program builds WASH infrastructure and provides hygiene education at local schools in order to improve health, education, and economic sustainability outcomes for the entire village over time.

The results of this analysis suggest that Global Partners' KC WASH project at Apondo Primary School had significant health and education impacts for students. Though there were some limitations to this study, the results provide encouragement for continued funding of WASH projects at schools in this region.

Appendix

    A. Enumerator Training Plan

Activity	Topic	Learning Activities	Materials	Learning Objectives
DAY 1 Fortune Cookie Icebreaker *9-9:20am*	Icebreaker and Needs Assessment	Pass out fortune cookies and explain what they are. Everyone will think about what they hope the fortune cookie will say. Then we will go around the circle and share their hopes and open the cookie to see what it says.	Small strips of paper, pens	Share names and goals to get comfortable in conversation
Circle Share *9:45-10am*		Everyone will share one of their professional goals and one personal goal, including the facilitators.	Chairs in a circle	Open up and build a bond between enumerators. Focus the group on its goals.
Training Expectations *9:20-9:45am*	Needs Assessment	Transition from the icebreaker and ask a similar question about the expectations people have for the training. Write down the expectations people have of facilitators, of their peers, and of what they will learn in the training on flipchart paper. It will hang on the wall for the duration of training.	Flipchart paper, marker	Share the expectations of the training in terms of what they will learn, how facilitators will work with enumerators, and how their peers will collaborate. This will hopefully build confidence of the enumerators to give their feedback openly.
Defining Evaluation *10-11am*	Evaluation definitions	Discuss the basic concepts and definitions of evaluation. Explain terms such as evaluation, impact, theory of change, and indicators. Then, ask the group to give two examples of indicators they might use for different projects.		Be able to define evaluation terminology especially as it relates to the context of the questionnaire.
Developing Understanding of This	Evaluation Indicators	In pairs, enumerators will write down three questions that they would want to	Flipchart paper, markers,	Be able to recognize why this evaluation is

Evaluation *11am-12pm*		know about how water projects will impact people in the community pretending to be different stakeholders – i.e. mothers, schoolchildren, teachers, employers, local politicians – and why they want those specific questions answered. Then they will share their questions with the group, and the facilitator will write them on flipchart paper. Discussion of the purpose of the baseline and follow-up questionnaires and the indicators used.	sheets of paper, pens	crucial to program success. Understand how we came up with indicators for this program's success. Create a shared vision for the evaluation.
Lunch *12-1pm*				
Individual Thoughts on Questionnaire *1:10-1:45*	Questionnaire Development	Facilitator will ask enumerators to read both questionnaires carefully and make notes about cultural relevance and clarity of questions. I will also ask them to let me know if they see any translation problems. The group will then share their thoughts.	Pens, extra paper, questionnaire (in English and Luo)	Enumerators are able to look at the questionnaire with a critical lens. Enumerators will gain an understanding of what they will be asking primary caregivers.
15 minute break *1:45-2pm*				
Thoughts on Questionnaire Continued *2-3pm*	Questionnaire Development	Facilitator and group will go through each question one by one to ensure enumerators understand the meaning and purpose of each question. Discussion of the importance of enumerators, parents, and Global Partners staff all having the same understanding of what information is gathered in	Pens, extra paper, questionnaire (in English and Luo)	Be able to look at the questionnaire with a critical lens. Be able to respond to parents' questions during the questionnaire. Enumerators will gain an

		the questionnaire and what each question means.		understanding of what they will be asking primary caregivers and why. Enumerators will recognize the importance of respondent understanding of each question
Check-In, Wrap-Up, and Homework *3-4pm*		Facilitator will ask the group what they learned that day and write down responses. Facilitator will ask how the training is going and if it is meeting expectations of the group. Enumerators will complete a mini "evaluation" to show that evaluations are always important. Facilitator will ask the group to look over the questionnaire again that night to write down anything else they think might be problematic when giving the questionnaire. They should practice with family members if they can and bring their responses back the next day.	Flipchart paper, markers, questionnaire (in English and Luo)	K – Reinforce knowledge gained during the day S – Gain confidence using the questionnaire with people in their own social circles
DAY 2 Icebreaker and Check-In on Homework *9-10am*	Icebreaker and Needs Assessment	Icebreaker – Categories – Enumerators will stand up. Facilitator will read categories and enumerators will have to find ways to group people with similar responses together. I.e. – favorite color, favorite subject in school, etc. Facilitators should participate too. Enumerators will sit in pairs and discuss whom		Build on relationship between facilitators and enumerators Open a safe space to discuss thoughts on giving the questionnaire

		they asked to answer the questionnaire the night before, what problems they had, and how they felt about the process. Then each pair will share anything they'd like with the group about their experience.		
Giving the Questionnaire *10-11am*	Questionnaire	Opening question: How should someone who is taking the questionnaire feel? Each person writes down adjectives and shares them with the group. Facilitator writes them down on flipchart paper. Open the floor to any more questions on how to give the questionnaire.	Strips of paper, pens, flipchart paper, markers	Enumerators will understand the goal of how the respondent should feel and how to interact with them Reinforce ideas on collective understanding of the questionnaire from the day before
Giving the Questionnaire *11am-12pm*	Questionnaire	Facilitator will give the questionnaire to research assistant in front of the group and ask the group to follow along. Enumerators will discuss each section of the questionnaire one at a time with facilitator giving mini examples for each section.	Questionnaire (in English)	Enumerators will learn how to give the questionnaire. They will learn the details of how to record responses.
Lunch *12-1pm*				
Giving the Questionnaire *1-1:30pm*	Questionnaire	Enumerators will be paired with a partner with pairs chosen alphabetically. One enumerator will give the questionnaire all the way through. then, the partners will switch roles. Both people should take notes when necessary.	Questionnaire (fresh copy in Luo)	Enumerators will learn how to give the questionnaire. They will learn the details of how to record responses.
Giving the Questionna	Questionnaire	Enumerators will ask questions about the first	Questionnaire with	Enumerators will learn how to give

ire 1:30-1:45pm		round of practice and facilitators and enumerators will troubleshoot	notes on it	the questionnaire. They will learn the details of how to record responses.
15-minute break 1:45-2pm				
Giving the Questionnaire 2-3pm		Enumerators will be paired with a new partner. Pairing will be based on height – girls will line up tallest to shortest and then the line will fold to create pairs. The enumerator will give the questionnaire all the way through. Their partner will be given a card that tells them to act confused about a specific question. Then, the partners will switch roles, and a new card will be handed out. Both people should take notes when necessary. Find another partner and do this again if time allows. Each enumerator should give the questionnaire to a facilitator at least once.	Questionnaire (two fresh copies in Luo)	Enumerators will learn how to give the questionnaire. They will learn the details of how to record responses. Enumerators will learn how to troubleshoot confusion that may arise during the questionnaire and answer respondent questions.
Check-in, Evaluation, and Wrap-Up 3-4pm	Questionnaire	Enumerators will ask questions on the first round of practice and facilitators will troubleshoot. Enumerators will share their anxieties and excitements about the questionnaire days and their expectations for how they will perform. Facilitator will write these down and address them as a whole as natural and express confidence in the group's	Flipchart paper, markers, evaluation form	Enumerators will learn how to give the questionnaire. They will learn the details of how to record responses. Think of the questionnaire day and what anxieties there are. Become aware that they are ready to do

		abilities. Enumerators will fill out evaluation form on the training.		this and are professionals that should have confidence.

B. Questionnaire

Symbols used in this survey
📖 *Read silently: instructions for the assessor*
👈 **Say out loud to the respondent**
✍ *Write*

✍**Questions to fill out before beginning the survey**

A. ✍ Location: School _____ Household _____

B. ✍ Name of school respondents' child attends: _____

C. ✍ Date of Assessment: (Month)_____(Day)_____(Year)_____

D. ✍ Administrator: First name _____ Last Name_____

E. ✍ Gender of respondent: Male _____ Female _____

F. ✍ Child's Number: _____

👈 *Hello, my name is [underline]insert your name[/underline]. Today I would like to ask you some questions about health and education as it relates to your child and your household to help us understand how to design and implement programs that will help your child become a healthier and better student. Please answer all the questions as honestly as you can because your honest perspective will help us create better programs for you. Your name and your child's name will not appear in any of the reports derived from this study, and your responses will be kept confidential. Your individual responses will not be shared with anyone outside of the Global Partners team in the United States. This is NOT a test and you will not be graded or judged. Responses will NOT affect whether or not Global Partners funds projects in your area. We would like to follow-up with you about the same topics in a few months if you are willing.*

👈 *You do not have to participate if you do not wish to do so. Once we begin, if you don't want to answer a question, that's ok. You can also stop the survey at any time if you don't feel like finishing it.*

Verbal consent:

👈 *Do you agree to participate in this survey?*

✍ **Check box if verbal consent is obtained:**   ☐ *YES*

Background Questions

🗣 *Let's begin with some background information about you and your household.*

1. 🗣 *In order to contact you in a few months for a follow-up interview, at what phone number can we reach you? _____*

2. 🗣 *How old is the child you care for? _____*

3. 🗣 *At what level is this child in school? _____*

4. 🗣 *What gender is this child?   Girl   Boy*

5. 🗣 *How many people live in your household right now? _____*
   a. How many adults more than 18 years of age live in your household? _____
   b. How many youth or children less than 18 years of age live in your household? _____

6. 🗣 *How many people who live with you bring income into your household? _____*

7. 🗣 *Is your household's monthly income enough to cover its basic needs? Please choose from the following options:*
   Always   Most of the time   Sometimes   Rarely

8. 🗣 *How often does the child contribute to your household income?*

📖 *Let parents answer without reading the options. Circle all that apply and specify based on response.*

Most days weekends	**Most nights**	**Most weekends**	**Some**
Some days	**Some nights**	**Never**	**Other (please specify): _____**

9. 🗣 *What is the last grade of school you completed? _____*

10. 🗣 *Are you the head of your household?   Yes   No*

📖 *If yes, proceed to question 13. If no, proceed to question 11.*

11. 🗣 *What is the highest level of education completed by the head of your household? _____*

12. 🗣 *What is the gender of the head of your household? Male   Female*

Water Questions

13. 🗣 *Has your child ever been taught about hygiene at home or at school?*
Yes   No   I don't know

14. 🗣 *How many kilometers do members of your household currently travel to get water?*

| Less than 1 km | 1-2 km | 3-4 km | More than 4 km |

15. 🗣 *How often do members of your household currently retrieve water?*

| Once a week or less | 2-3 times per week | 4-6 times per week | Every day |

16. 🗣 *How much time do members of your household spend collecting water per week?*

| Less than one hour | 1-3 hours | 4-6 hours | 7 hours or more |

17. 🗣 *In your household, who is primarily responsible for collecting water?*

✍ Circle one of the following

| *School-aged girls* | *School-aged boys* | *Adult men* | *Adult women* |

18. 🗣 *What is the primary source of your household's drinking water?*

✍ Circle one of the following

| *Public well* | *Private well* | *Public tap* | *Natural source (stream, pond, river, lake, etc.)* |

19. 🗣 *What do you usually do with water you collected before you drink it?*

📖 *Let parents answer without reading the options. Circle all that apply and specify based on response.*

| *Boil it before drinking* | *Use chlorine on water before drinking* | *Use water guards before drinking* | *Drink it right away without boiling, using chlorine, or using water guards* |

Other:
_____

Student Questions

🗣 *Now I will ask some questions about the education and health of the child you care for:*

20. 🗣 *In the last two weeks, has your child had any of the following?*

📖 If parent says I don't know, please circle no.

a.	*Diarrhea*	*Yes*	*No*
b.	*Typhoid Fever*	*Yes*	*No*
c.	*Upper Respiratory Infection*		
	(cough, congestion, nasal discharge, sore throat)	*Yes*	*No*
d.	*Cholera*	*Yes*	*No*
e.	*Parasitic infection*	*Yes*	*No*
f.	*Other: _____*		

21. 🗣 *How many times did the child have diarrhea in the last two weeks?*
   _____

22. 🗣 *How many days of school did the child miss in the last two weeks?*
   _____

23. 🗣 *If your child missed one or more days of school in the last two weeks, why was he/she unable to go to school?*

📖 *Let parents answer without reading the options. Circle all that apply and specify based on response.*
   a. *Diarrhea*
   b. *Other illness (please specify): _____*
   c. *Injury*
   d. *Lack of transportation*
   e. *Other (please specify): _____*

24. 🗣 *Approximately how many hours does your child usually spend on homework each night? _____*

25. 🗣 *What do you think most limits your child's attendance at school?*

📖 *Let parents answer without reading the options. Circle all that apply and specify based on response.*

   a. *Illness*
   b. *Distance to school*

     c. Fees paid to the school
     d. Cost of school supplies
     e. Need to work to help support the family instead of studying (caregiving or income-generating)
     f. Other (please specify): _____

26. 🕮 *What do you think is the greatest problem associated with your child's health?*

📖 *Let parents answer without reading the options. Circle all that apply and specify based on response.*

     a. Mosquito-borne diseases (i.e. malaria)
     b. Distance to health center
     c. Water quality
     d. Malnutrition
     e. Other (please specify): _____

Caregiver Questions

🕮 ***Now I will ask some questions about how you spend your time.***

27. 🕮 *How do you spend most of your typical day right now?*

📖 *Let parents answer without reading the options. Choose only ONE answer based on response.*
     a. Caring for household/children
     b. Farming your own property for food
     c. Working for pay
     d. Other (please specify): _____
     e. Prefer not to answer

📖 *If respondent IS working for pay (answer 'C'), proceed to question 28.*

📖 *If respondent is NOT working for pay, proceed to question 33.*

28. 🕮 *How many days that you were supposed to work did you miss last week?*
     _____

29. 🕮 *If you missed one or more days that you were supposed to work this week, why were you unable to go?*

     a. Illness
     b. Injury
     c. Lack of transportation
     d. Other (please specify): _____

30. 🔊 *On average, how many hours do you spend a day working for pay?*
   Less than 1   *1-2*   *3-4*   *5-6*   *7-8*   *More than 8*

31. 🔊 *On average, how many days do you spend a week working for pay?*
   1   *2*   *3*   *4*   *5*   *6*   *7*

32. 🔊 *a. Is your job seasonal?*   *Yes*   *No*
   🔊 *b. If yes, is the season for work occurring now?*   *Yes*   *No*

33. 🔊 *How often are you satisfied with the number of hours you are currently working?*

Always satisfied   *Sometimes Satisfied*   *Never Satisfied*   *Not Sure*

📖 *If respondent is always satisfied, sometimes satisfied, or not sure, the survey is finished.*

📖 *If respondent is never satisfied, proceed to question 34.*

34. 🔊 *If you are not satisfied with the number of hours you're working, why not?*
   a. *I work too little because of illness*
   b. *I work too little because of injury*
   c. *I work too little because of lack of transportation*
   d. *There are not enough hours available to work*
   e. *I work too many hours*
   f. *Other (please specify): _____*

🔊 *Thank you for sharing your insights on the health, education, and economic opportunities of your household. Your responses will be incredibly helpful as we develop programs to support you and your children. Please feel free to contact Global Partners with questions about the survey or its results. Again, we will not share your information with anyone outside of the Global Partners team and your responses will be kept confidential.*

📖 *The survey is complete. On this survey, please write down any notes that you think are important based on comments or behaviors of the respondent before giving the next survey.*

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