Kenya Comparative Analysis

June 2016

CONTENTS

ACRONYMS

CHW	Community Health Workers
CLTS	Community-led Total Sanitation
CU	Community Unit
HIV	Human Immunodeficiency Virus
OD	Open Defecation
ODF	Open Defecation Free
PDA	Personal Digital Assistant
PLHIV	People Living with HIV/AIDS
WASH	Water, Sanitation, and Hygiene

INTRODUCTION

This document presents the highlights of research conducted in Kenya to assess the effectiveness of WASHplus-supported activities to increase sanitation coverage and promote given hygiene practices. WASHplus was a USAID-activity, which in Kenya implemented a program to support the Kenya's government objective to end open defecation (OD). WASHplus/Kenya was defined as an inclusive sanitation program that targeted three vulnerable sub-populations: households with children under 5, with elderly family members 65 years old and above, and potentially with people living with HIV/AIDS (PLHIV). WASHplus behavior change activities in Kenya included specific hygiene and sanitation recommendations for the targeted populations.

Data were collected in rural households located in Nyanza Province in both intervention and comparison areas before and after WASHplus' efforts extending from 2012 to 2014. For comparison purposes, data were collected in the districts of Rongo and Migori, the intervention and the comparison districts respectively. Data were collected during the same season at both at pre- and post-measurement waves.

This document describes the open defecation challenges facing Kenya when the program started, the USAID response, and WASHplus's involvement in the country as part of that response. The reader will also find the indicators tracked, the methods used in collecting data at baseline and endline. The document finally presents the major highlights of the comparative analysis conducted. An annex contains tables of cross-tabulations constructed as part of the analysis.

BACKGROUND

More than 5.4 million Kenyans, both in rural and peri-urban areas, defecate in the open (JMP 2014).[1] This practice increases the risk of diarrhea, which is among the top five killer diseases in the country. To address the problem, Kenya adopted the community-led total sanitation (CLTS) approach to mobilize rural communities to improve their sanitation and hygiene practices in 2010.[2] CLTS is a participatory approach for mobilizing communities to eliminate OD completely. Communities are facilitated—through a triggering process described by Kar and Chambers, 2008[3]—to appraise and analyze open defecation and take their own actions to become open defecation free (ODF). [4]

Furthermore, a growing body of evidence indicates that preventable diseases such as diarrhea have a profoundly negative impact on quality of life and effectiveness of antiretroviral treatments for PLHIV. People and households affected by HIV and AIDS have a substantially greater need for WASH services—more water, safe water, easy access to water and sanitation, and proper hygiene.[5]

USAID/Kenya recognized that diarrhea prevention begins at home with improved water, sanitation and hygiene practices including safe feces disposal, water treatment, and effective handwashing at critical times, as does the prevention of HIV transmission through menstrual hygiene management. As part of this effort, USAID funded the WASHplus project to address hygiene and sanitation shortcomings in a country still recording HIV infection rates of 5.6 percent.[6]

WASHPLUS EFFORTS

WASHplus supported the Government of Kenya to accelerate CLTS programming to meet the government sanitation coverage objectives. In the context of that support, WASHplus developed a training toolkit for WASH-HIV integration endorsed by the Ministry of Health and trained government and implementing partners who then cascaded down to the community

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[1] WHO and UNICEF. 2014. *Progress on Drinking Water and Sanitation, 2014 Update*. http://www.wssinfo.org/fileadmin/user_upload/resources/JMP_report_2014_webEng.pdf

[2] Ministry of Public Health and Sanitation, Kenya. 2010. *National Strategy for Environmental Sanitation and Hygiene* 2010-2015. http://www.ircwash.org/resources/national-strategy-environmental-sanitation-and-hygiene-2010-%E2%80%93-2015-kenya

[3] Kar K and Chambers R. *Handbook in Community-Led Total Sanitation*. Plan International and the Institute for Development Studies, University of Sussex.

[4] Chambers R. 2008. *Going to Scale with Community-Led Total Sanitation: Reflections on Experience, Issues and Way Forward*. Institute of Development Studies, University of Sussex. http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/cltshandbook.pdfhttp://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/media/Chambers_Going%20to%20Scale%20with%20CLTS.pdf. In this context, triggering refers to a process of developing a collective sense of disgust and shame among community members to address the effects on communities of mass open defecation by community members.

[5] MNB Momba1, E Madoroba1 and CL Obi. 2000. Apparent impact of enteric pathogens in drinking water and implications for the relentless saga of HIV/AIDS in South Africa. In A. Mendez-Vilas*, Current Research, Technology and Education Topics in Applied Microbiology and Microbial Biotechnology*. Formatex Research Center, Badajoz, Spain.

[6]

level across the country. The materials were adapted and integrated into Kenya's community health worker (CHW) training curriculum.

WASHplus also suggested ways to include WASH and inclusive sanitation in various policies. Later the project added a component to help the government advance sanitation uptake by generating demand for sanitation; this included introducing simple supportive technologies to vulnerable households and focusing on equity and inclusion—actions that became incorporated into the government's CLTS strategy.

Working with the Ministry of Health and USAID-funded health projects, WASHplus's rural sanitation pilot program increased sanitation uptake through the government-led CLTS program. Triggering and increasing awareness of the need for sanitation facilities through WASHplus's CLTS+ approach spurred the uptake of improved sanitation at the outset. The project, with other partners, developed a booklet of latrine options, including latrine pits, slabs, and superstructures appropriate to local conditions.

METHODOLOGY

The study was based on a quasi-experimental pre-post study design with non-equivalent comparison groups. The design did not permit establishing causality since it did not consider all other potential factors that may have influenced the results. However, including a comparison group helped to explain the potential benefits of the intervention.

The primary sampling unit was the community unit (CU) defined as a set of communities managed together by health programs implemented by the Kenya government for maximizing health impact. Both intervention and comparison areas were high HIV-prevalence non-adjacent CUs. The comparison and intervention districts have similar socio-economic characteristics and were selected through a consultative process with the Ministry of Health. Little intervention-related contamination was expected between the intervention and the comparison group since health workers in comparison districts did not receive any kind of training to mobilize communities for CLTS purposes. In addition, health workers in the comparison districts did not receive any of the job aids used in the intervention area. Since the intervention was mainly based on interpersonal communication by CHWs, no spillover effects were anticipated. Spillover effects may have occurred if mass media was used by the government or other donors.

Community units were chosen first, segments were randomly chosen within community units and households were randomly chosen within segments. Large villages over 1,000 households had more than one segment.

In segments selected, households visited were chosen by establishing an initial point and randomly selecting the direction in which enumerators moved. Every sixth household on the same side of the street was visited. All households recruited had to meet eligibility criteria. If the sixth household did not, the next sixth house was visited until the established quota of 10 houses per segment was met. Previous household involvement in the baseline did not lead to exclusion from the endline.

To be eligible to participate in the survey, the head of the household or the spouse indicated whether the respondent had reached the age of majority and if family had a member which met any of the selection criteria:

- a child under 5,
- an elderly person 65 years or more, or
- a family member who is chronically ill (i.e., with long-term disease that may not be cured) and bedridden.

The sample size required 670 households per arm at the baseline and at the endline, implying visiting 10 households in 67 CU segments. Because there were two arms (one intervention and one comparison area) the requirement was to have a e a total sample size of 1,340 study participants. We oversampled by 5% for quality assurance and analysis purposes. The sample was calculated assuming a 15% increase in sanitation coverage from baseline to endline with a ± 5 margin of estimation error, a 95% confidence and a design effect of 2. The sample in the end was constituted by a total of 1,301 baseline and 1,325 endline participants with a slightly higher number in the comparison area at both measures.

Enumerators used a standardized survey questionnaire uploaded onto password-protected personal digital assistants (PDAs)/or mobile phones to collect data. The only identifying information collected was the number of the house on the site map. This information was used for quality comparison purposes. The full questionnaire used by enumerators included questions and observations on the follow topic areas.

- Socio-demographics (profile of respondent; family size; vulnerable household members; household characteristics and possessions)
- Drinking water treatment and storage practices
- Handwashing practices and stations with essential supplies
- Management of human feces, including type of facility usually used by household members
- Sanitation facility condition and current use
- Menstrual hygiene management practices

The table below lists the indicators tracked.

Indicator
% of households that abandoned open defecation
% of households using improved[7] sanitation facilities
% of households where the youngest child used a sanitation facility, potty, or diaper the last time child defecated
% of households with vulnerable members that have access to inclusive sanitation facilities
% of caretakers of vulnerable populations aware of the five critical handwashing junctures
% of households with soap and water at a handwashing station commonly used by family members
% of households practicing correct use of recommended household water treatment technologies
% of households that use a container with a tight fitting lid to protect treated drinking water
% of households reporting that vulnerable family members drink treated water
% of households with chronically ill female members that follow recommended menstrual hygiene

[7] Per the Joint Monitoring Program, "improved sanitation facilities are likely to ensure hygienic separation of human excreta from human contact. They include the following facilities: flush/pour flush to a piped sewer system or a septic tank; pit latrine; ventilated improved pit (VIP) latrine; pit latrine with slab or a composting toilet."

practices

MAJOR FINDINGS

Socio-Demographics

Per the data presented in Table 1 the tabular section of the report, the socio-demographic characteristics of respondents were comparable between measures at both intervention and comparison areas. Most study participants were female, the majority of whom were in the 18–34 age bracket, generally attended school (78% to 85%), and were literate (74% to 84%). In the intervention and comparison areas, however, the percent of study participants having completed elementary school was significantly higher at the baseline than at the endline.

Per data presented in Table 2, over 82 percent of households visited had a child 5 years old or younger, with the presence of this age group increasing significantly from 85 percent to 93 percent between baseline and endline in the comparison area. The percent of households visited with a family member at least 65 years old generally hovered around just under one fourth, yet it dropped significantly from 22 percent to 15 percent from baseline to endline in the comparison area as well.

The percent of visited households with a chronically ill member that was bedridden, a proxy indicator for the presence of a PLHIV in the household, was limited to 5 percent of at the baseline in the intervention area and to 7 percent in the comparison area. The percent were slightly down to 3 percent at the endline in the intervention area and to 5 percent in the comparison area, a 2 percent drop in each case which was not statistically significant in either study group. Further investigation during implementation detected that health support groups operated in the two districts in the sample, and that most if not all individuals participating in the groups were HIV+. WASHplus added membership in a health support group as another proxy for tracking PLHIV at the endline. The percent of households with such a member was 5 percent in the intervention area and 8 percent in the comparison area. When putting both proxies together the percent of households with a PLHIV was 8 percent in the intervention area and 13 percent in the comparison area. No overlap between the two proxies for PLHIV was detected.

Sanitation

Per data presented in Table 3, in the rural areas studied in Kenya, OD dropped from 34 percent to 11 percent between the baseline and the endline in intervention areas, whereas it remained static in the comparison areas with 44 percent of households engaged in OD at baseline and 47 percent at endline. The drop in intervention areas was statistically significant. Change mentioned in the comparison area was not. Most gains in sanitation in intervention areas, though, were due to increases in access to unimproved sanitation. This finding indicated that whereas CLTS was key in reducing open defecation, this drop does not necessarily translate into access to improved sanitation. Further, per data presented in Table 7, at endline the chance of having a latrine in the intervention area was 6.2 times higher in households with a family member 65 years old or older when compared with those without seniors. No such finding was detected in the control area. By the same token, intervention households where the study participant is at least 55 years of age are 57 more likely to have a latrine when compared to households where the study participant was between 18 and 24 years old. Further, in the intervention area alone, households with a chronically ill family member, a proxy for having a

PLHIV at home, were 21 times more likely to have a latrine when compared to households without such family members. In fact, the practice of open defecation in households with a PLHIV, measured through yet another proxy (e.g., membership in a health support group), was as low as 3 percent in intervention areas at the endline, compared to 42 percent in comparison areas. No information exists for such a proxy at the baseline as the additional proxy was added only at the endline. No support groups for individuals under retroviral treatment were detected at the baseline. These findings speak to the work supported by WASHplus in the context of an inclusive sanitation activity, where sanitation was integrated into an HIV/AIDS program.

Per data in Table 8, at the endline, in intervention areas, households in CLTS-triggered villages were 4.3 times more likely to have a latrine when compared to villages that were not triggered. By the same token, households that reported being visited by a health educator to discuss sanitation issues were 9.5 times more likely to have one as well. No such associations were found in comparison areas.

Per data available in Table 4 in the Annex, the disposal of child feces in a sanitation facility increased 27 points from 49 percent to 76 percent in intervention areas, and it increased only 6 points from 45 percent to 51 percent in comparison areas. The differences detected in intervention areas were statistically significant, whereas those detected in the comparison areas were not.

Per data in Table 6, the conditions of the latrines changed over time. Some changes observed were in the expected directions, others were not. For example, the presence of a clear path leading to the latrine among latrine owners was relatively high and remained so between measures in the intervention area. That is, it was as high as 84 percent in the baseline and 86 percent at the endline in this area. However, in the comparison area it was as low as 65 percent at the baseline and it dropped to 55 percent in the comparison area. This drop was not statistically significant.

The presence of a slab or pit cover increased from 3 percent to 15 percent in the intervention area between measures, with the increase being statistically significant. It increased from 2 percent to 7 percent in the comparison area, which was not statistically significant.

Hygiene

Per data available in Tables 10 and 11, regarding hygiene practices, results are mixed. The presence of a functional handwashing device commonly used by family members increased 15 points from 43 percent to 58 percent when comparing baseline and endline values in intervention areas. But it also increased by 19 points between measurements going from 14 percent to 33 percent in comparison areas. These increases were both statistically significant. Yet, households with a fixed handwashing device increased from 13 percent to 32 percent, a 19-point jump between measures in intervention areas. That increase was only 3 points, from 2 percent to 5 percent in comparison areas. The first increase was statistically significant, the second was not. Further, the location of devices differed. The presence of a handwashing device at latrines increased from 6 percent to 20 percent in intervention areas compared to an increase from 1 percent to 4 percent in comparison areas. Handwashing devices seem to be moving from yards to either toilets or kitchens in both study groups. However, the transfer is more pronounced in intervention areas.

The chances of having a handwashing device varied depending on family characteristics. As such, families with a chronically ill member, one of the proxies for the presence of a PLHIV, were 3.09 times more likely to have such a device when compared to families where no chronically ill persons lived.

Per data available in Table 9, changes in knowledge about the junctures at which hands should be washed with soap to prevent diarrheal disease increased for junctures associated with the risk of fecal contact. For example, the unprompted mention of handwashing with soap needed after visiting a toilet increased from 76 percent to 95 percent in the intervention area, but it also increased from 62 percent to 80 percent in the comparison area. Both of these increments, which were of comparable magnitude, were statistically significant. The mention of handwashing with soap being necessary after defecation increased from 44 percent to 77 percent between measures in the intervention area, yet it decreased from 31 percent to 26 percent in the comparison area. The former increase was statistically significant, but the drop was not. Parenthetically, the study distinguished between handwashing after a toilet visit from after defecating because not all households had latrines and some family members defecated in the open. Finally, there was an increase in one juncture, handwashing prior to food handling. The mention of the need to wash hands before feeding a child happened only in the comparison area, practically doubling since it increased from 14 percent to 29 percent between measures. That change was statistically significant. In the intervention area, mentioning this juncture between measures remained static, hovering about one third of participating households.

Further, households reporting treatment of drinking water with chlorine increased 37 points in intervention areas compared to only 27 points in comparison areas; both are statistically significant.

The low number of households reporting a female family member who was bedridden with a chronic disease at either measure and study group made it unadvisable to explore menstrual hygiene management practices over time and in intervention vs. comparison areas.

Water

Per data presented in Table 14, the percent of households with access to an improved water source was 19 percent at the baseline in both the intervention and comparison areas, yet it increased to 25 percent in the intervention area and to 34 percent in the comparison area. The increase detected in the comparison area was statistically significant. That detected in the intervention area between measures was not.

Per data presented in Table 14, the percentage of households treating drinking water in the intervention area increased from 47 percent to 90 percent and in the comparison area from 47 percent to 80 percent; these increases were statistically significant. Most gains were explained by changes in chlorination. The latter significantly increased from 22 percent to 76 percent in the intervention area and from 21 percent to 66 percent in the comparison area. Per data in Table 15, "having received training or information on water treatment" as one reason given for treating drinking water increased significantly from 26 percent to 34 percent in the intervention area. An increase from 9 percent to 17 percent of the same reason in the comparison area was

not statistically significant. Access to information is one determinant of the increase in drinking water treatment practices in both study groups. Information was obtained through radio.

Per data presented in Table 16, the use of a container with a tight-fitting lid to store drinking water among water treaters decreased significantly, however, in the intervention area from 72 percent to 43 percent. Yet, it dropped only from 59 percent to 52 percent in the comparison area.

MAJOR CONCLUSIONS

Clear changes in the expected direction regarding access to sanitation occurred over time in the intervention area. The changes in sanitation coverage in the intervention area were statistically associated with promotional efforts supported by WASHplus, including the adoption of the CLTS approach and the visit of outreach workers to discussion sanitation (improvement) issues. Noteworthy, however, is the fact that households where study participant is the oldest have more chances of having a latrine than households where the study participant was between 18 and 24 years old, implying that younger households may have more difficulty setting up latrines. Now, the impact of the intervention to tackle inclusive sanitation concerns was also clearly demonstrated. Moving from open defecation to improved sanitation, however, remained a challenge. The hygienic disposal of child feces in latrines also increased significantly in intervention areas. Most likely, the increase in access to sanitation made this possible.

Two noteworthy changes were observed in handwashing facilities when comparing study groups: 1) a higher percentage of fixed handwashing devices available in the intervention area and 2) an increase of handwashing devices near toilets. Households may have moved previously available handwashing devices from courtyards and installed them near toilets. This interpretation is speculative and would merit confirmation in other studies. Questions concerning the rationale for placing the handwashing stations in different areas of the house that could be added in future studies may help clarify the matter. The mixed results regarding handwashing, however, maybe partially due to the fact that constructing a latrine and setting up and maintaining handwashing stations are different practices that merit different intervention strategies. The maintenance of handwashing devices and their use may require strategies that focus on habit formation which may be different than CLTS to promote sanitation uptake.

Drinking water treatment and use of adequate storage increased over time in intervention and in comparison areas as well, with most of the changes in both areas driven by the adoption of chlorination practices. Cholera cases were detected in the districts included in the study, both in intervention as well as in comparison areas. The government promoted chlorination as a water treatment practices in both areas as a response. The similarities in water treatment practices in both the intervention and the comparison area may be due to this unexpected modification in promotional efforts prior to conducting the endline study.

ANNEX 1: Tables of Comparative Analysis between Baseline and Endline by Study Group

Socio-Demographics

Table 1: Primary caregiver demographic characteristics

Characteristics	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Gender						
Male	6%	13%	0.45	14%	9%	0.37
Female	94%	87%		86%	91%	
Age (in year)						
18 to 24	23%	27%	0.84	25%	33%	0.86
25 to 34	33%	33%		25%	33%	
35 to 44	18%	15%		17%	16%	
45 to 54	8%	9%		13%	8%	
55 and above	18%	17%		19%	10%	
Literacy						
Yes I can read and write	81%	79%	0.89	74%	84%	0.18
Yes I can read but not write	3%	4%		6%	2%	
No I cannot read or write	17%	16%		19%	14%	
Ever attended school						
Yes	88%	90%	0.94	85%	91%	0.19
No	12%	10%		15%	9%	
	N = 579	**N = 607**		**N = 562**	**N = 606**	
Highest level of school completed						
Primary school	85%	79%	**0.01**	83%	78%	**0.01**
Secondary school	14%	0%		11%	1%	
High school	1%	16%		4%	19%	
College *(Certificate level)*	0%	2%		2%	1%	
College *(Diploma)*	0%	1%		1%	0%	
SES						
Poorest	25%	27%	0.84	26%	26%	0.90
Poor	21%	26%		25%	25%	
Rich	30%	25%		27%	24%	
Richest	24%	22%		22%	25%	

Table 2: Households with vulnerable household members

Types	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Chronically ill who are bedridden	5%	3%	0.99	7%	5%	0.99
Elderly *(> 65 years old)*	21%	23%	0.99	22%	15%	**0.04**
Children (< *5 years old)*	82%	83%	0.99	85%	93%	**0.02**
Bedridden and chronically ill women ages 18 to 50 years old	1%	1%	0.99	1%	1%	0.89
Member of support group for HIV +	NA	5%	---	NA	8%	---

Sanitation

Table 3: Access to Sanitation Facilities

Sanitation categories	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 630	N = 671		N = 659	N = 666	
Improved sanitation facility						
Not shared	14%	14%	**0.02**	14%	16%	0.92
Shared	21%	14%		17%	17%	
Unimproved sanitation facility						
Not shared	12%	29%	**0.02**	12%	12%	0.92
Shared	19%	33%		13%	8%	
Open Defecation	34%	11%		44%	47%	

Table 4: Management of human feces among households with children under 5 years old

Feces management	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 630	N = 671		N = 659	N = 666	
Households where the youngest child used a sanitation facility, potty, or diaper the last time he or she defecated						
Yes	42%	45%	0.08	27%	31%	0.07
Households where the respondent disposed of child feces in a sanitation facility						
Yes	49%	76%	**0.01**	45%	51%	0.06

Table 5: Practice of open defecation among HIV-positive persons

	Endline					
	Rongo (intervention)		Khi Test P (value)	Migori (Comparison)		Khi Test P (value)
	N = 671			N = 666		
Practice of open defecation	Member of support group for HIV +			Member of support group for HIV +		
	Yes	No		Yes	No	
Yes	3%	10%	**0.04**	42%	41%	0.88
No	97%	90%		58%	59%	

Table 6: Sanitation characteristics (among those who have access to facility only)

Characteristics	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 382	N = 433		N = 364	N = 319	
Clear path	84%	86%	0.99	65%	55%	0.10
Rope structure	0%	4%	0.94	0%	3%	0.98
Entrance wider *(allow two people to go)*	16%	21%	0.56	6%	26%	**0.00**
Raised seat	1%	6%	0.68	1%	1%	1.00
Rope or pole to permit squatting	0%	2%	0.99	1%	0%	0.99
Child-friendly features	48%	26%	**0.00**	35%	11%	**0.00**
Toilet has wall	81%	83%	0.99	80%	51%	**0.00**
Toilet has roof	75%	73%	0.99	75%	54%	**0.00**
Toilet allows privacy	59%	63%	0.92	57%	54%	0.99
Covered pit	3%	15%	**0.03**	2%	7%	0.73
Slab wet	20%	22%	0.99	25%	30%	0.91
Slab grey color	21%	10%	**0.02**	13%	23%	0.07
Smelly toilet	55%	63%	0.14	55%	83%	**0.00**
Flies around the toilet	53%	63%	0.65	57%	66%	0.86
Broom near by	12%	4%	0.99	7%	7%	1.00

Table 7: Determinants of access to latrine

Access to latrine	Options	Rongo (Intervention)				Migori (Comparison)			
		p	Exp(ß)	95% IC (Exp ß)		p	Exp(ß)	95% IC (Exp ß)	
				Inf	Sup			Inf	Sup
SES									
Baseline	Poorest	Reference				Reference			
	Poor	**.00**	2.00	1.39	2.88	.35	1.16	.85	1.58
	Rich	**.00**	2.02	1.49	2.71	.49	1.11	.82	1.49
	Richest	**.00**	4.67	3.08	7.07	**.027**	1.45	1.04	2.02
Endline	Poorest	Reference				Reference			
	Poor	**.00**	**10.73**	6.32	18.22	.074	1.32	.97	1.80
	Rich	**.00**	**6.50**	4.15	10.18	.272	1.84	.62	4.15
	Richest	**.00**	3.97	2.68	5.92	**.017**	2.69	1.50	8.94
Age									
Baseline	18 to 24	Reference				Reference			
	25 to 34	**.00**	1.99	1.49	2.65	.94	1.01	.75	1.37
	35 to 44	**.01**	1.85	1.24	2.68	.45	.867	.59	1.26
	45 to 54	**.00**	3.90	1.95	7.81	.11	1.417	.93	2.17
	55 and above	**.01**	1.69	1.17	2.47	**.01**	1.739	1.21	2.49
Endline	25 to 34	Reference				Reference			
	35 to 44	**.00**	8.56	5.56	13.19	.20	1.19	.91	1.55
	45 to 54	**.00**	8.09	4.33	15.14	.92	.98	.67	1.43
	55 and above	**.00**	**57.00**	7.89	411.63	.78	1.08	.63	1.86
Existence of chronically ill member at home									
Baseline	No	Reference				Reference			
	Yes	.19	1.64	.77	3.47	.29	1.37	.76	2.47
Endline	No	Reference				Reference			
	Yes	**.01**	**21.0**	2.83	156.12	.61	1.19	.61	2.31
Existence of senior at home									
Baseline	No	Reference				Reference			
	Yes	**.00**	2.00	1.40	2.85	**.02**	1.49	1.07	2.07
Endline	No	Reference				Reference			
	Yes	**.00**	**6.24**	3.94	9.89	.16	1.33	.89	1.99
Existence of under 5 children at home									
Baseline	No	Reference				Reference			
	Yes	.23	1.10	.94	1.29	.22	1.11	.94	1.31
Endline	No	Reference				Reference			
	Yes	**.00**	**9.49**	7.15	12.59	.23	1.10	.94	1.29
Attended school									
Baseline	No	Reference				Reference			
	Yes	**.00**	1.99	1.67	2.38	**.01**	1.25	1.06	1.48
Endline	No	Reference				Reference			
	Yes	**.00**	8.95	6.87	11.66	.05	1.17	.99	1.38

Table 8: Exposure Variables as determinants of Access to latrine

Access to latrine	Options	Rongo (Intervention)				Migori (Comparison)			
		P	Exp(ß)	95% IC (Exp ß)		p	Exp(ß)	95% IC (Exp ß)	
				Inf	Sup			Inf	Sup
Village participated in community activities to end open defecation									
Baseline	No	Reference				Reference			
	Yes	**.00**	2.19	1.60	3.00	.43	1.12	.85	1.49
Endline	No	Reference				Reference			
	Yes	**.00**	**4.33**	2.85	6.59	.43	1.09	.88	1.34
Village visited by health educator									
Baseline	No	Reference				Reference			
	Yes	**.00**	1.49	1.22	1.82	.09	1.25	.96	1.62
Endline	No	Reference				Reference			
	Yes	**.00**	**9.52**	7.11	12.74	**.04**	1.33	1.02	1.75
Exposed to information on sanitation in the past month									
Baseline	No	Reference				Reference			
	Yes	**.00**	1.89	1.53	2.34	**.01**	1.53	1.18	1.98
Endline	No	Reference				Reference			
	Yes	**.00**	**11.55**	8.09	16.48	**.01**	1.33	1.03	1.62

Handwashing

Table 9: Unprompted junctures at which study participants indicate hands should be washed

Junctures	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
After risk of fecal contact						
After toilet visit	76%	95%	**0.01**	62%	80%	**0.00**
After defecating	44%	77%	**0.00**	31%	26%	0.29
After cleaning child	34%	30%	0.58	14%	30%	**0.00**
After cleaning latrine	25%	30%	0.63	8%	11%	0.90
After cleaning potty	20%	16%	0.52	1%	5%	0.78
Before food handling						
Before food preparation	49%	43%	0.21	39%	39%	1.00
Before eating	86%	90%	0.59	82%	81%	0.99
Before feeding a child	31%	35%	0.75	14%	29%	**0.01**

Table 10: Presence of handwashing device

Location	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Households with **any type** of handwashing device						
Yes	71%	60%	0.10	73%	24%	**0.00**
No *(not observed)*	29%	40%		27%	76%	
	N = 466	**N = 400**		**N = 485**	**N = 159**	
Households with **fixed** handwashing device						
Yes	13%	32%	**0.00**	2%	5%	0.86
No	87%	68%		98%	95%	
Number of handwashing devices						
0	29%	40%	**(T –Test) 0.03**	27%	76%	**(T –Test) 0.00**
1	59%	45%		72%	24%	
2	11%	15%		1%	0%	
	N = 62	**N = 128**		**N = 8**	**N = 8**	
Number of fixed handwashing devices (among those who have fixed handwashing device)						
1	46%	88%	**0.00**	87%	88%	0.99
2	54%	12%		13%	12%	
	N = 404	**N = 272**		**N = 477**	**N = 151**	
Number of mobile washing devices (among those who have mobile handwashing device)						
1	84%	83%	0.99	98%	99%	0.99
2	16%	17%		2%	1%	
	N = 466	**N = 400**		**N = 485**	**N = 159**	
Location of handwashing device (any type)						
Yard	53%	3%	**0.02**	77%	38%	**0.01**
Kitchen *(at or within 5 m)*	36%	38%		19%	28%	
Toilet	6%	20%		1%	4%	
Elsewhere	4%	29%		4%	29%	

Table 11: Functionality of handwashing device commonly used by study participants

Location	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 466	N = 400		N = 485	N = 159	
No supplies	36%	19%	**0.03**	62%	33%	**0.00**
Water only	13%	19%		8%	13%	
Cleansing agent only	5%	4%		17%	21%	
Both water and cleansing agent	45%	58%		14%	33%	

Table 12: Determinants of existence of handwashing device

Access to latrine	Options	Rongo (Intervention)				Migori (Comparison)			
		p	Exp(ß)	95% IC (Exp ß)		p	Exp(ß)	95% IC (Exp ß)	
				Inf	Sup			Inf	Sup
SES									
Baseline	Poorest	Reference				Reference			
	Poor	**.00**	1.92	1.35	2.73	**.01**	1.51	1.12	2.05
	Rich	**.00**	3.41	2.46	4.74	.24	1.20	.88	1.63
	Richest	**.00**	2.22	1.59	3.10	**.04**	1.40	1.01	1.94
Endline	Poorest	Reference				Reference			
	Poor	**.00**	2.82	1.99	3.98	**.00**	.33	.23	.47
	Rich	**.00**	3.14	2.23	4.43	**.00**	.25	.17	.36
	Richest	**.00**	3.59	2.43	5.32	**.00**	.28	.19	.39
Age									
Baseline	18 to 24	Reference				Reference			
	25 to 34	**.00**	1.99	1.50	2.63	**.01**	1.44	1.10	1.89
	35 to 44	**.01**	1.81	1.24	2.64	**.00**	2.13	1.39	3.24
	45 to 54	**.00**	4.00	2.00	7.99	**.01**	2.05	1.19	3.55
	55 and above	**.00**	2.72	1.81	4.08	.11	1.35	.93	1.95
Endline	25 to 34	Reference				Reference			
	35 to 44	**.00**	**3.57**	2.48	5.14	**.00**	.34	.25	.46
	45 to 54	**.01**	1.81	1.23	2.64	**.00**	.27	.17	.42
	55 and above	**.00**	2.63	1.64	4.20	**.01**	.44	.25	.80
	25 to 34	**.00**	2.63	1.78	3.88	**.00**	.23	.12	.43
Existence of chronically ill member at home									
Baseline	No	Reference				Reference			
	Yes	**.01**	2.75	1.22	6.18	1.00	1.00	.43	2.31
Endline	No	Reference				Reference			
	Yes	**.01**	**3.09**	1.57	6.10	**.01**	.29	.14	.65
Existence of senior at home									
Baseline	No	Reference				Reference			
	Yes	**.00**	2.23	1.56	3.18	**.04**	1.41	1.02	1.95
Endline	No	Reference				Reference			
	Yes	**.00**	2.70	1.88	3.88	**.00**	.29	.18	.47
Existence of under 5 children at home									
Baseline	No	Reference				Reference			
	Yes	**.00**	2.43	2.02	2.93	**.00**	1.52	1.28	1.79
Endline	No	Reference				Reference			
	Yes	**.00**	2.77	2.29	3.34	**.00**	.31	.25	.37
Attend school									
Baseline	No	Reference				Reference			
	Yes	**.00**	2.35	1.96	2.80	**.00**	1.54	1.31	1.81
Endline	No	Reference				Reference			
	Yes	**.00**	2.77	2.29	3.34	**.00**	.31	.25	.37

Table 13: Exposure variables as determinants of existence of handwashing device

Access to latrine	Options	Rongo (Intervention)				Migori (Comparison)			
		p	Exp(ß)	95% IC (Exp ß)		p	Exp(ß)	95% IC (Exp ß)	
				Inf	Sup			Inf	Sup
Exposed to information on sanitation in the last past month									
Baseline	No	Reference				Reference			
	Yes	**.00**	2.22	1.77	2.77	**.00**	1.95	1.55	2.47
Endline	No	Reference				Reference			
	Yes	**.00**	2.41	1.78	3.26	**.00**	.26	.18	.35

Water

Table 14: Drinking water source and treatment households

Drinking water source and treatment	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Source						
Improved water source	19%	25%	0.35	19%	34%	**0.02**
Treatment used (multiple answers)						
None	53%	10%	**0.00**	53%	20%	**0.00**
Boiling	20%	21%	0.89	18%	15%	0.85
Chlorination	22%	76%	**0.00**	21%	66%	**0.04**
Filtration	5%	7%	0.89	8%	9%	0.27
Other than solar disinfection	6%	9%	0.32	7%	16%	**0.04**

Table 15: Reported reasons for treating drinking water among water treatment users

Reasons for treating drinking water	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 312	N = 605		N = 314	N = 531	
Does not trust water	36%	16%	**0.00**	62%	43%	0.89
Habit	18%	6%	**0.03**	20%	6%	**0.02**
Received training/information	26%	34%	**0.04**	9%	17%	**0.01**
I had supplies	1%	15%	**0.00**	0%	9%	0.41
Somebody currently ill in family	2%	2%	---	2%	2%	---
Other reasons	18%	11%	0.45	7%	4%	0.99
Combination of different reasons		28%	---		19%	---

Table 16: Storage of water among water treaters

Storage practices	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 237	N = 572		N = 185	N = 392	
Closed/Covered container	98%	95%	0.99	96%	94%	0.99
Container with a tight-fitting lid	72%	43%	**0.00**	59%	52%	0.95
Container with spigot	12%	1%	**0.02**	3%	1%	0.99
Container kept out of reach of animals	92%	82%	**0.03**	78%	69%	0.93

Exposure to Program Activities

Table 17: Primary caregivers exposed to and their sources of information on diarrhea in the past one month

Information on diarrhea in the past one month	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Exposure to information on diarrhea						
Information on diarrhea heard and seen	6%	53%	**0.00**	14%	54%	**0.00**

Table 18: Primary caregivers exposed to and their sources of information on sanitation in the past one month

Information on sanitation in the past one month	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Exposure to information on sanitation						
Information on sanitation heard and seen	61%	62%	0.99	37%	58%	**0.00**
Sources of information on sanitation *(among respondents exposed to information on sanitation)*						
	N = 400	**N = 414**		**N = 243**	**N = 386**	
Health center	10%	25%	**0.01**	16%	18%	0.99
Village health educator	79%	66%	**0.02**	30%	31%	0.99
Chief public meeting	4%	11%	0.23	1%	13%	**0.02**
School children	1%	7%	0.36	2%	0%	.99
Radio	8%	36%	**0.00**	37%	62%	**0.00**
Other sources	6%	4%	0.95	23%	5%	**0.00**

Table 19: Households reached with community activities on open defecation

Stop open defecation activities	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Households whose village participated in community activity to stop open defecation	29%	79%	**0.00**	29%	53%	**0.00**
Households ever visited by a community health educator to stop open defecation	64%	78%	**0.03**	34%	33%	0.92

Table 20: Primary caregivers exposed to and their sources of information on handwashing in the past one month

Information on handwashing in the past one month	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Exposure to information on handwashing						
Information on handwashing heard and seen	46%	47%	0.99	30%	43%	**0.02**
Sources of information on handwashing *(among respondents exposed to information on handwashing)*						
	N = 304	**N = 316**		**N = 201**	**N = 288**	
Health center	12%	27%	**0.02**	17%	21%	0.96
Village health educator	79%	56%	**0.01**	23%	23%	1.00
Chief public meeting	3%	5%	0.99	2%	5%	0.99
School children	2%	7%	0.83	4%	1%	0.99
Radio	7%	37%	**0.00**	40%	75%	**0.00**
Other sources	10%	5%	0.87	25%	7%	**0.00**

Table 21: Primary caregivers exposed to and their sources of information on water treatment in the past one month

Information on water treatment in the past one month	Rongo (Intervention)		Test Kolmogorov p (value)	Migori (Comparison)		Test Kolmogorov p (value)
	Baseline	Endline		Baseline	Endline	
	N = 661	N = 671		N = 663	N = 666	
Exposure to information on water treatment						
Information on water treatment heard and seen	59%	64%	0.36	38%	65%	**0.00**
Sources of information on water treatment *(among respondents exposed to information on water treatment)*						
	N = 392	**N = 432**		**N = 254**	**N = 432**	
Health center	16%	28%	**0.01**	19%	23%	0.84
Village health educator	74%	67%	0.22	27%	33%	0.72
Chief public meeting	1%	5%	0.95	1%	7%	0.49
School children	0%	5%	0.66	1%	0%	0.99
Radio	13%	31%	**0.00**	45%	59%	**0.03**
Other sources	7%	3%	0.82	18%	6%	**0.04**