



Mali Baseline–Endline Comparisons

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ABOUT WASHPLUS

The WASHplus project supports healthy households and communities by creating and delivering interventions that lead to improvements in WASH and household air pollution (HAP). This multi-year project (2010-2016), funded through USAID's Bureau for Global Health and led by FHI 360 in partnership with CARE and Winrock International, uses at-scale programming approaches to reduce diarrheal diseases and acute respiratory infections, the two top killers of children under age 5 globally.

RECOMMENDED CITATION

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
BACKGROUND	1
WASHPLUS PROJECT OVERVIEW	2
Brief Description of the WASHplus Intervention.....	2
Indicators Tracked	3
METHODOLOGY	4
Design	4
Data Collection Methods	4
Study Population and Sampling.....	4
NARRATIVE OF MAJOR FINDINGS	6
MAJOR TABULAR COMPARISONS	8
CONCLUSION	9

EXECUTIVE SUMMARY

This report presents the major baseline–endline comparisons for a study conducted by the WASHplus project in Mopti Province, Mali. Enumerators collected baseline data December 2012–January 2013, and endline data December 2015–January 2016. The background section of the report discusses the importance of water, sanitation, and hygiene (WASH) interventions in Mali, the USAID response to the existing needs, the methodology used for both waves of data collection, and major findings. Following the narrative, a tabular section presents the major findings.

BACKGROUND

Diarrhea is a leading causes of child mortality in Mali, after malaria and pneumonia, accounting for approximately 20 percent of child deaths. The World Health Organization (WHO) estimates that 88 percent of diarrhea cases occur because of unsafe water, lack of sanitation, and poor hygiene behaviors, and is thus preventable with established WASH interventions.

Inadequate hygiene- and inadequate nutrition-related behaviors also contribute to child undernutrition. These damaging behaviors result from a range of factors—insufficient information on appropriate hygiene and nutrition practices along with poverty, lack of key critical supplies and services, and cultural practices and social norms, such as extended family dynamics and unequal gender relations, which affect family food allocation.

In addition to mortality, undernutrition stunts the physical and mental growth of children, with lifelong effects of lost potential. Improvements in access to and use of water and sanitation infrastructure, as well as improved hygiene behaviors at the household level, can have direct improvements in other key development domains, including nutrition, education, environment, economic growth, and governance. The WHO estimates that each dollar invested in sanitation results in \$9 of benefits, including greater productivity and fewer costs incurred from treating diarrhea.¹

The national policy framework in Mali encompasses the National Sanitation Policy passed in 2009, which includes both sanitation and drinking water quality. In addition, in 2010, Mali’s Ministry of Health released a National Hygiene Behavior Change Strategy to reduce diarrheal disease through a range of mechanisms, including social mobilization, behavior change communication, public-private partnerships, and advocacy. The key hygiene practices promoted are: handwashing, use of basic sanitation and household water treatment, and safe storage of drinking water.

¹ Hutton G, L. Haller, and J. Bartram. 2007. Economic and health effects of increasing coverage of low cost household drinking-water supply and sanitation interventions to countries off-track to meet MDG target 10. Background document to the “Human Development Report 2006.” New York and Geneva: United Nations Development Program and World Health Organization.

WASHPLUS PROJECT OVERVIEW

USAID/Washington’s centrally managed WASHplus project, led by FHI 360 with CARE USA as a core partner, was designed to create and support interventions that lead to WASH improvements, and explore and promote innovation in the WASH sector, including integrating WASH into related sectors like nutrition.

Through the WASHplus project, USAID/Mali funded activities to increase WASH access in selected sites where CARE has implemented the Keneya Ciwara II (PKC-II) project and other WASH and food security initiatives. WASHplus was implemented in three districts of the Mopti region (Mopti, Bandiagara, and Bankass), USAID priority areas for both Feed the Future and the Global Health Initiative. The communes selected for the WASHplus intervention were new ones that had not yet received community-led total sanitation (CLTS) training and where the CLTS-plus (+) approach was introduced. CLTS+ in this context refers to integrating WASH and nutrition programmatic components and adding innovative sanitation solutions that were appropriate for the soil characteristics in Mopti households. FHI 360 provided funds to CARE to implement this activity in Mopti. The intervention and its evaluation were designed jointly between FHI 360 and CARE. Program implementation and monitoring and evaluation activities, however, resided exclusively with CARE.

The overall goal of the WASHplus program linked directly to two of CARE Mali’s four long-term programs, the Health and Governance program and the Food Security and Climate Change Adaptation program, allowing lessons, technologies, and mechanisms to flow across impact groups and target areas and taking advantage of shared senior management across complementary projects. Both programs strived (broadly) for women’s equal opportunity, participation, and status, with the former focused on achieving positive health outcomes for women of reproductive age and the latter striving for their ability to gain and maintain food and nutritional security for themselves, their children, and their families.

Brief Description of the WASHplus Intervention

WASHplus approaches built on the existing networks and activities of Keneya Ciwara II and other CARE WASH and nutrition programs—notably school WASH interventions funded by Dubai Cares and private sector engagement through the USAID WA-WASH program—and linked with other actors in promoting improved sanitation and key hygiene behaviors, working through multiple channels in the community.

The project focused on reaching a population of 187,000 women—of reproductive age and with an income of less than \$1.25 per day (per capita)—and approximately 60,000 of their children, aged 0–23 months.

Focusing on poor, rural households in Mali’s three northern districts (Mopti, Bandiagara, and Bankass), WASHplus worked to improve the nutritional status of children under 2 years old in 180 villages. The project emphasized improving nutrition and hygiene practices through a range of behavior change approaches, including CLTS, and identified and referred

undernourished children to community health/nutrition centers for treatment. One hundred forty-six (81%) of intervention villages triggered by WASHplus were certified open defecation free (ODF). Within these communities, over 10,000 latrines were constructed, rehabilitated, or upgraded, and more than 15,000 new handwashing stations were added. WASHplus trained 400 community volunteers and extension workers to negotiate small doable actions to improve WASH and nutrition practices at the household level. As an incentive, communities reaching ODF status were eligible to receive a new water point or have an existing one rehabilitated. Villages competed to develop improved tippy tap designs, and many water user groups developed strategies to maintain and repair water points. Activities included CLTS triggering; cooking, breastfeeding, and water treatment demonstrations in the community and at health centers; and household visits promoting exclusive breastfeeding, handwashing with soap, and nutrition counseling and referrals.

USAID/Mali wished to integrate WASH and nutrition and requested that WASHplus track two indicators at the endline related to WASHplus-supported activities. These indicators track the prevalence of exclusive breastfeeding among children up to 6 months, and prevalence of an acceptable minimum diet among children 7–23 months. Both of these measures may be considered as confounders of self-reported diarrheal disease during the two weeks prior to the survey, a health outcome that WASHplus was also expected to track. All three indicators are Food for Peace indicators.

Indicators Tracked

The following table lists the household-level indicators tracked by the study:

Table 1 – Breakdown of Indicators by Domain

Domain	Indicators
Health	% of households with children under 2 with reported diarrheal disease in the two weeks prior to the survey among this age group
Water	% of households with children under 2 that have access to an improved drinking water source ²
Sanitation	% of households with children under 2 using hygienic latrine facilities
	% of households of children under 2 that practice safe disposal of child feces
Hygiene	% of households with children under 2 that are equipped with a functional handwashing device/station near the latrine
	% of households with children under 2 with a functional handwashing device/station at or near the area for preparing complementary foods for children undergoing weaning

² Treatment can happen at the source and also at the point of use. Source refers here to the location where water is fetched whereas point of use refers usually to the home. The treatment technologies are different at the source and at the point of use. For example, boiling is available in homes but not at the source given the amount of water that needs to be distributed at the source. If the water is treated at the source it may be contaminated as it gets transported from the source to the point of use. The literature suggests that water treatment at the point of use is more effective than treatment at the source for diarrheal disease reduction.

	% of households with children under 2 with a functional handwashing device/station commonly used by family members anywhere (else) in the household
	% of households that treat drinking water according to the suggested methods (e.g. chlorine or Aquatabs)
	% of households that practice safe storage of treated drinking water
Nutrition	% of children up to 6 months being exclusively breastfed
	% of children 7–23 months receiving a minimum acceptable diet

METHODOLOGY

Study Setting

The study was conducted in the Mopti region, located in northern Mali, with an estimated population of 1.5 million habitants. The region is divided into 10 districts known as *cercles*, with six subdistricts known as *communes*. The region is arid but has a large surface water network and a chain of small lakes dominated by the Niger River, which has several tributaries. The WASHplus program was implemented in only three districts and only in 20 communes within these districts.

Design

This was a cross-sectional study using a pre-post design with an intervention and a comparison group. The intervention occurred in a 180 villages in the three targeted districts. In those same districts, numerous villages received no intervention, and comparison villages were selected from this subset. The selection of comparison villages from the same subdistricts kept ethnic and socio-demographic variables (e.g., family composition, family size, residence patterns) comparable in the intervention and comparison study groups. The methodology described here applies to surveys conducted prior to implementing project activities on the ground in target areas and toward the end of the intervention in the two different study groups.

Data Collection Methods

The study used a household survey that contained questions about household characteristics, access to water and sanitation, handwashing practices, and exposure to programs promoting WASH improvements.

Study Population and Sampling

The study population is primary caretakers of children under 2 that are at least 18 years old. In the rural areas in Mali where the study was conducted, this role is mainly played by the mother of the child of interest. Primary caretakers are responsible for addressing WASH issues within the household. They are also responsible for preparing food for the children, feeding the children, and managing children's diarrhoea.

Male heads of households were asked to grant permission to conduct the interview. The team expected few refusals as CARE/Mali was well respected in the region given its multiple-year presence in targeted districts and the fact that village leaders were informed of the WASH activities to be implemented and the survey to be done. Enumerators identified themselves as being affiliated with CARE/Mali.

In northern Mali, families may live in a compound. A compound is described as a series of independent constructions that may be inside a dividing wall or fence. A family is generally a group of individuals connected or not by blood ties that live under the authority of an individual recognized as the family head. A family may include a man, his wife or wives if he practices polygamy, and their unmarried children. WASHplus interviewed only one family per compound, which was selected at random. For nutritional outcome purposes, the project selected a child under 2 that lived with that family. If there was more than one child, the older of the two was selected.

This study required a sample of 1,720 households for the baseline and 1,600 households for the endline, with the number of households equally distributed in both study groups. This quota required interviewing 20 households in a total of 43 clusters per study group for the baseline, and 20 households in 40 clusters each in the intervention and the comparison group at the endline. For this study, a cluster was a village. Based on baseline results, the sample size calculation at the endline assumed an increase in sanitation from 45 percent to 65 percent between the baseline and the endline, a design effect of 2, and a two-sided significance level of 5. The sample size calculation was obtained using C-Survey.

This study had multiple purposes, but the primary one was to detect the change in sanitation coverage over time. The need to track exclusive breastfeeding for children under 6 months and the administration of a minimum acceptable diet to 7–23 month olds created some sampling challenges. If the age of children in the sample was distributed equally among the four semesters that make up two years, we expected to have 200 children per survey up to 6 months old and 600 children 7–23 months old. We had wider confidence intervals for those age cohorts and for the distribution of nutrition-related practices.

The sample was selected following a three-stage cluster sampling approach. There was a random selection of villages, households, and families within household compounds. Mapping occurred prior to the final selection of households in each village. This exercise permitted identifying compounds and households within compounds with at least one child under 2. Random selection from the map of eligible households was done using a random numbers table.

There was proportional sample allocation. Cluster selection reflects the population distribution in the targeted districts. Based on census figures the study team assumed that 947,000 residents lived in the three districts where WASHplus operated in the targeted region. Of those, 39 percent lived in the Mopti District, 33 percent in Bandiagara, and 28 percent in Bankass. Consequently, 12 clusters were drawn from Mopti, 10 clusters were drawn from Bandiagara, and eight clusters were drawn from Bankass. Adjustments were made to this estimate as large villages were divided into two segments, each one

constituting a cluster, before first stage sample selection. For example, any randomly selected village with over 1,000 households was broken down into two halves tracing a vertical line going from north to south and each half constituted a cluster. The segments of larger villages were in the sampling framework for random selection as separate clusters.

The comparison villages were also selected in the Mopti region, but in different subdistricts within the districts of Mopti, Bandiagara, and Bankass. Not all subdistricts in those communes were targeted by the intervention. The selection procedures in the comparison areas were the same as outlined above for the intervention areas.

Subdistricts were randomly selected as were villages within those subdistricts. The study outlined a sample framework in selected villages to help identify compounds with children under 2 years of age. In the sample framework, all eligible households within one compound were listed separately. In the baseline and the endline, the sampling framework at the village level was developed in advance with the assistance of both the village chief and the local community health worker(s) who knew the households. Village chiefs keep a record of how many families live in a given village and they record the number of adults and children per household. Village health workers identified which households on that list had children that meet the eligibility criteria. The village health workers visit households regularly and are familiar with the composition of family households. This procedure was applied during both measurement waves.

The beginning of the questionnaire had a screening section to verify the information used to select the sample. If selected study participants were not available for interview during the initial household visit, the enumerator established an appointment for a follow-up visit. If the potential study participant was absent during an initial visit, there were two revisit attempts before dropping the case and replacing it with another household. Both in the intervention and the comparison study groups, the final list of selected households contained a 5 percent replacement quota per village.

NARRATIVE OF MAJOR FINDINGS

- In Mali, WASHplus observed a significant drop in reported diarrheal disease among children under 2 during the two weeks prior to the survey in the intervention group, with no comparable reduction in the comparison group. We observed a 7.2 percent drop in reported diarrhea among children under 2 years of age between baseline and endline in intervention households and only a 3.5 percent drop in comparison households. The first drop is statistically significant, while the second is not. The data in Table 2 below show the difference in difference is 3.7 percent.
- In the intervention area changes in the expected direction were noted in all the sanitation indicators tracked: increase in the reported disposal of child feces in latrines, decrease in the practice of open defecation, and increase in access to improved latrines. Enumerators observed latrine characteristics to determine whether they were improved. Similar changes exist in the comparison group, but the differences observed in the intervention

group are larger or steeper. For example, the increase in hygienic disposal of child feces was larger in the intervention areas (62 points) compared to comparison areas (25 points). Regarding open defecation, the drop in intervention households from baseline to endline was 47 points and only 31 points in the comparison areas. Further, the percentage of households with access to improved sanitation increased practically 39 points from 18.4 percent to 57.5 percent in intervention areas and almost 15 points in comparison areas from 16.9 percent to 31.8 percent. The difference in difference presented in the table below shows net gains are 36.4 percent in the case of child feces management, 15.9 percent in the case of abandoning open defecation, and 24.2 percent regarding access to improved sanitation.

- Regarding hygiene practices, increases from baseline to endline also tended to be larger in intervention areas than in comparison areas. In intervention areas the use of chlorine (liquid or Aquatabs) to treat drinking water increased 27 percent compared to 2.3 percent in comparison areas. These water treatment changes in the intervention were statistically significant, which was not the case in the comparison area.
- Improvement in knowledge about drinking water treatment was equally statistically significant in the intervention and in the comparison areas.
- The increase of at least one functional handwashing device with needed supplies jumped over 14 points in intervention areas compared to only 9 points in comparison areas when comparing baseline to endline values. The net gain is 5.6 percent per the difference in difference estimate in the table below. Parenthetically, WASHplus opted to present data aggregating functional handwashing devices across locations as no differences between locations were observed between study groups.
- Despite these differences, similar increases were found in nutritional practices among intervention and comparison areas, with changes being statistically significant in both. This is true both for exclusive breastfeeding as well as for adoption of a minimum acceptable diet for children 7–23 months of age. That is, exclusive breastfeeding among children under 6 months increased from 6.2 percent to 32.9 percent between the baseline and the endline in the intervention area, and from 9.3 percent to 27.3 percent during the same period in the comparison area. By the same token, feeding 7–23 month old children a minimum acceptable diet increased from 26.4 percent to 66.3 percent in intervention households and 30.9 percent to 61.3 percent in comparison areas. The increases were statistically significant in both study groups. Per the difference in difference estimate in the table below, the net increase is 6.5 percent for exclusive breastfeeding and 8.7 percent for the minimum acceptable diet.

MAJOR TABULAR COMPARISONS

Table 2. Comparison of Indicators in Intervention Areas from Baseline and Endline Surveys

Indicator	Intervention			Comparison			Differences in intervention group minus difference in comparison group (difference in difference estimate)
	Baseline N = 860	Endline N = 800	p value (Kolmogorov)	Baseline N = 860	Endline N = 800	p value (Kolmogorov)	
Health							
% of households with children under 2 who had diarrhea in the two weeks before the study	34.5%	27.3%	0.03	33.6%	30.1%	0.62	3.7%
Sanitation							
% of mothers who disposed of their children's feces in latrines	21.6%	83.5%	0.00	28.0%	53.5%	0.00	36.4%
% of households that defecated in the open	53.0%	5.9%	0.00	58.1%	26.9%	0.00	15.9%
% of households with improved sanitation	18.4%	57.5%	0.00	16.9%	31.8%	0.00	24.2%
% of mothers who used a potty	43.8%	84.6%	0.00	44.1%	67.0%	0.00	17.9%
Water							
% of households that did not know that water should be treated	18.4% (N = 860)	3.6% (N = 800)	0.00	21.3% (N = 860)	7.8% (N = 800)	0.02	1.3%
% of households that did not know that water should be treated among those who did not treat	33.8% (n = 468)	11.9% (n = 244)	0.00	37.3% (n = 490)	16.0% (n = 388)	0.01	0.6%
% of households that used solid chlorine (Aquatabs) to treat drinking water at home	4.9%	7.8%	0.00	4.8%	2.1%	0.94	(5.6%) ³
% of households that used liquid chlorine to treat drinking water at home	15.2%	36.4%	0.00	13.1%	15.1%	0.97	19.2%
% of households that used	17.2%	44.1%	0.00	15.0%	17.3%	0.86	24.6%

³ Changes not in the same direction, increasing in the case of the intervention households and decreasing in the case of the comparison households.

liquid and/or solid chlorine (Aquatabs and/or chlorine)							
% of households that used jerry cans to transport drinking water	25.3%	31.1%	0.00	19.6%	23.7%	0.14	1.7%
% of households that practiced good drinking water conservation (water container closed with well-fitted lid, and out of reach of children and animals)	25.7%	43.5%	0.01	26.6%	34.5%	0.01	9.9%
Handwashing							
% of households with functional handwashing device	13.6% (N = 860)	35.5% (N = 800)	0.00	16.0% (N = 860)	35.9% (N = 800)	0.00	2%
% of households with functional handwashing device among those who have at least one device	21.1% (n = 555)	35.6% (n = 797)	0.04	27.1% (n = 510)	36.0% (n = 797)	0.17	5.6%
Nutrition	n = 435	n = 207		n = 428	n = 222		
% of children 6–23 months who received a minimum acceptable diet	6.2%	32.9%	0.00	9.3%	27.3%	0.00	8.7%
% of children under 6 months who were exclusively breastfed	26.4%	63.3%	0.00	30.9%	61.3%	0.00	6.5%

CONCLUSION

Mali is one country where WASHplus implemented activities that showed changes in the right direction for most of the indicators tracked. The changes observed were often larger and/or steeper than those that may have occurred in the comparison area especially pertaining to sanitation and handwashing. No changes in intervention and comparison areas were found in recommended practices regarding water treatment.

Spillover effects from the intervention to the comparison areas was possible given that villages in the two study groups were in same districts even though not adjacent or not necessarily in close proximity. But exposure data to WASH promotion, action and/or information was not fully absent in the comparison areas. For example, even though 93 percent of households reported that the village chief was highly involved in improving village sanitation since December 2013, when WASHplus activities started in the region, 60 percent reported the same in comparison households ($p < .00$).

Further, health centers and outreach works were information sources for particulars pertaining to child feeding, handwashing, and water treatment. This is true, even though access to the type of information mentioned is significantly higher in intervention households. Yet, it is possible that village members may have visited the same health

facilities and were exposed to similar information. Concerning hygiene, it is important to note that Ebola hit West Africa when the WASHplus intervention was being implemented and government sources may have promoted similar hygiene information throughout the region through existing channels. Thus, 26 percent of intervention households and 30 percent of comparison households did indicate that they had received information about Ebola from health centers. Even though the percent is higher in the comparison area, the difference is not statistically significant, showing that the Ebola information was being communicated equally to intervention and control areas and could have implications for access to hygiene practices.