

## DSW Baseline Data Report

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This document reviews and outlines the baseline data available for the Dispensers for Safe Water (DSW) programs in Kenya, Malawi, and Uganda collected between 2012 and 2015. Additionally, this document provides a description of the data's completeness and representativeness in regards to the population served by DSW as of August 2021.

This document was prepared by the MLE Strategy team and an external consultant, Philip Kahuho, a previous Evidence Action employee. We developed this document by reviewing documentation and data sets saved in Box, as well as Philip's email communication regarding baseline data between 2014 and 2019. To the extent that is possible, we tried to verify this information with documentation, but please note that institutional knowledge was applied to reconstruct the description of baseline data collection activities. If there are gaps in our knowledge, we specify what is not known or uncertainties.

### Background

When Evidence Action initially registered Kenyan dispensers at the start of the program in 2012 the dispensers were registered with the carbon voluntary market. The voluntary market required pre- and post-installation household data collection. As a part of the pre-installation data collection, referred to as baseline data collection in this report, we collected information on water treatment methods as well as tested drinking water for chlorine presence.

In 2016, Evidence Action decided to transfer all dispensers (as well as future dispensers) to the compliance market, which no longer required pre-installation data collection. As a result, we stopped collecting household baseline data for the program, and baseline data on water treatment is only available up until 2015.<sup>1</sup>

### Objectives + key indicators

DSW baseline data collection was completed for carbon crediting purposes. Therefore, the objectives, indicators, and the design of baseline DSW data collection are largely influenced by carbon market registration requirements. Unfortunately, we were unable to locate any documents that specify these registration requirements for the voluntary market, but we believe the internal key indicators for the baseline data collection were as follows:

- **% and # of households treating their drinking water (self-reported):** Households interviewed at baseline that provided a glass of their drinking water were asked whether they had treated their water in any way to make it safe. If they responded yes, the types of treatment were recorded. This provided an insight into various methods used by the community to treat their water before dispensers were in use.
- **% of households chlorinating their drinking water:** This is the proportion of households whose drinking water tested positive for total chlorine residual (TCR) and/or free chlorine residual (FCR) before dispensers were in use.<sup>2</sup> The methodology for which households had their drinking water tested for chlorine changed over time, and this explained in detail in the [sampling](#) section.

Important to note, we only collected data for these indicators from households that collected water from the water point that was about to get a dispenser. This was structured to ensure we are collecting data from households that will be using the dispensers.

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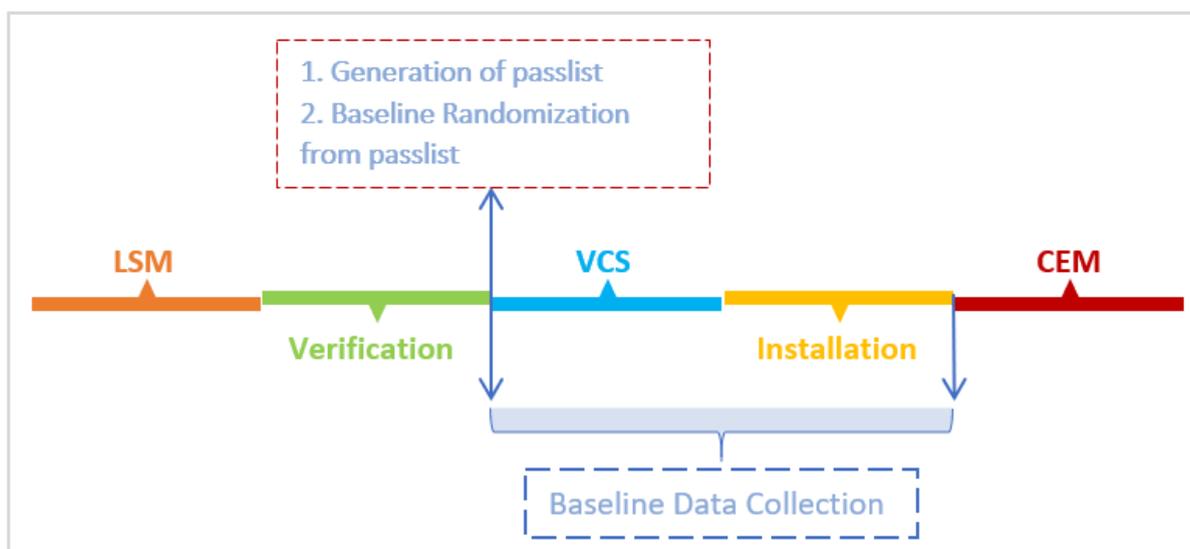
<sup>1</sup> Although we registered Malawi and Uganda dispensers in the compliance carbon market only, we still collected some baseline data for these countries because we registered the dispensers after the decision was made to move to the compliance market. Therefore, the data for these two countries isn't as robust as Kenya.

<sup>2</sup> TCR is the total amount of chlorine present in a water sample. This is the sum of the free chlorine residual and the combined available chlorine residual. FCR is the residual consisting of hypochlorite ions, hypochlorous acid, or a combination of the two. These are the most effective in killing bacteria.

## Timing of the data collection

The diagram below shows the timeline when DSW baseline data was collected in respect to other program implementation activities. As displayed, baseline data was intended to be collected after we determined which water points qualified for dispenser installation, but before the community started using the dispenser.

It is at the community engagement meeting (CEM) that the tank that holds the chlorine is put at the dispenser, and chlorine is put inside the tank. At CEM, the promoter and assistant promoters are elected, given the first stock of chlorine, and the dispenser starts operating.



\*LSM = Local Leadership Sensitization Meeting; VCS = Village Community Sensitization

In our analysis, we confirmed the data was a true baseline by merging the baseline data with data from the dispenser database, and compared the date of data collection to the CEM date for each dispenser. This procedure was used across all datasets. There were a few observations in the data collected after CEM. In these cases, we've specified how we dealt with these observations for the analysis in the individual country sections later in the report.

## Sampling

Water point and household sampling for baseline data collection was done by installation rounds, meaning a separate sample was drawn for each installation round. The sampling frame for each installation round was referred to as a "pass list," or list of water points that passed the eligibility criteria for dispenser installation.<sup>3</sup> These lists were generated by the MLE team, referred to as MLIS at the time, following verification activities conducted by the program team, which collected water point data on eligibility criteria.

Important to note is that we did not install dispensers at all water points on the "pass list." This is because additional water point information could be captured in later program activities (e.g., during village community sensitization or on installation day) that disqualify the water point for installation. Some of these reasons included:

- The landowner refuses dispenser installation after verification activities;
- The water point breaks down or is no longer functional after verification activities; or,
- The water point is in close proximity to another water point where we've installed a dispenser.

<sup>3</sup> Water point eligibility criteria for dispenser installation included: (1) water point flow rate; (2) personality of individual(s) hosting the water point; (3) primary use of the water point; (4) water turbidity; (5) seasonality of the water flow; and, (6) number of average users. DSW program leads also noted that criteria included known chlorination at the water point as well as the presence of fluorite.

As a result, there are some observations in the baseline data set from water points where we ultimately did not install a dispenser. For the purposes of this document and the [accompanying baseline analysis](#), we retained these data because (1) they were collected at a water point that did not have a dispenser present (thus qualify as baseline), (2) these water points qualified for dispenser installation, and (3) the water points appear to be in areas where dispensers are present and share characteristics with water points that have a dispenser.

### Sample size and sample selection

Two-stage cluster sampling was used for the baseline data collection, where the first stage involved a simple random selection of water points and the second stage involved selecting households clustered around the sampled water points (similar to our current sampling protocol for adoption monitoring).

Five percent of water points on the water point pass list (for each installation round) were randomly selected for the first stage. This selection was done before data collection started, using Stata and a simple random sampling technique.<sup>4</sup> Once random water points were sampled, households clustered around the water point were selected randomly in one of two ways: (1) in-office using a household list collected by the enumerator, or (2) in the community using the in-field randomization form. On average, eight households per water point were randomly sampled for baseline data collection.

### Changes to sampling methodology in 2014

In 2014, the voluntary carbon market issued updated guidance which led to Evidence Action revising the sampling methodology.<sup>5</sup> The new methodology changed the water point selection to a random sample of five percent of water points per installation round with a maximum of 15 water points per installation round. In other words, if the installation round pass list contained more than 300 water points, then only 15 water points should be selected and the five percent guidance did not apply. No changes were made to household sampling.

## Survey

The baseline survey was administered to a household member of sampled households, and used to record household water treatment practices as well as the results from testing household drinking water for the presence of chlorine.

In Kenya, there are two versions of the baseline household survey with the main differences being: (1) the types of chlorine tests conducted during the survey, and (2) the skip logic in the survey that guided which households' drinking water was tested for chlorine presence. Below is a description of the two versions:

1. **Version 1:** The first version of the survey was implemented pre-2014 in Kenya only. Only free chlorine residual (FCR) testing was conducted in this version of the survey. Additionally, the skip logic only required FCR testing in households that provided a glass of water and self-reported using Waterguard, Aquatabs, or PUR (i.e., all known chlorine products included as survey responses). Thus, any chlorine testing data collected before 2014 is not representative of the entire sample.
2. **Version 2:** Beginning in 2014, the second version of the survey included both FCR and total chlorine residual (TCR) testing for all households surveyed that provided a glass of water for testing. This aligns with the current chlorine testing protocol and our approach to measuring chlorine adoption.

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<sup>4</sup> Important to note is that there was no stratification applied during sampling as each sample selection was done separately for each installation round.

<sup>5</sup> The email "Re: Sample size for carbon baseline in new areas" mentions this change in guidance.

In Uganda and Malawi, there was only one survey used, and it collected chlorine testing data in the same manner as the second version of the Kenyan survey.

We were unable to locate any documentation on whether back check surveys were conducted on the household survey.

## Baseline Data Availability, Representativeness and Completeness

Below we provide an overview of the baseline data available, as well as comment on its representativeness and completeness. We also provide results for a few key indicators. The full analysis and descriptive statistics can be found in the [DSW Baseline Analysis](#) workbook.

For some countries, namely Uganda and Malawi, we did not collect data for all installation rounds that occurred before the 2016 decision. It is unknown why we did not collect this data, but we feel confident the data is not missing rather the data was never collected.

### Malawi

Malawi dispensers were primarily installed between 2013 and 2016 in one district, Zomba. Dispensers were installed in nine installation rounds. The installation rounds are named Zomba 1 to Zomba 9, and the installation rounds correspond with the district's seven health clusters. Zomba 1 (ZMB1), ZMB2, and ZMB3 installation rounds are all in the one health cluster, while the other installation rounds (ZMB4 to ZMB9) each occurred in separate clusters.

We only collected baseline data for one installation round, ZMB2,<sup>6</sup> located in the Likangala cluster in 2014. In total, the baseline data came from a sample of 15 water points and 117 households (approximately 7.8 households per water point) in ZMB2.

## Results

We confirmed all baseline data comes from one health cluster, Likangala, in the Zomba district, the only district where DSW has a presence. The data appears to be mostly complete and we've confirmed all data was collected before chlorine became available in the survey catchment area, except for one water point observation (i102\_wpt\_id=8010096). This observation was retained in the dataset because it was collected shortly after installation and all household TCR and FCR tests from this water point were negative.

After discussion with the Malawi program team, we understand the ZMB2 area was/is known to be a cholera hotspot, relative to other areas in the district, but is generally a good representation of our catchment areas in Zomba. We have not conducted any analysis that can confirm this representativeness at this time.

While we wouldn't typically recommend using data from such a small sample to infer program rates, we realize this is likely the only indication we have about Malawi's baseline treatment rates for our current footprint.

### Self-reported water treatment

Of the 117 households interviewed, all of them provided a glass of drinking water. A total of 116 households out of the 117 interviewed reported they did not do anything to make the water safe, while one did not know if the water had been treated or not.

### TCR/FCR Results

| Chlorination Results | TCR |        | FCR |        |
|----------------------|-----|--------|-----|--------|
|                      | #   | %      | #   | %      |
| Negative             | 116 | 99.15% | 116 | 99.15% |

<sup>6</sup> ZMB1 was a pilot installation round used to determine the feasibility of scaling the DSW program in Malawi and, as a result, no baseline data was collected.

|                 |            |             |            |             |
|-----------------|------------|-------------|------------|-------------|
| <b>Positive</b> | 1          | 0.85%       | 1          | 0.85%       |
| <b>Total</b>    | <b>117</b> | <b>100%</b> | <b>117</b> | <b>100%</b> |

## Uganda

Uganda dispensers were primarily installed between 2012 and 2016 in 8 installation rounds across 11 districts: Budaka, Butaleja, Butebo, Kibuku, Manafwa, Mbale, Namisindwa, Namutumba, Pallisa, Sironko and Tororo. The districts were distributed over the installation rounds as follows:

- The Kibuku installation rounds included both Kibuku and Budaka districts. Important to note, there were four “Kibuku” installation rounds, referred to as KBK1 through KBK4.
- The Manafwa installation round included both Manafwa and Namisindwa districts.
- The Pallisa installation round included both Pallisa and Butebo districts.
- The remaining districts were each in separate installation rounds.

We only collected baseline data for two installation rounds, Manafwa and Tororo.<sup>7</sup> The data was collected in 2013 and 2015, respectively. In total, we collected baseline data from a sample of 49 water points (roughly 5% of water points on the pass list) and 393 households in Manafwa (roughly 8 households per water point), and 10 water points and 80 households in Tororo.

## Results

We confirmed all baseline data for Uganda was located, and feel confident we only collected data for two installation rounds in three districts. The data for both Manafwa and Tororo appears complete, and we’ve confirmed all data was collected before chlorine became available in the survey catchment areas.

In Manafwa, there were four water points in the sample where we ultimately did not install dispensers. Nevertheless, we retained the observations from these water points for analysis purposes, as noted above in the [sampling](#) section.

In Tororo, there was one water point in the sample where we ultimately did not install a dispenser, and there were two other key issues with the data. First, the sample list for Tororo included 16 water points, yet we only collected data for 10. It is unclear why this occurred. Second, there appears to be an error in the survey that only allowed one sample per water point to be tested for chlorine presence. As a result, there were only 10 baseline TCR and FCR readings for the entire installation round. These issues, primarily the small sample size, made us less confident using the data from Tororo, and we subsequently made the decision to drop these observations from the Uganda baseline analysis.

After discussion with the Uganda program team, we believe Manafwa can be used as a representative program area for the Uganda DSW program, though we have not determined whether there is any analysis to confirm this representativeness. While we wouldn’t typically use data from a segment of the program population to infer program rates, we realize there aren’t other alternative baseline data sources for our footprint in Uganda and this is likely the best indication.

### Self-reported water treatment

Of the 393 households interviewed, 2 households did not use the water point. Of the remaining 391 households, 381 households provided a glass of drinking water and were asked whether they treated their drinking water, and 1 household had missing data.

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<sup>7</sup> KBK1 and KBK2 were pilot installations to determine the feasibility of scaling the DSW program in Uganda and, as a result, no baseline data was collected. We suspect this may be true for the other two phases of installations in Kibuku as well.

| Self-reported water treatment               | #          | %           |
|---|------------|-------------|
| Treated with non-chlorine methods only      | 22         | 5.64%       |
| Treated with chlorine methods only          | 11         | 2.82%       |
| Non-chlorine and chlorine treatment methods | 1          | 0.26%       |
| Treated water but treatment unknown         | 0          | 0.00%       |
| Don't know if they treated the water        | 1          | 0.26%       |
| No treatment                                | 346        | 88.72%      |
| Didn't provide a glass of drinking water    | 9          | 2.31%       |
| <b>Total</b>                                | <b>390</b> | <b>100%</b> |

## TCR/FCR Results

| Chlorination Results                     | TCR        |             | FCR        |             |
|--|------------|-------------|------------|-------------|
|  | #          | %           | #          | %           |
| Positive                                 | 6          | 1.54%       | 2          | 0.51%       |
| Negative                                 | 375        | 96.15%      | 379        | 97.18%      |
| Didn't provide a glass of drinking water | 9          | 2.31%       | 9          | 2.31%       |
| <b>Total</b>                             | <b>390</b> | <b>100%</b> | <b>390</b> | <b>100%</b> |

## Kenya

Kenya dispensers were primarily installed between 2009 and 2016 in 25 installation rounds across 9 counties: Bungoma, Busia, Homabay, Kakamega, Migori, Uasin Gishu and Trans-Nzoia. For a description of how installation rounds are spread across counties, please see the [baseline analysis workbook](#) (tab "Baseline Data Representation").

We collected baseline data for 19 out of 25 installation rounds in Kenya. Geographically, the baseline data was collected in all nine counties where dispensers are currently present, although with low representativeness in some counties. The data was collected between 2012 to 2015. In total, we collected baseline data from a sample of 304 water points and 2,551 households.

| Program:   | 2012     | 2013     | 2014     | 2015    | Total    |
|------------|----------|----------|----------|---------|----------|
| UJA        | 409 (35) | 78 (9)   |          |         | 487(44)  |
| VHG        |          | 409 (50) |          |         | 409 (50) |
| SYA        |          | 488 (56) |          |         | 488 (56) |
| KKM + KKM2 |          |          | 80 (10)  |         | 80 (10)  |
| KLF        |          |          | 100 (11) |         | 100 (11) |
| KRA        |          |          | 58 (7)   |         | 58 (7)   |
| LGR        |          |          | 197 (25) |         | 197 (25) |
| MGR        |          |          | 74 (10)  |         | 74 (10)  |
| RNG        |          |          | 118 (18) |         | 118 (18) |
| WSB/WASH75 |          |          | 105 (13) |         | 105 (13) |
| BSA2       |          |          | 72 (9)   |         | 72 (9)   |
| BSA3       |          |          |          | 78 (10) | 78 (10)  |
| AMG        |          |          |          | 78 (10) | 78 (10)  |
| BGM2       |          |          |          | 78 (10) | 78 (10)  |
| TNZ2       |          |          |          | 28 (5)  | 28 (5)   |
| TNZ3       |          |          |          | 49 (7)  | 49 (7)   |

|              |  |  |  |        |                    |
|--------------|--|--|--|--------|--------------------|
| UGS + UGS5   |  |  |  | 52 (9) | 52 (9)             |
| <b>Total</b> |  |  |  |        | <b>2,551 (304)</b> |

Note: Baseline data for installation rounds KKM + KKM2 and UGS + UGS5 were collected together in the same sample.

## Results

We confirmed all baseline data for Kenya was located, and the data appears mostly complete. Most data was collected before chlorine dispensers were in use in the survey catchment areas, with the following exceptions:

- One each in the Busia (BSA) installation round (10500082), the Rongai (RNG) installation round (10310170), the Ugunja (UJA) installation round (1021001), and the Kakamega (KKM) installation round (10350146), and two in the WSB/WASH installation round (10530250 and 10600227). These waterpoints were dropped from the below analysis because the data was collected long after CEM.
- One each in KKM (10350491), RNG (10310437), and KRA (10320936) were done immediately after CEM (1, 3 and 7 days after CEM, respectively). These waterpoints were retained in the analysis, and only one HH tested positive for TCR.

Important to the analysis is the difference in surveys mentioned above ([household survey](#) section). Prior to 2014, the baseline household survey had a skip logic that only allowed FCR testing for households that self-reported using Waterguard, Aquatabs, or PUR (i.e., known chlorine products at the time). In 2014, the survey logic changed and allowed TCR and FCR testing for all households who provided a glass of water. Therefore, the data collected before 2014, particularly for TCR and FCR, is not representative of the entire sample and we did not include it in the baseline analysis.

We also removed the data from KLF installation round from the analysis because it was pilot data for eastern Kenya where we ultimately did not install any dispensers.

All results below and in the [baseline analysis workbook](#) are for 2014-2015 data only, and comes from a total of 143 water points and 1,067 households from 15 installation rounds. For the analysis, we calculated weighted rates and averages using the number of dispensers currently installed in each respective installation round represented in the 2014-2015 sample.

### Self-reported water treatment

Of the 1,067 households targeted for the survey, 1,043 households consented and 988 households used the water point regularly. Of these 988 households, 962 households provided a glass of drinking water and were asked whether they treated their drinking water.

| Self-reported water treatment               | 2014-2015  |                |
|---|------------|----------------|
|   | #          | Weighted %     |
| Treated with non-chlorine methods only      | 124        | 13.28%         |
| Treated with chlorine methods only          | 108        | 11.90%         |
| Non-chlorine and chlorine treatment methods | 4          | 0.33%          |
| Treated water but treatment unknown         | 47         | 3.89%          |
| Don't know if they treated the water        | 7          | 0.88%          |
| No treatment                                | 672        | 67.29%         |
| Didn't provide a glass of drinking water    | 26         | 2.43%          |
| <b>Total</b>                                | <b>988</b> | <b>100.00%</b> |

## TCR/FCR Results

Of the 988 households that used the water point regularly, 962 households provided a glass of drinking water and 26 households did not. Of the 962 households that provided a glass of drinking water, we tested the water from 943 households for TCR and FCR.

Below we calculate the TCR rate using our current calculation method which includes households that didn't provide a glass of drinking water in the denominator. If we remove the 26 households that did not provide a glass of drinking water for testing and only include households whose water was tested, the TCR rate is 10.02% [CI: +/- 2.05%]. This result is provided in the [baseline analysis workbook](#).

| TCR testing results                      | 2014-2015  |                |
|--|------------|----------------|
|  | #          | Weighted %     |
| Positive                                 | 91         | 9.80%          |
| Negative                                 | 852        | 87.66%         |
| Didn't provide a glass of drinking water | 26         | 2.53%          |
| <b>Total</b>                             | <b>969</b> | <b>100.00%</b> |

Below we calculate the FCR rate using our current calculation method which includes households that didn't provide a glass of drinking water in the denominator. If we remove the 26 households that did not provide a glass of drinking water for testing and only include households whose water was tested, the FCR rate is 8.49% [CI: +/- 1.90%]. This result is provided in the [baseline analysis workbook](#).

| FCR testing results                      | 2014-2015  |                |
|--|------------|----------------|
|  | #          | Weighted %     |
| Positive                                 | 77         | 8.34%          |
| Negative                                 | 866        | 89.13%         |
| Didn't provide a glass of drinking water | 26         | 2.53%          |
| <b>Total</b>                             | <b>969</b> | <b>100.00%</b> |