WASH services in small towns

Baseline report for a quasi-randomised control trial to assess impacts of the One WaSH Plus programme

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1. Introduction

This report presents a summary of the baseline for a Quasi-randomised control trial designed to assess the impact of Water, Sanitation and Hygiene (WASH) interventions in One WaSH Plus programme intervention areas. It covers the overall study design and baseline data collection, data management and quality control procedures, and an initial analysis of the main data. Recommendations are made for further analysis and follow-up.

1.1 One WaSH Plus programme interventions

The Quasi-randomised control trial is designed to assess One WaSH Plus interventions within eight selected small towns and their surrounding satellite villages.

Small towns are considered a strategic area of intervention for several reasons including: rapid growth, limited efforts to date to improve water and sanitation services, lower institutional capacities compared to larger towns and cities, the high potential for serious disease outbreaks and negative health impacts, and their importance as centres of local business and growth.

The eight towns selected by the programme are located in four different regions: Abomsa, Sheno and Welenchiti in Oromia; Maksegnit in Amhara; Adishihu and Wukro in Tigray; and Gode and Kebridehar in Somali region.

The One WaSH Plus programme overall addresses critical gaps related to governance, private sector engagement, climate risks, equity, enabling environment for integrated WASH services delivery and human resources capacity.

Key features of One WaSH Plus interventions in the selected towns are:

- integration of a comprehensive package of multiple interventions related to water and sanitation infrastructure, services delivery and behaviour change.
- concern to address to equity challenges with special attention to the poor, women and girls.
- attention to the full-cycle of service delivery including solid and liquid waste management issues.
- inclusion of satellite villages around the main towns (generally within 8 km of the town) in the programme, through either connection to centralised piped water supply systems or separate solutions (note: satellite villages are not included in Somali region).
- innovation to test new solutions to overcome challenges and with potential for wider national uptake.

Integrated solutions to improve water, sanitation and hygiene are together expected to lead to better living conditions and health improvements in the towns and their satellite villages.

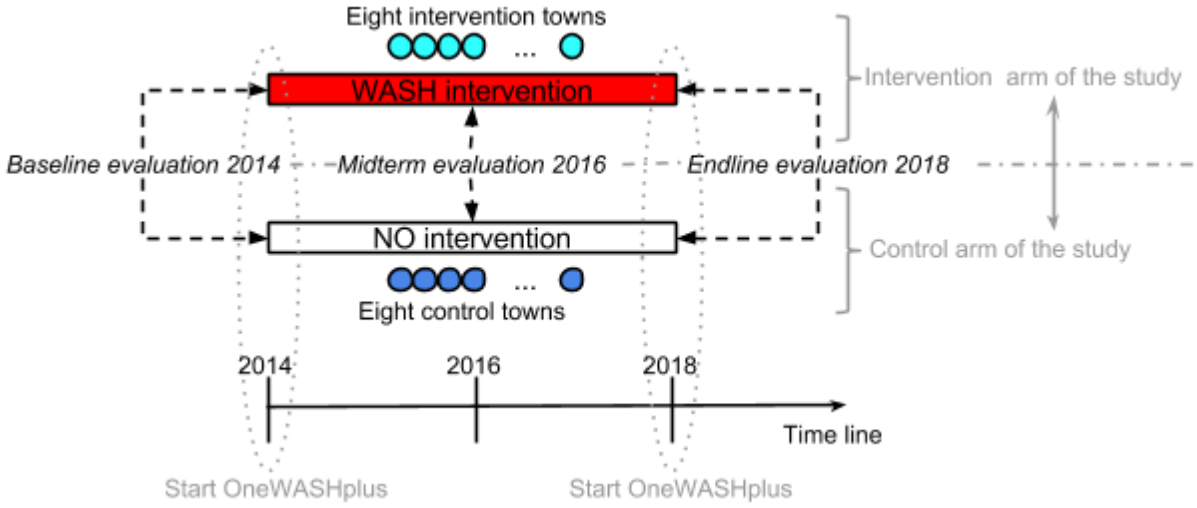
1.2 Baseline study implementation

The Quasi-randomised control trial is being implemented by the IRC/ Hoarec consortium that has been commissioned to provide independent monitoring of the One WaSH Plus programme and related knowledge management activities. These partners were supported by SRS consultants to undertake the baseline survey in Oromia and by Hogaan Research-Based Organisation in Somali region. Staff of woreda governments, municipalities and town water utilities provided vital assistance in undertaking the surveys and wherever possible were involved to promote wider use of the data collected.

2. Study design and data collection

In order to assess the impact and outcomes of the One WaSH Plus programme, a quasi-randomised control trial has been designed to include a baseline, midline and endline survey in the 8 focus towns (with interventions) and 8 further 'control' towns (without One WaSH Plus interventions). The baseline study provides insight into the current situation related to the provision of WASH services in the intervention towns and their satellite villages. The mid- and endline surveys are to be executed in 2016 and 2018 respectively to assess the progress made in the intervention towns and villages in relation to the baseline situation and against observed changes over the same period in the control towns (Figure 1).

Figure 1: Quasi-randomised control trial design with intervention and control groups



The design chosen for the study of programme impacts is a quasi-randomised control trial (RCT). A full RCT is not feasible, as the intervention areas had been selected before the design of the study and are therefore impossible to randomise. Another problem is that blinding of the intervention is difficult, but the study processes ensure blinding of intervention and control groups for the analysis.

The design should not be confused with a longitudinal study. Longitudinal surveys are correlational research studies that involve repeated observations of the same variables over long periods of time. They aim at understanding the reason of an effect rather than, as in this case, measuring if there is an attributable effect. Longitudinal studies span often many decades and often are observational studies. We will not follow up individual households over a long period and neither will we do many repeat visits. There will only be a three data collection moments.

2.1 Research questions

The Quasi-RCT is mainly designed to answers questions related to the impact and the overall outcomes of the One WaSH Plus project. The baseline study intends to answer the following questions:

What is the current status related diarrhoeal disease occurrence and time spending on collecting water in the intervention and control towns?

- Prevalence of diarrhoeal disease
- Prevalence of diarrhoeal disease in boys and girls under 5
- Average time taken by different people (especially women and girls) to collect water

What is the current status of water service provision in the intervention and control towns?

- Number and types of systems in towns and satellite villages
- Number of household connections, water point connections (public water points), institutional connections and commercial connections
- Functionality rate and service level of different systems, including:
  - Number of days service provided (days/year)
  - Number of hours service provided (average number of hours service on days system functioning)
  - % of sources with low risk water quality (E. coli) at source and point of collection
  - % of improved water sources that pass the sanitary inspection
  - Non-revenue water for area served by piped water supplies (NRW) (%)
- % of (vulnerable) households with access to adequate water services, including
  - % of (vulnerable) households with access to an improved water source
  - % of (vulnerable) households with access to an improved water source within 500m (urban) and 1500 m (rural)
  - Number of people with main access through household connections
  - Number of people in urban areas with main access through water points and kiosks, within and outside 500 m of home
  - Number of people in rural areas with access within and outside 1500 m of home
- User satisfaction with WASH services by different user groups (including the most vulnerable people)

What is the current status of sanitation and hygiene services and practices at household and community level in the intervention and control towns?

- Number of (vulnerable) people with access to sanitation services
  - % of people with access to at least latrine facilities
  - Number and % of households with household latrines, with and without hand washing facilities
  - % of people using improved sanitation facilities
- % of people practicing open defecation and number of ODF villages
- % of people that practise hand washing with soap at critical moments
- Number of towns with solid waste management systems in place (including facilities for sorting and recycling of solid waste)
- Number of towns with liquid waste management systems in place
- Number of health facilities with a process for handling and disposing of health waste

What is the current status of institutional sanitation and hygiene services and practices?

- School enrolment and attendance by boys and girls
- Number and % of institutional (schools, health facilities, prisons, public latrines etc) with (adequate, inclusive and sustainable) latrines
- Number and % of public institutions (schools, health facilities, prisons, etc) declared ODF
- Number and % of schools with adequate facilities for menstrual health management

The midline and endline surveys will ask similar questions, focussing on change and progress made related to these issues.

Data collected through the Quasi-RCT will also provide data for action research around specific interventions and innovations.

2.2 Data collection tools

In order to collect the data required to answer the above mentioned questions, seven surveys were developed (see Table 1).

Table 1: Data collection surveys

Survey	Data
• Urban piped water system survey • Urban water source survey (sources supplying the urban piped water systems) • Water points survey • Water quality	On water supply infrastructure, functionality and services provided
• Household survey	On level of water and sanitation services accessed, hygiene and sanitation practices, user satisfaction and health impacts
• Institutional WASH survey	On the level of water and sanitation services provided by public institutions hygiene and sanitation practices by these institutions
• Waste collector survey	On solid and liquid waste management

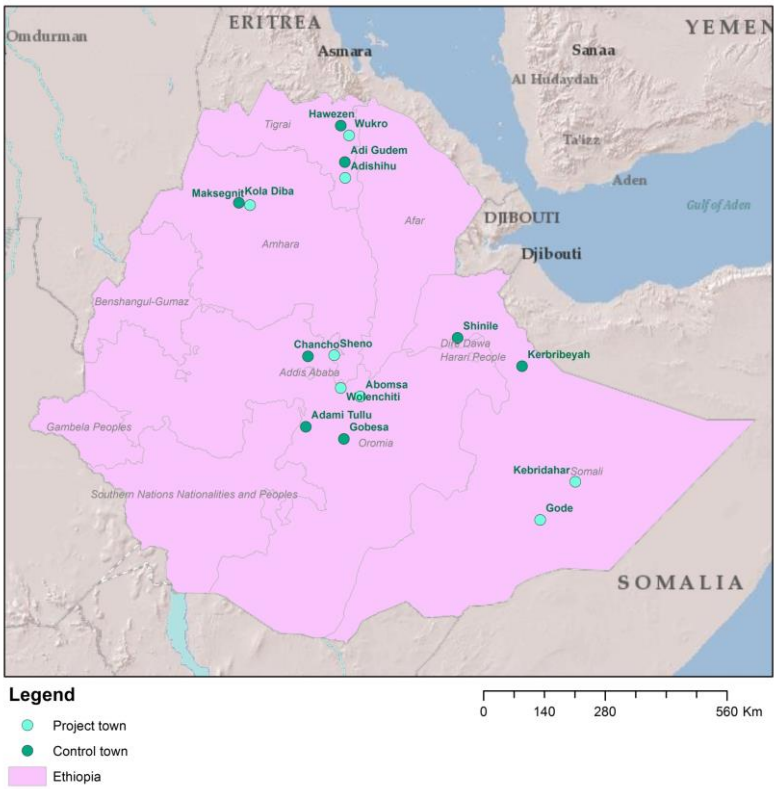
The surveys enabled the collection of geolocations, photos and answers to free text questions, numeric questions and option questions.

Compartment Bag Tests were used to assess the water quality of selected water points, focussed on one critical microbiological indicator: *E.coli*. The compartment bag text is a new, relatively simple test that offers more robustness that membrane filter tests.

2.3 Project and the control towns

Figure 2 gives an overview of the intervention towns and the control towns. For each intervention town a control town was selected in collaboration with regional government and Unicef, based on a number of criteria, including size, location and planned WASH interventions in the areas.

Figure 2: Project intervention and control towns



Intervention town		
	Town	**Woreda**
Amhara	Maksegnit	Gondor Zuria
Oromia	Sheno	Kimbibit
	Abomsa	Merti
	Welenchiti	Boset
Tigray	Wukro	Wukro
	Adishihu	Emba Alaje
Somai	Kebridehar	Kebridehar
	Gode	Gode
Control town		
	Town	**Woreda**
Amhara	Koladiba	Dembia
Oromia	Chancho	Sululta
	Gobesa	Sherka
	Adami Tullu	Adami Tulu Jido Kombolcha
Tigray	Hawezen	Hawezen
	Adi Gudem	Hintalo Wejerat
Somai	Kebribeyah	Kebribeyah
	Shinile	Shinile

2.4 Sampling

Data was collected on all piped water schemes and sources, communal water points, waste collectors and public institutions in the project and control towns and their satellite villages. Household data was collected from a sample of households, and water quality data from a sample of communal water points.

2.4.1 Household sampling

Below is the estimation of the household sample size calculation based on Kelsey and Fleiss, with and without continuity correction. Table 2 is the calculation of the sample size required for the overall study (all intervention and control areas added together) while Table 3 looks at the intervention by town and by paired control as well was by individual intervention town and grouped controls (*in italics)*. These figures served as a guide for the design of the practical sample design.

Table 2: Sample Size for RCT in overall study area.

Two-sided significance level(1-alpha):	95
Power(1-beta, % chance of detecting):	80
Ratio of sample size, Unexposed/Exposed:	0.7
Percent of Unexposed with Outcome:	5
Percent of Exposed with Outcome:	10
Odds Ratio:	2.1
Risk/Prevalence Ratio:	2
Risk/Prevalence difference:	5

	Kelsey	Fleiss	Fleiss (+continuity correction)
Sample Size - Exposed	559	540	587
Sample Size-Nonexposed	391	378	411
Total sample size:	**950**	**918**	**998**

Results are rounded up to the nearest integer.

References for sample size algorithms:
Kelsey et al., Methods in Observational Epidemiology 2nd Edition, Table 12-15
Fleiss, Statistical Methods for Rates and Proportions, formulas 3.18 &3.19
Calculated using http://www.openepi.com/ Version 3.01 Updated 2013/04/06

Table 3: Sample Size for RCT per intervention town paired & with all control towns in italics

Two-sided significance level(1-alpha):	95	
Power(1-beta, % chance of detecting):	80	
Ratio of sample size, Unexposed/Exposed:	0.7 (towns paired)	*5.3 (all towns as control)*
Percent of Unexposed with Outcome:	4	
Percent of Exposed with Outcome:	20	
Odds Ratio:	6	
Risk/Prevalence Ratio:	5	
Risk/Prevalence difference:	16	

	Kelsey	Fleiss	Fleiss (+continuity correction)
Sample Size - Exposed	87 *(23)*	80 *(30)*	95 *(37)*
Sample Size-Nonexposed	61 (119	56 *(158*	67 *(195)*
Total sample size:	**148** *(142)*	**136** *(188)*	**162** *(232)*

Results are rounded up to the nearest integer.

References for sample size algorithms:
Kelsey et al., Methods in Observational Epidemiology 2nd Edition, Table 12-15
Fleiss, Statistical Methods for Rates and Proportions, formulas 3.18 &3.19
Calculated using http://www.openepi.com/ Version 3.01 Updated 2013/04/06

Based on the above, the household sample size was set at 100 households from the intervention towns and 50 from the villages surrounding each town, and 50 households the control towns and 50 households from villages surrounding each control town. Two project towns Gode and Kebridehar and therefore the two selected control towns (Kebribeyah, Shinile) in Somali Region did not include surveys in satellite villages, bringing the total household sample size to 1800.

A quasi random sampling procedure was applied to select the sampled households. Each town was divided up into blocks (see Figure 3 for an example). The number of households sampled per block varied in proportion to the estimated number of households in each block. The blocks were drawn and sized from high definition satellite images available from Google Earth. As the sampling units are self-weighted, it is not required to weight across these blocks during the analysis. However, the analysis between urban and satellite areas in a woreda and between towns will need to take the total number of households in each town or satellite area into account.

Figure 3: Example of household sampling blocks (Sheno town)

Sampling unit	Settlement pattern	nr of blocks (or estimated equivalent)	Selected sample size
A	Informal	16	11
B	Informal	16	11
C	Informal	8	6
D	Planned	20	14
E	Planned	8	6
F	Planned	5	3
G	Planned	7	5
H	Planned	16	11
I	Planned	32	22
J	Informal	2	2
K	Planned	6	3
L	Roadside	8	6
Total		**144**	**100**

The actual number of households sampled can be found in Annex 6.

2.4.2 Weighting methodology for analysis

Since the sampling is not proportional to the total number of households in each town, the probability of sampling a household in one town will be different to another. While this does not have a large impact on the analysis of the results of a single town, it may be significant when analysing the data across several towns, e.g. the estimating proportion of households that have had a diarrhoeal incident in the last two weeks. In order to correct for the changing probability, sampling weights have been applied.

The weight for each record is the inverse of the probability of selecting the household, i.e. the number of households in the area divided the number of households in the sample. The number of households in each sample is known but the number of households in the area had to be estimated.

Secondary population data from the Federal Democratic Republic of Ethiopia Central Statistical Agency (CSA) has been used to estimate the population of the study areas. CSA publish population projections per woreda for each year based on the 2007 census (projections for July 2014 were used). As the population projections are only provided per woreda, it sometimes had to be corrected with a factor to represent the urban population of the town in question. The factor was calculated based on the size of the town's population relative to the total woreda population in 2007. As the ratio of the town population to woreda population is likely to change over time, the analysis and weighting will be improved as better population estimates become available. The final estimate of the number of households was calculated using the estimated urban population divided by the average household size found in each urban area.

As the population estimates were only possible on the basis of urban areas, the rural areas could not be included in the weighted analysis. As a result, the analysis uses both weighted and unweighted tests depending on the context. P-values are reported as weighted if the weights have been applied.

Omission means that it is not a weighted test. Any analysis comparing rural and urban areas has not been weighted due to missing satellite village population figures.

In most cases, we found that weighting did not change the significance of the results when applying a 95% confidence level. When a difference was found, we only used the weighted test when comparing across project and control areas and we have only reported on urban households.

In order to examine the incidence of diarrhoea in children under five, it was again necessary to make some assumptions about the proportion of families with children under five in each town. It was found that there was a significant difference between the proportions of families with children under five in Somali region compared to the rest of the country. For this reason, weighting based on the number of households with children under five was corrected for the difference with Somali region.

The R survey analysis package was used to calculate the weights and apply the survey design for various statistical analyses.

2.4.2 Water point sampling for water quality testing

The water quality testing focuses on points of supply rather than point of use/ household consumption (these may be the focus of alternative studies). Five public water points in each town, five alternative urban water sources where these existed and five public water points in surrounding villages were randomly-selected. The samples were collected after the water point surveys had been completed.

2.5 Data collection process

Before primary data collection, general secondary data was collected for each town and the town / woreda administration was informed of the upcoming survey.

Data collection took place between late September and late December 2014 (see Annexes 2-4 for full details). Primary data was collected by 3 teams consisting of 6 data collectors, supervised by a regional coordinator: team one collected data from the Oromia towns, team 2 from the Amhara and Tigray towns and team 3 from the Somali region towns.

Mobile phones with the Akvo FLOW application were used by the data collectors to collect primary data. Data from the mobile phones was transferred through the mobile phone network to an online database, accessible through the Akvo Flow dashboard.

The data collection teams received a 3-day training in the use of the phones and the surveys prior to start of data collection.

Table 4 gives an overview of the surveys, where they were administered and the procedure followed.

Table 4: Data collection procedure

Name of survey	Procedure
Urban water scheme	In towns, this survey was used first to get a good overview of the piped system and its components. The system manager, operators and finance staff were asked to answer the questions. They were given the opportunity to look up answers in documents and provide relevant data.
Urban water source	Each of the sources of the piped scheme was visited. Data was collected through talks with the operational manager or someone else delegated by the

	utility and observations.
OWP water point • **Water point** • **Water quality test**	Each of the public fountains connected to the piped scheme and the alternative communal water points was surveyed. Data was collected through talks with the utility staff, WASHCO members/ caretakers, measurements and observations. After general water point data had been collected, a number of water points were randomly selected for water quality testing.
Institutional WASH	Each of the **schools** was visited. Data was obtained through talks with the head master or his/ her delegate and observations. Each of the **health facilities** was visited. Data was obtained through talks with the head of the facility or his / her delegate and observations. Each of the **public latrine** blocks was visited. Data was obtained through talks with the manager of the facility or his / her delegate and observations. All **other relevant public institutions** (e.g. prisons) were visited. Data was obtained through talks with the head / manager of the facility or his / her delegate and observations.
Waste collector	All waste collectors active in the town were visited. Data was collected through talks with the manager.
Household	A sample of households was visited. The data collectors introduced themselves, stated the purpose of the household survey and asked for permission and time. It was recommended that the data collectors ask the questions to the lady of the house, or at least make sure she is present during the interview as women are mostly responsible and affected by WASH and are therefore in the best position to answer the survey questions.

Copies of surveys are included at annex 5 and an overview of the administered surveys can be found in Annex 6.

Challenges of the data collection process included:

- Internet connectivity was found to be low in most satellite villages and many towns, which resulted in delays to data transfer.
- Frequent power cuts were a challenge as power was needed for the incubation of the water quality samples. The data collection coordinators had to find places with generators willing to provide electricity to the incubators.
- Some water quality samples were collected from private household connections instead of communal connections.

Based on feedback from the data collectors and coordinators, small changes were made to the surveys during data collection (mainly related to the dependencies of the questions).

3. Data management and quality control

Data management, quality control, and cleaning are all vital to both facilitate analysis and to ensure valid conclusions. While the previous section covered these procedures during data collection, this chapter describes how the collected data was managed and quality controlled thereafter, i.e. during cleaning and analysis.

3.1 Data management and cleaning

For the purposes of analysis and data storage, a number of tools were selected to address the needs after data collection and during analysis. The basic elements of the One WaSH Plus data management procedures as set up are:

- All tools are free or open source tools or affordable and accessible to required project partners
- There is offline access to all data sets.
- A single SQLite master database with the raw data and cleaned data.
- Raw data and cleaned data are stored separately.
- All the data and calculations are human-readable and code is documented.
- Excel is used for exploring, analysing and correcting data when possible.
- Changes in data are documented by retaining each version of each data set as separate files.
- Common corrections are documented to improve the survey questions and responses during the mid-line and end-line.
- R is used for advanced statistical analysis.
- Excel and R scripts are set up so that the cleaning and analysis are iterative and data quality is improved by the whole team while the analysts work with data.
- Automation of the importing and exporting of data is used when possible to speed cleaning and analysis.

The One WaSH Plus baseline cleaning protocol ensured that these elements were implemented. The protocol is described in detail in the attached baseline data collection guidelines (Annex 1) under "Section 11 Data management, cleaning and analysis" and briefly summarised here.

During the baseline data collection, data was exported manually from the Akvo FLOW dashboard to Excel sheets and then imported into the master SQLite database using an R script[1]. While manual export added some overhead, it was possible to export the dashboard data in several rounds without any problems. All data downloaded was stored in the project dropbox folder, which retains previous versions of each file for a year even after being deleted. For long term storage, we ensured that each time data was downloaded from Akvo FLOW, it was saved in a new folder with the date of download. These data sets were then imported into the SQLite database.

The SQLite database provided a number of useful functions for cleaning the data and ensuring that the raw data collected and clean data are separated. First, some fields required enumerators to fill in answers by hand such as multiple choice questions with an 'other' option and some place names. The

[1] An automated link between Akvo FLOW and the SQLite database may be established in Phase 2 after the Akvo FLOW API has been tested and used by at least one other organisation. It is currently being tested in Ghana by the Community Water and Sanitation Agency to link data to DiMES.

database consolidated all these responses into a list for data cleaning. Once corrections were made in this list, these were used to export the complete dataset for further manual cleaning in Excel. Changes made in Excel by the data collection supervisors and analysts were then imported into the database as separately stored clean data.

As new records were added during data collection, the user could easily differentiate records that had been cleaned from those that were not and the database also provided a list of records with common problems to facilitate the cleaning. Finally, the database also provided a final dataset with calculated indicators that could be used for analysis in Excel or R. It was decided to calculate these database using standard SQL queries and the human-readable variable names because it is much easier to interpret than Excel formulas or R scripts.

3.2 Quality control

Quality control has been a key consideration during the selection of the IRC/Hoarec team for the baseline data collection, both in terms of technical skills and their familiarity with the local regions and languages. During data cleaning, the whole team from the international and local analysts to the data collection supervisors were involved in checking both the raw data and the results of the analysis.

Furthermore, the photos of water and sanitation infrastructure have also been used to double check the data entry by enumerators while in the field and ensure that they have not introduced systematic mistakes that might reduce the validity of the project evaluation. The database does not store these photos directly but rather they are stored in the Amazon S3 cloud storage[2]. They are viewed by clicking the URL in Excel or by generating a web page for checking in one go. These photos have been extremely useful but at times it was not always possible to verify all elements of the survey, e.g. the number of taps on a standpipe or the type of latrine, because of the way the photos were taken. It is suggested to evaluate the photos requested and improve the training of the enumerators in taking photos as a simple but effective way to improve the quality of these datasets in future rounds of data collection.

The town fact sheets make the data collection results easily digestible and have provided a way to identify when either the data provided different results than expected by those who were familiar with these towns. It is expected that the dissemination of these factsheets will provide further “ground truthing” of the baseline results. The production of a fact sheet with statistics on each town and their satellite village was generated using the same R script for each town to avoid biases. Further interpretation, analysis and editing were led by the regional supervisors of the data collection and project analysts.

Finally, the iterative cleaning and analysis process ensures that quality improves over time as stakeholders review the data. Because clean and raw data are stored together, it will always be possible to review all changes and ensure bias has not been introduced at any point during the quality control. It is important that lessons learned during this round of data collection and cleaning inform the adaptation of the data collection surveys to improve the quality and validity of the raw data during the mid-line and end-line.

[2] Provided by Akvo FLOW

4. Baseline results

This chapter presents the initial results of the baseline survey. After discussion of indicators relating to the general population, results relating to diarrhoeal disease occurrence are discussed. The main urban water systems of these towns are then introduced. This is followed by an assessment of the functionality of these systems and the services they provide. The types of systems, their functioning and the services they provide are discussed for both alternative urban water points as well as for water points in the satellite villages. The last half of the chapter shifts the scale down towards the household level and the water, sanitation and hygiene services that households access and their satisfaction with these services. The section that follows focuses on institutional WASH.

4.1 General baseline information on the towns and their surrounding areas

Household size

The average household size in the urban areas of the 16 towns was 4.9 persons (median: 4 persons), while the average household size in the surrounding rural areas of these towns amounted to 5.4 persons (median: 5). The average household size in Somali Region was higher than in the other three regions, with an average of 7.3 persons per household (median: 7 persons).

Livelihoods

In the urban areas of the 16 towns, the main livelihood strategy was having a formal or informal business or engagement in some form of trade. In addition households generally relied on income from employment or from day labour. In the rural areas, farming was the main livelihood strategy.

Vulnerable households

In order to differentiate between more vulnerable and less-vulnerable households, households were asked about their household composition (in terms of being male or female headed, and in terms of having household members with disabilities) and their economic situation.

The proportion of **female-headed households** was found to be relatively high, with 24% of rural households and 48% of urban households being female-headed. This was slightly higher than the 19% and 35% of households being female-headed in rural and urban areas respectively, as reported by the Central Statistical Agency (2014).

In total, 96 of the 1804 households (5.3%) had at least one household member who has a **disability**. The proportion of households with a household member with a disability was higher in Shinile and Keberedehar, both in Somali Region, compared to the total study area. The most common disability is a limitation in physical movement (51% of disabilities) and blindness (22% of disabilities).

To get an idea of the **economic situation** of households in the towns and their surrounding rural areas, information was collected on household income, as well as on the number of assets, livestock, agricultural land and type of house. Here, we will limit ourselves to presenting the analysis of the household income. It should however be noted that a considerable part of households (26%) were not willing or able to provide information of their annual income. The type of housing and the number of assets did not give a strong enough indication of the economic situation of these households. Missing values have been excluded in this preliminary analysis. A statistically significant difference (with significance level 0.05) was observed between the average income in the urban areas of the towns and the rural areas surrounding the towns.

Table 5: Annual household income

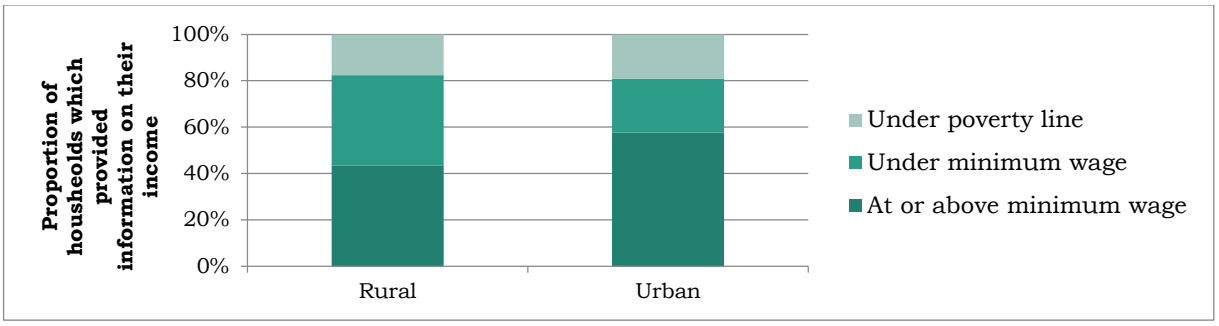
	Median	Mean (CI 95%)	Mean, weighted
Urban	14,000 birr	18,842 birr (17,358 – 20,326)	19,040 birr
Rural	10,000 birr	12,696 birr (11,860 – 13,479)	NA

In order to compare household characteristics across different income groups, households were classified into the following three income groups:

- Income under the poverty line (500 birr per month or less),
- Income above the poverty line, but under minimum wage,
- Income above minimum wage (1000 birr per month or more).

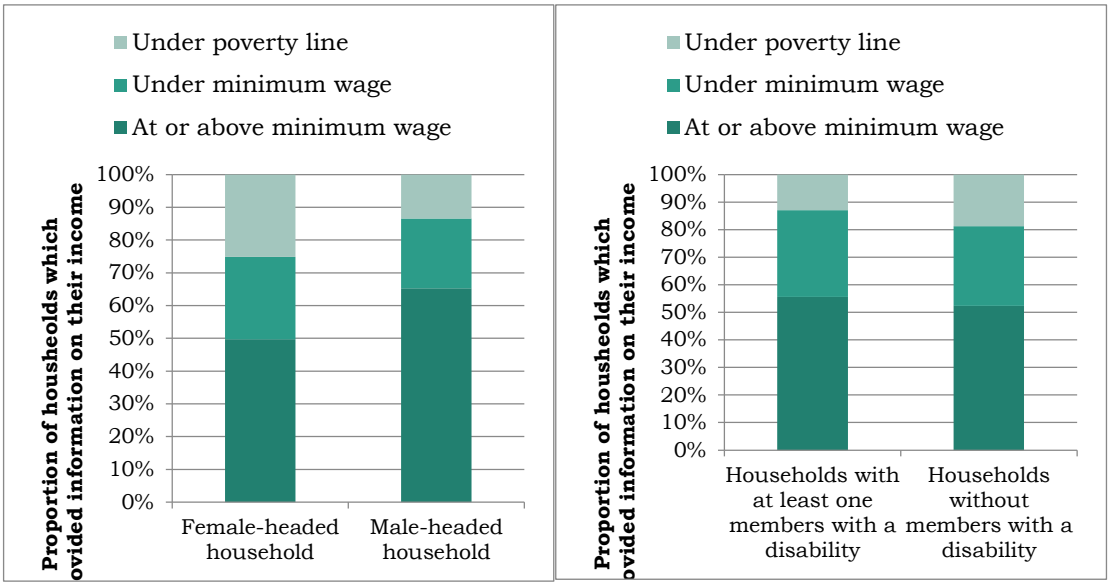
The proportion of households with an income above the poverty line and the proportion of households with an income above the minimum wage is significantly different in the urban areas of the towns to the surrounding satellite villages (Pearson's Chi-squared test, p-value = 1.077e-05). There is a larger proportion of households in the higher wealth category in the towns.

Figure 4: Proportion of rural and urban housheolds in different income groups



As shown in figure 4, the proportion of households with an income under the poverty line was higher for female-headed households than for male headed households. This difference was found to be statistically significant (Pearson’s Chi-squared test, p-value = 3.489e-06).

Figure 5: Proportion of vulnerage and non-vulnerable housheolds in different income groups



Of the 96 households with at least one household member with a disability, almost half (42 households) were not able to provide information on their household income. For the 54 households that did provide information on their household income, the income distribution was fairly similar to that for households without members with a disability.

4.2 Diarrhoeal disease occurrence

The overall proportion of households with at least one household member who had suffered from diarrhoea[3] over the last two weeks was 5.4% (95% confidence interval (Clopper and Pearson): 4.4% - 6.6%). The proportion of households with diarrhoea cases was observed to exceed 10% in Kebidehar (CI: 7.8% - 22%), Koladiba (CI: 6.4% to 20.2%) and the rural areas around Maksegnit (CI: 6.3% - 17%). No statistical significant difference was observed in incidence of diarrhoea between income groups, nor between control and project areas or between rural and urban areas.

Of the 787 households with children under five, 5.2% reported that at least one of the children under five had suffered from diarrhoeal disease over the last two weeks. The weighted proportion in urban areas is slightly higher at 6% (CI: 4.2% - 8.0%). The proportion of households with children under five that reported diarrhoea cases in children under five exceeded 10% in urban and rural Welenchiti, Kebridehar and Adishihu. In the case of children under five, there seems to be higher incidence of diarrhoea in the project areas than in the control areas (Pearson's Chi-squared test, p-value = 0.004486). No statistically significant difference was observed between rural and urban areas (p-value = 0.06247).

[3] Diarrhoea was defined as having three or more loose or liquid stools within 24 hours.

Table 6: Diarrhoeal disease occurrence

	Project towns		Control towns		Total
Row Labels	**Rural**	**Urban**	**Rural**	**Urban**	
Household with at least one household member who had diarrhoea in the last two weeks	7.1%	5.9%	3.6%	4.5%	5.4%
Household with children under five of which at least one under five had diarrhoea in the last two weeks	5.4%	7.7%	1.3%	3.5%	5.2%

4.3 Water service provision in the intervention and control towns

Water systems

Each of the project and control towns has a **piped town water system**. Most piped systems are supplied by multiple boreholes. The piped systems in the project town Adishuhu and the control town Gobesa are supplied by protected springs. The piped system of the project town Gode (Somali Region) is the only one supplied by a river diversion structure.

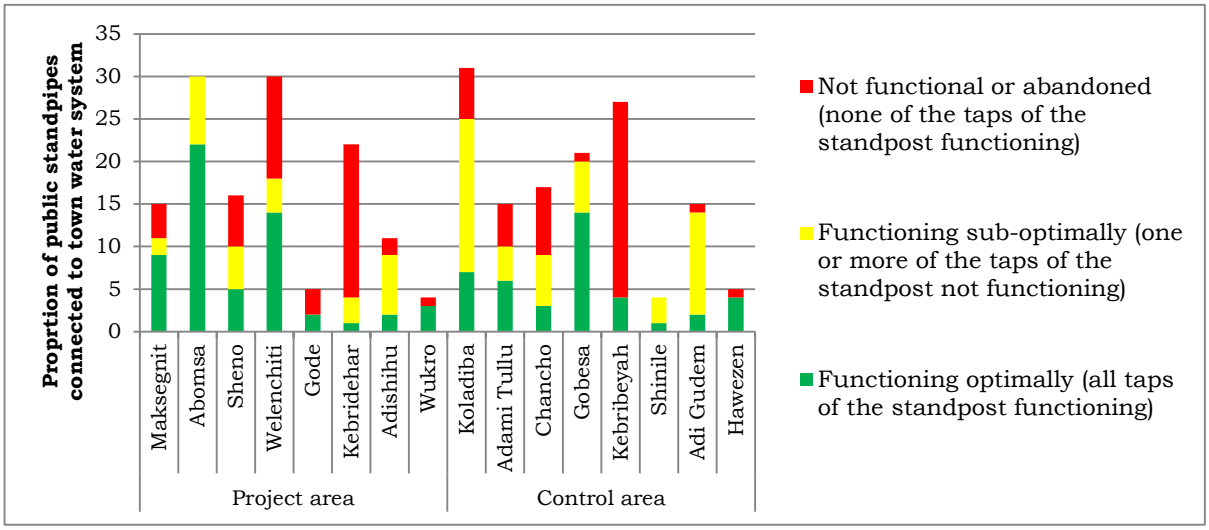
Table 7 gives an overview of the piped systems. The piped systems in the project towns Welenchiti, Abomsa and Kebridehar have 20 public standposts or more. This was also the case of the systems in the control towns Kolodiba and Kerbibeyah.

Table 7: Overview of piped schemes

Project town	Town population	Number of household connections	Number of public water points	Control town	Town population	Number of household connections	Number of public water points
Gode	52,942	389	3	**Koladiba**	17,912	1021	32
Wukro	49,925	5147	4	**Gobesa**	15,644	1193	17
Kebridehar	35,807	1000	22	**Kebribeyah**	14,052	300	39
Welenchiti	21,282	1673	38	**Adami Tullu**	12,718	1500	10
Abomsa	20,517	1928	29	**Chancho**	12,244	1853	18
Maksegnit	16,930	823	10	**Adi Gudem**	11,403	1480	14
Sheno	15,459	2078	11	**Hawezen**	10,736	895	7
Adishuhu	10,771	687	11	**Shinile**	10,162	600	2

In both the project and the control towns, public standposts connected to the small town system are the main communal water points in the urban areas. However, as shown in figure 5, not all these standposts are functional. In the Somali Region towns Kebridehar, Gode and Kebribeyah more than half of the public standposts was found to be not functional at the time of the baseline survey.

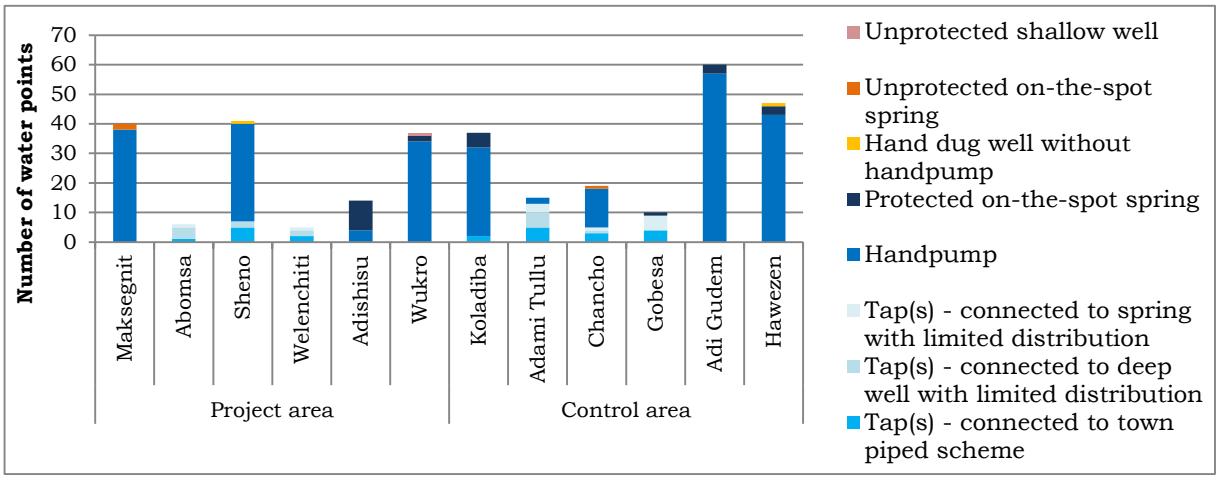
Figure 6: Functionality of public standposts connected to the town water systems



In addition to the standposts connected to the town piped systems, **alternative communal urban water points** were found in some of the towns. One non-functional unprotected on-the–spot spring and three handpumps (one not functional) were found in the urban areas of the control towns Hawezen. In the control town Adi Gudem three handpumps were identified, two of which were not functional. In the project town Maksegnit eight handpumps were found of which 3 functioning sub-optimally.

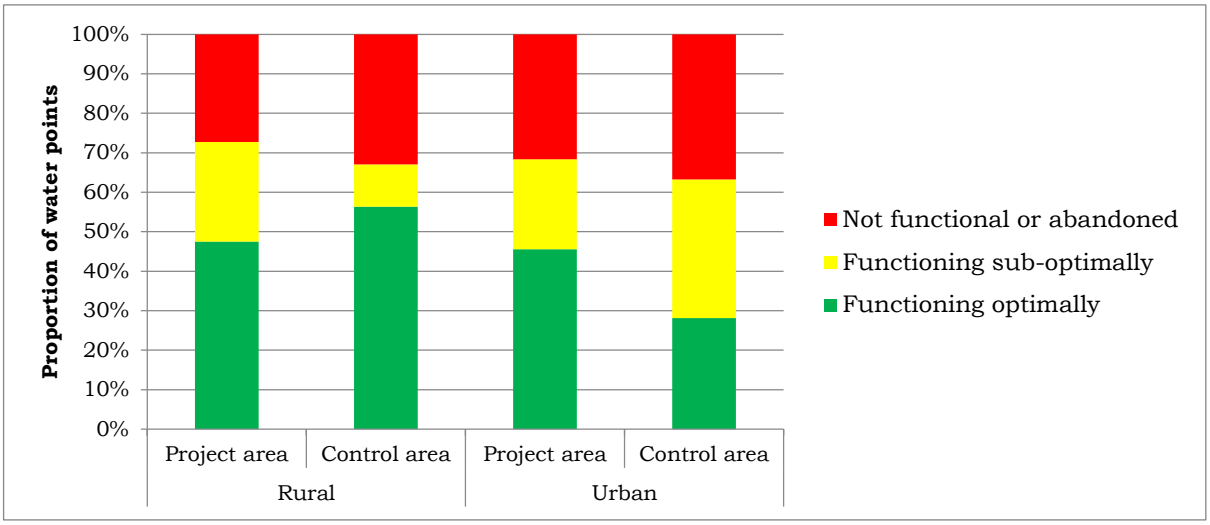
Most of the **communal rural water points** found in the satellite villages surrounding the project town Welenchiti and Abomsa and in the control towns Shinile and Adami Tullu, were public standposts. In Adishihu, a relatively large number of protected springs was found. In the rural areas surrounding the other towns, mostly handpumps were found.

Figure 7: Water points in the rural areas surrounding the project and control towns



The proportion of optimally functional rural water points was slightly higher in the control areas than in the project areas, but so was the proportion of non-functional or abandoned water points, as shown in figure 7. Overall, functionality of urban water points was lower in the control towns than in the project towns.

Figure 8: Water point functionality, rural-urban and project-control



In addition to functionality, the **reliability** of the services provided by the water points was assessed during the baseline survey, based on the estimated number of days the water point had been functioning over the course of last year. In the project towns Maksegnit and Wukro and in the control towns Dembia, Hawezen, Shinili and Adi Gudem, half or more of the public standposts provided reliable services, functioning for at least 95% of the time over the last year. Half or more of the rural water points provided reliable services in the project towns of Adishihu and Sheno, and around the control towns Hawazen, Chancho and Gobesa. In the other towns, less than half of the water points provided reliable services.

Overall there was hardly any difference in the proportion of rural water point reliability between the project and the control towns. The proportion of urban water points which were reliable (functioning for at least 95% of the time) was slightly higher in the control towns than in the project towns. In the project towns, the proportion of reliable water points was slightly lower in the urban areas than in the rural areas. In the control towns this difference was neglectable.

Water quality analysis

A total of 121 samples were taken for analysis of microbial (E. coli) contamination: 55 samples of rural water points; and 66 samples of urban water supplies. Sources to be sampled were selected randomly after urban and rural water points had been mapped. Guidelines were to sample up to 5 urban piped supplies (focusing on standposts, replacing with household connections where sufficient standposts not available although this was not always done), up to 5 alternative supplies in urban areas where these existed and up to 5 supplies in the satellite villages.

In both rural and urban areas, the same number of samples - 16 in each – failed, where failure is defined as levels of contamination >10 MPN/100ml. While zero levels are desirable and the ultimate standard, levels below 10 MPN/100ml are considered low-risk (safe or probably safe) according World Health Organization Guidelines for Drinking Water Quality (2011). Roughly a third of rural samples (16/55 or 29%) and one quarter of urban samples (16/66 or 24%) failed on this measure which indicates a widespread problem of microbial contamination of water supplies. This is a widespread problem where water supply systems operate intermittently.

While the indicator is different, being total thermotolerant coliforms (TTC), 9% of samples of utility piped water supplies exceeded 10 TTC per 100 ml in the national RADWQ study. The findings of the baseline study were worse than this (24% samples not low risk). According to RADWQ, 23% and 24% respectively of boreholes and protected dug wells in the same study also exceeded the 10 TTC per 100

ml measure. This appears comparable to the findings for the rural samples analysed in the baseline study.

All of the significantly contaminated urban supplies were found in a subset (5 no.) of the control towns i.e Welenchiti and Abomsa in Oromia, Gode in Somali, Maksegnit in Amhara, and Adishihu in Tigray. They also were all piped urban supplies taken from taps. None of the samples taken in intervention towns were found to be significantly contaminated.

Contaminated rural water samples were found around 7 out of the 12 towns (the 4 Somali towns did not include assessment in rural areas). This included 4 control areas and 3 intervention areas.

Microbial contamination is expected to be strongly seasonal, and might also vary substantially on shorter timescales. Most of the systems in these towns supply water on an intermittent basis and contamination may be expected to vary as water is supplied to different zones and then pipes lie empty and unpressurised for periods of days. If possible, further research is proposed to collect additional baseline data on seasonal and more sort-term water quality fluctuations, again with a focus on microbial contamination. Contamination between source and consumption may also be a further area of interest.

Additional water quality data also need to be collected, particularly for fluoride which is a known problem in some of the towns.

Table 8: Microbial water quality results (E. coli measured by Compartment Bag Test)

Location	Number of samples			No. of low risk samples (E. coli <10 MPN per 100 ml)/ Total No. samples												
	Urban	Rural	Total	Urban				Rural								Total
				Birka	Hand dug well with handpump	Tap(s) - connected to town piped scheme	Urban Total	Borehole with hand-pump	Hand dug well with hand-pump	Protected on-the-spot spring	Tap(s) - connected deep well with limited distri-bution	Tap(s) - connected spring with limited distri-bution	Tap(s) – con-nected piped scheme	Un-protected on-the-spot spring	Rural Total	Grand total
Project towns	37	24	61	4/4	1/1	16/32	21/37	6/9	1/5	3/3	3/3	2/2	2/2		17/24	38/61
Maksegnit	7	4	11		1/1	1/6	2/7	1/2	0/2						1/4	3/11
Abomsa	5	2	7			3/5	3/5					1/1	1/1		2/2	5/7
Sheno	3	4	7			3/3	3/3	0/1	0/2		1/1				1/4	4/7
Welenchiti	5	4	9			2/5	2/5				2/2	1/1	1/1		4/4	6/9
Gode	4		4			0/4	0/4									0/4
Kebridehar	5		5	4/4		1/1	5/5									5/5
Adishihu	5	5	10			3/5	3/5	1/1	1/1	3/3					5/5	8/10
Wukro	3	5	8			3/3	3/3	4/5							4/5	7/8
Control towns	29	31	60		2/2	27/27	29/29	6/8	9/12	1/2	2/2	2/2	2/4	0/1	22/31	51/60
Koladiba	5	5	10			5/5	5/5	0/1	2/3	0/1					2/5	7/10
Adami Tullu	1	5	6			1/1	1/1				2/2	1/1	2/2		5/5	6/6
Chancho	2	5	7			2/2	2/2	3/4						0/1	3/5	5/7
Gobesa	2	4	6			2/2	2/2			1/1		1/1	0/2		2/4	4/6
Kebribeyah	4		4			4/4	4/4									4/4
Shinile	4		4			4/4	4/4									4/4
Adi Gudem	5	7	12			5/5	5/5	2/2	3/5						5/7	10/12
Hawezen	6	5	11		2/2	4/4	6/6	1/1	4/4						5/5	11/11
Grand Total	66	55	121	4/4	3/3	43/59	50/66	12/17	10/17	4/5	5/5	4/4	4/6	0/1	39/55	89/121

Note: cells shaded dark green highlight where failed tests (>10 MPN per 100 ml) occurred.

Household access to water services

With the exception of the Somali project towns Gode and Kebridehar and the control town Kebribeyah, reported household access to improved water services in the dry season is high, both in the towns as well as in the rural areas surrounding the towns. In the Somali Region towns Gode, Kebridehar and Kebribeyah, a relatively high proportion of households depend on carts with small tank/drums and birkas, which are considered unimproved.

Figure 9: Urban water coverage

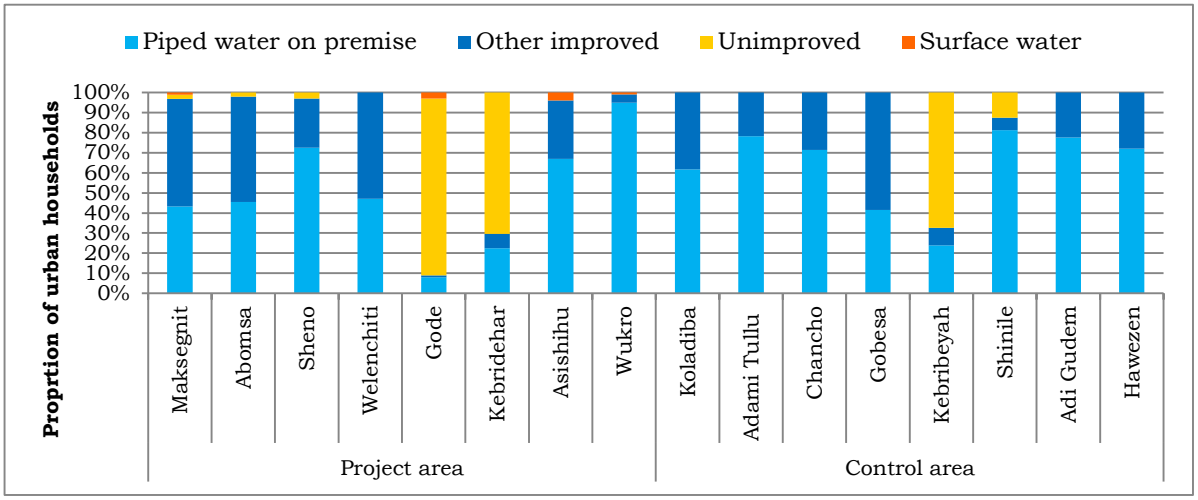
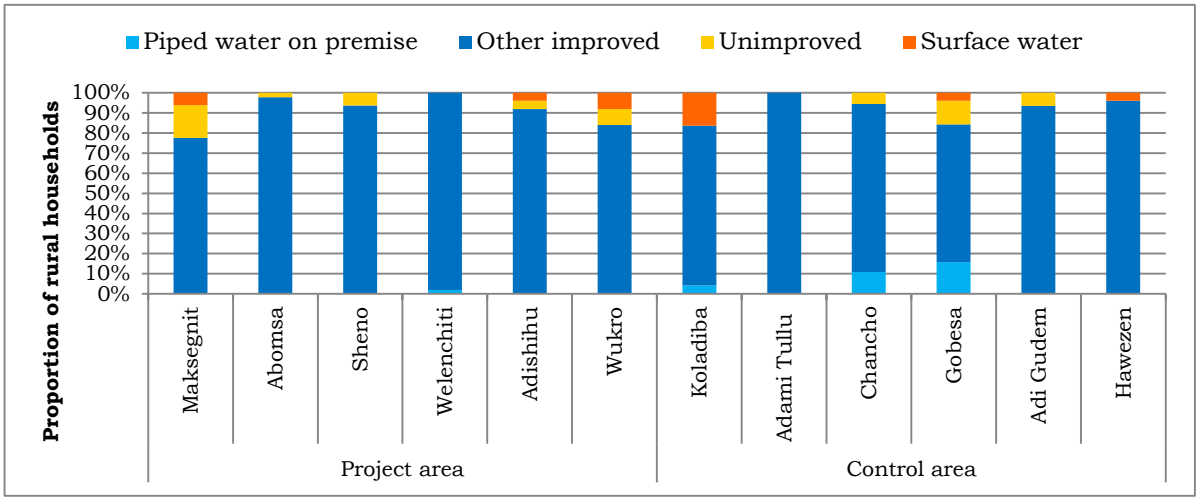
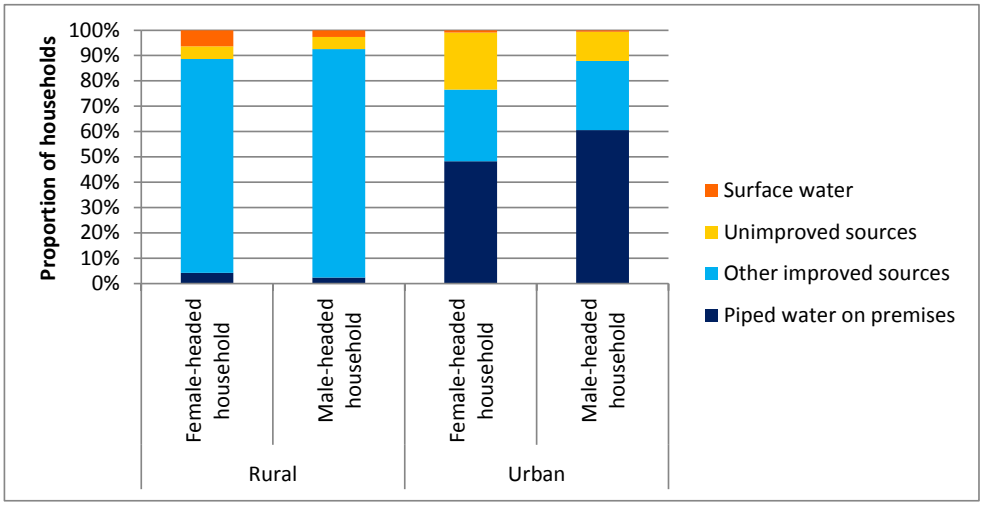


Figure 10: Rural water coverage



The proportion of female headed households with access to piped water supply in the urban areas is slightly lower than that of male-headed households, as shown in figure 11.

Figure 11: Access to water services of male and female-headed households



The 19 rural households which have at least one household member with a disability all have access to an improved water source. Of the 77 urban households which has at least one household member with a disability, almost half (35 households) have piped water supply on the premise, while about a quarter (19 households) depends on other improved sources and a quarter (21 households) depends on unimproved sources (for the remaining two household the main source of drinking water in the dry season was unknown). This relatively high proportion of households accessing unimproved water services could be due to the fact that a relatively large proportion of households with disabled household members are found in the Somali towns which have a relatively high proportion of households using unimproved water sources.

Water service levels

Services accessed by households are often not reliable, accessible, or provide water of unacceptable quality, even when these services are 'improved'.

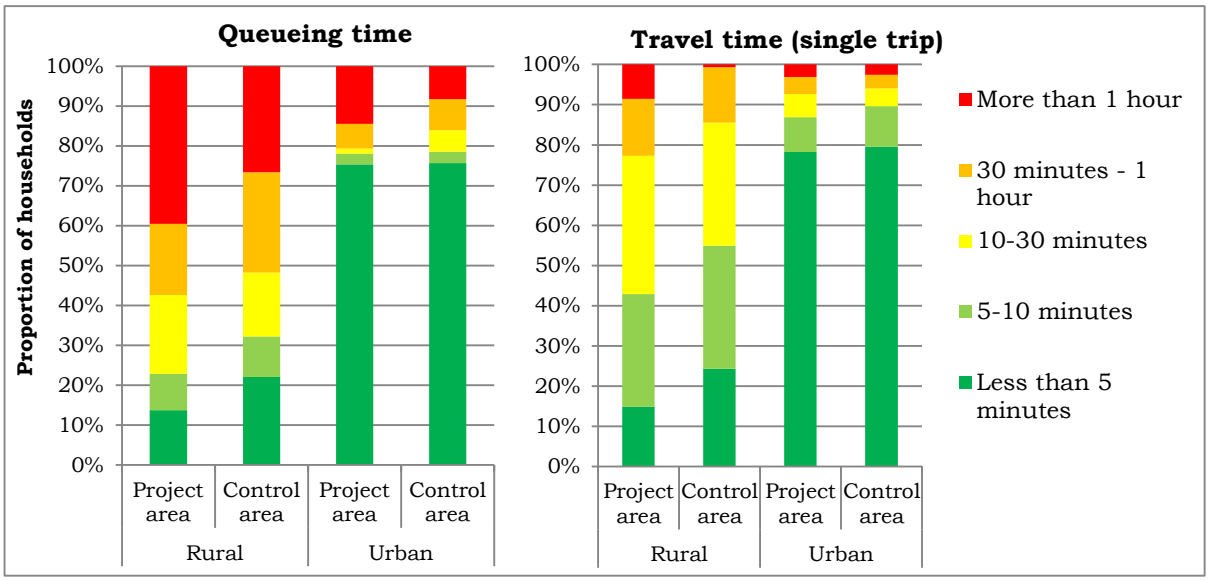
The proportion of households which reported that their main source of water supply in the dry season is very **reliable** (providing water throughout the year and breakdowns are repaired within 3 days) varies widely over the different towns. Overall, the proportion of rural households reporting reliable water services was slightly higher than the proportion of urban households doing so. Only in the two control towns Adi Godum and Shinili more than half of urban households reported access to very reliable water sources, while in rural areas around five towns at least half of rural households reported to access very reliable water services. The proportion of households reporting very reliable water services was found to be statistically significantly higher in the rural areas than in the urban areas (Pearson's Chi-squared test, p-value = 4.584e-07). Reliability is also significantly higher in control areas than in the project areas (Pearson's Chi-squared test, p-value = 1.17e-14).

Quality was especially perceived to be an issue in the Somali Project towns Gode and Kebribehar, and the control towns Kerbribayah, Koladiba and Adimi Tullu. Here only 75% or less of households considered the taste, colour and odour of their water supply acceptable. In the other towns, more than 75% of households perceived water quality as acceptable. There was little difference in the proportion of households perceiving the water quality as acceptable between the urban and the rural areas, nor between the project and control towns.

Households in urban areas have better access to their water services in term of **distance** and **queueing time** than households in rural areas. Overall, 76% of urban household spent 10 minutes or less queueing to fetch water, while in the rural areas, only 25% of households did so. In the project town Abomsa and the control town Gobase, more than half of urban households spend more than 10

minutes on queuing for water supply. About 85% of urban households and 46% of rural households spent 10 minutes or less travelling one way to the water source. There is no significant difference in the proportion of households spending 10 minutes or less on travelling one way between project and control town. However, the queuing time is significantly different (weighted p-value = 0.0415).

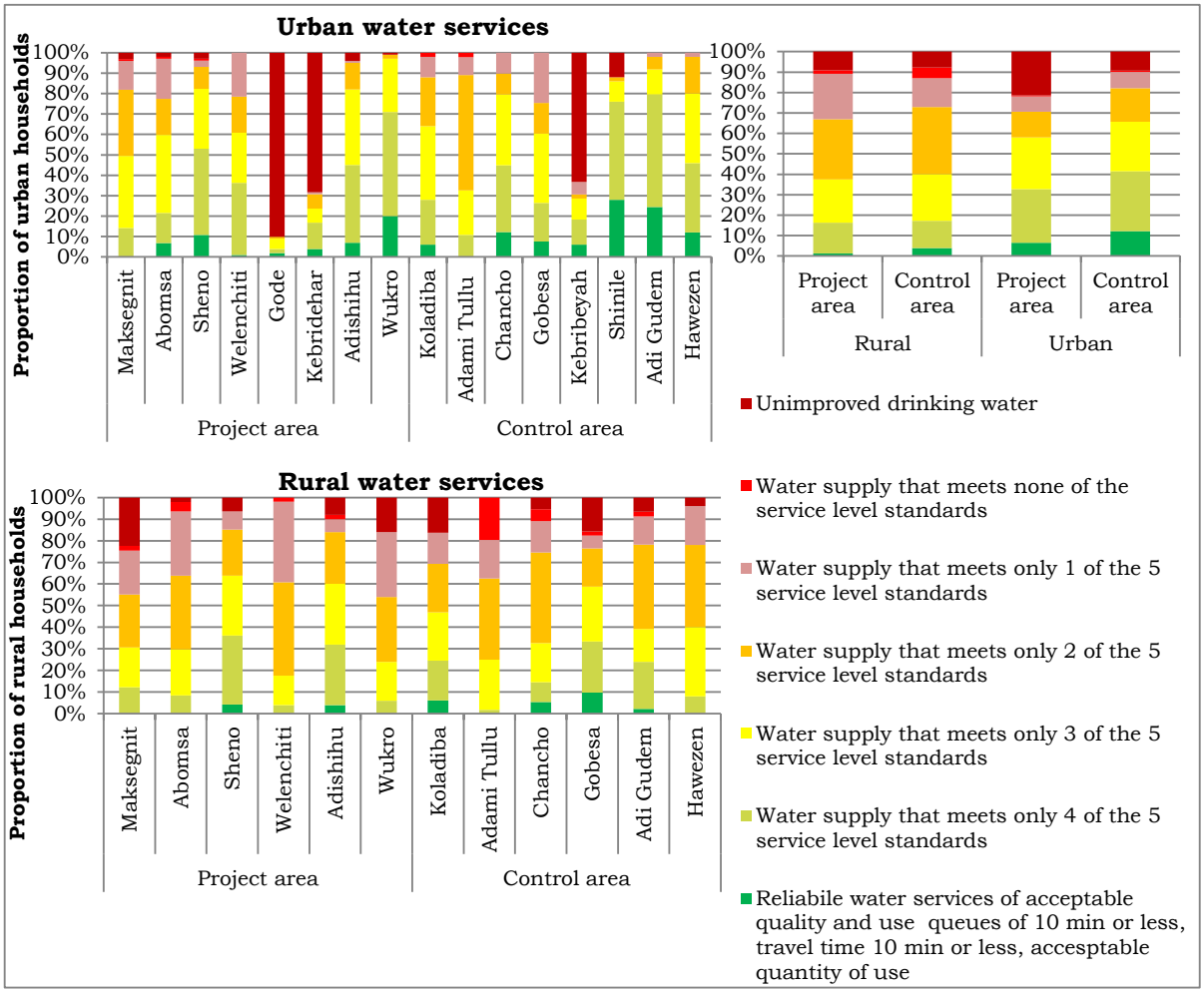
Figure 12: Accessibility of water services



According to the national standard, the **quantity** of water use should be at least 20 litres per capita per day in urban areas and 15 lpcd in rural areas. In Welenchiti, 56% of urban households reported to use at least 20 litres per capita per day. In all other towns, less than half of urban households reported to use at least 20 litres per capita per day. Project towns have significantly larger proportion of households using at least 20 litres per capita per day compared to the proportion in the control towns (weighted p-value = 0.008198). In the rural areas around Welenchiti, Sheno and Abomsa, 51% , 57% and 51% of households reported to use at least 15 litres per capita per day. In the rural areas around all other towns, less than half of the households reported to use at least 15 litres per capita per day. In rural areas with a threshold of 15 litres per capita per day, the difference between project and control areas remains significant (p-value = 0.0007135)

The **level of service** accessed by households can be assessed based on the reliability, accessibility (in terms of queueing time and travel time), quality and quantity, as presented above. As show in figure 13, only a very small proportion of households have access to year-round reliable water services, with a travel time of 10 minutes or less (single trip) and a queuing time of 10 minutes or less, with water of acceptable quality, using at least 20 lpcd in urban areas or 15 lpcd in rural areas.

Figure 13: Water service levels



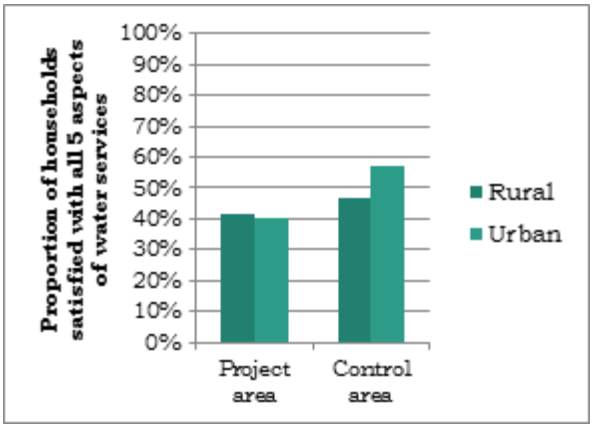
The proportion meeting all five service level standards was slightly higher in the urban areas than in the rural areas, while the proportion of households meeting all but one service level indicator, was higher for urban households than for rural.

User satisfaction with water services

The table below gives an overview of the proportion of households satisfied with all five aspects of water service provision (reliability, accessibility in terms of distance and time spending, quality and quantity) in the rural and urban project and control areas.

There was no significant difference in the proportion of overall satisfied households between urban and rural in the project areas. In the control areas, a slightly higher proportion of users were found to be satisfied than in project areas.

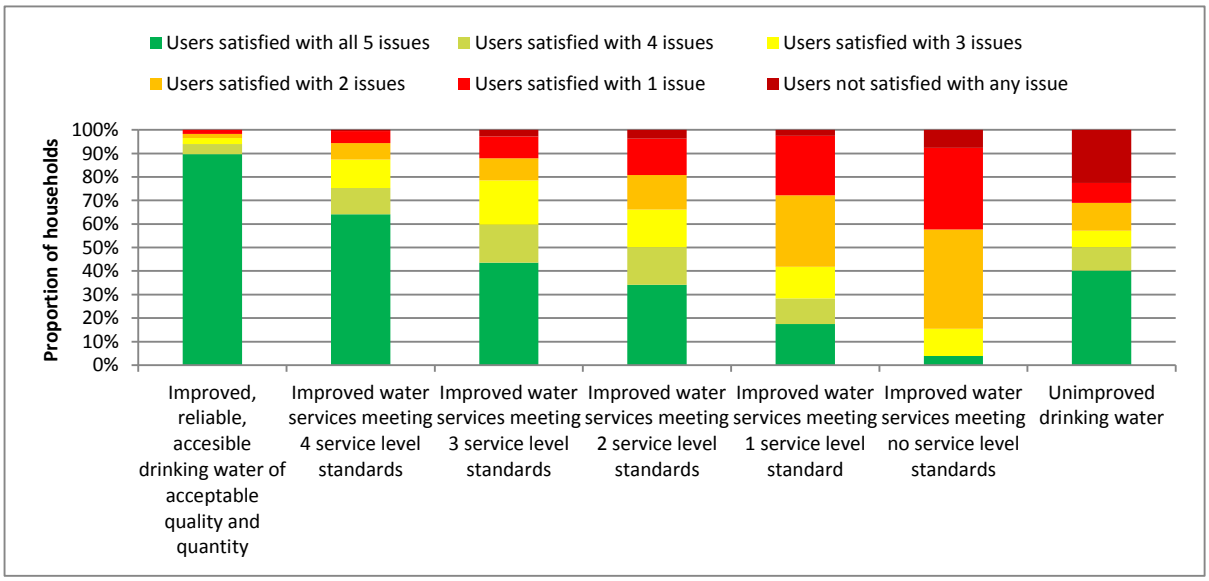
Figure 14: User satisfaction with water services



The proportion of households satisfied with the reliability of their water services roughly follows the same pattern as the proportion of households having access to very reliable services. In general however, households seem to be satisfied with reliability, even when the services that they access are not very reliable. Half of the households accessing unreliable water services expressed to be satisfied with the reliability of these services. Roughly the same was true for user satisfaction with time spending and actual time spending and user satisfaction with water quality and actual perceived quality. Comparing households using at least the prescribed amount (15 lpcd in rural areas, 20 lpcd in urban areas) and users not doing so, shows similar levels of user satisfaction with water quantity.

As shown in Figure 15, user satisfaction seems to be correlated with the level of service households access. However, interestingly the proportion of households satisfied with their water services was found to be almost equal for households accessing unimproved water sources, than for households accessing sub-standard water services, which only meet three of the five service level standards. Thus user satisfaction with unimproved services is often higher than satisfaction with bad improved water services.

Figure 15: Service level and user satisfaction



4.4 Sanitation and hygiene services and practices at household and community level in the intervention and control towns

Access to sanitation services

In general, sanitation coverage was lower than water coverage. Only in the Somali Region towns Gode, Kebridehar and Kebrebeyah, the improved sanitation coverage was found to be higher than the improved water coverage. Coverage in the urban areas was significantly higher than in the rural areas surrounding the towns (Pearson's Chi-squared test, p-value= < 2.2e-16).

Figure 16: Urban sanitation coverage

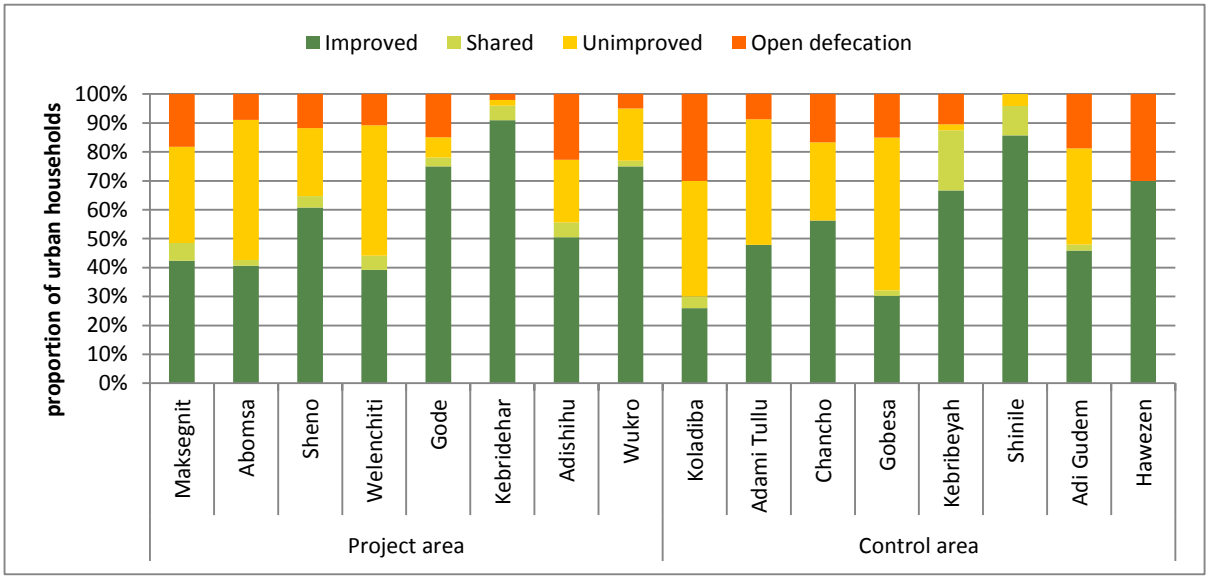
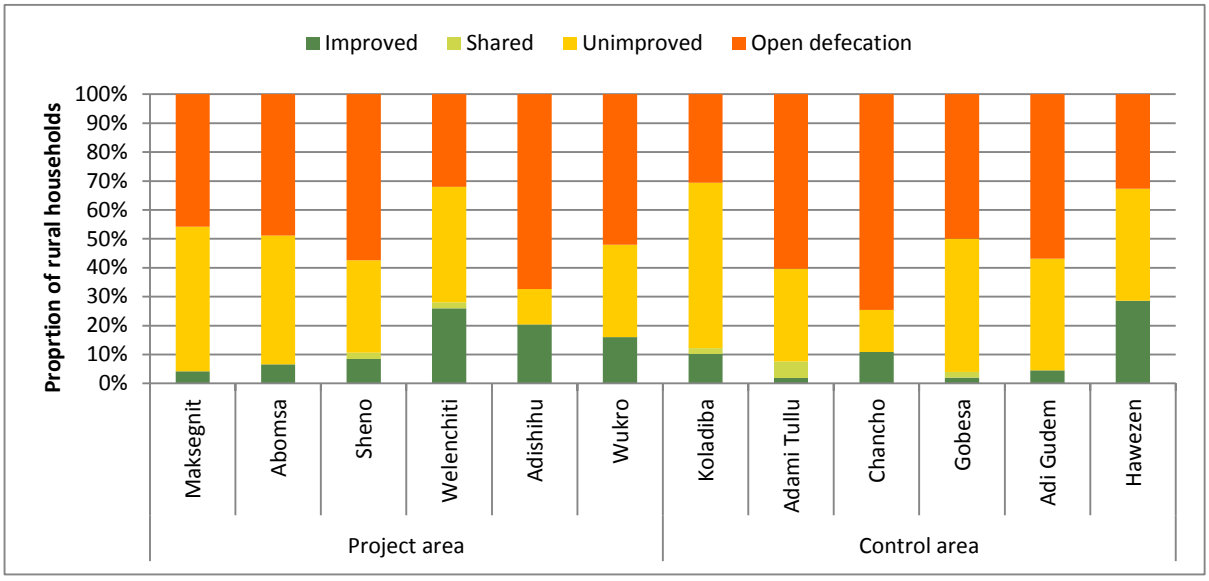
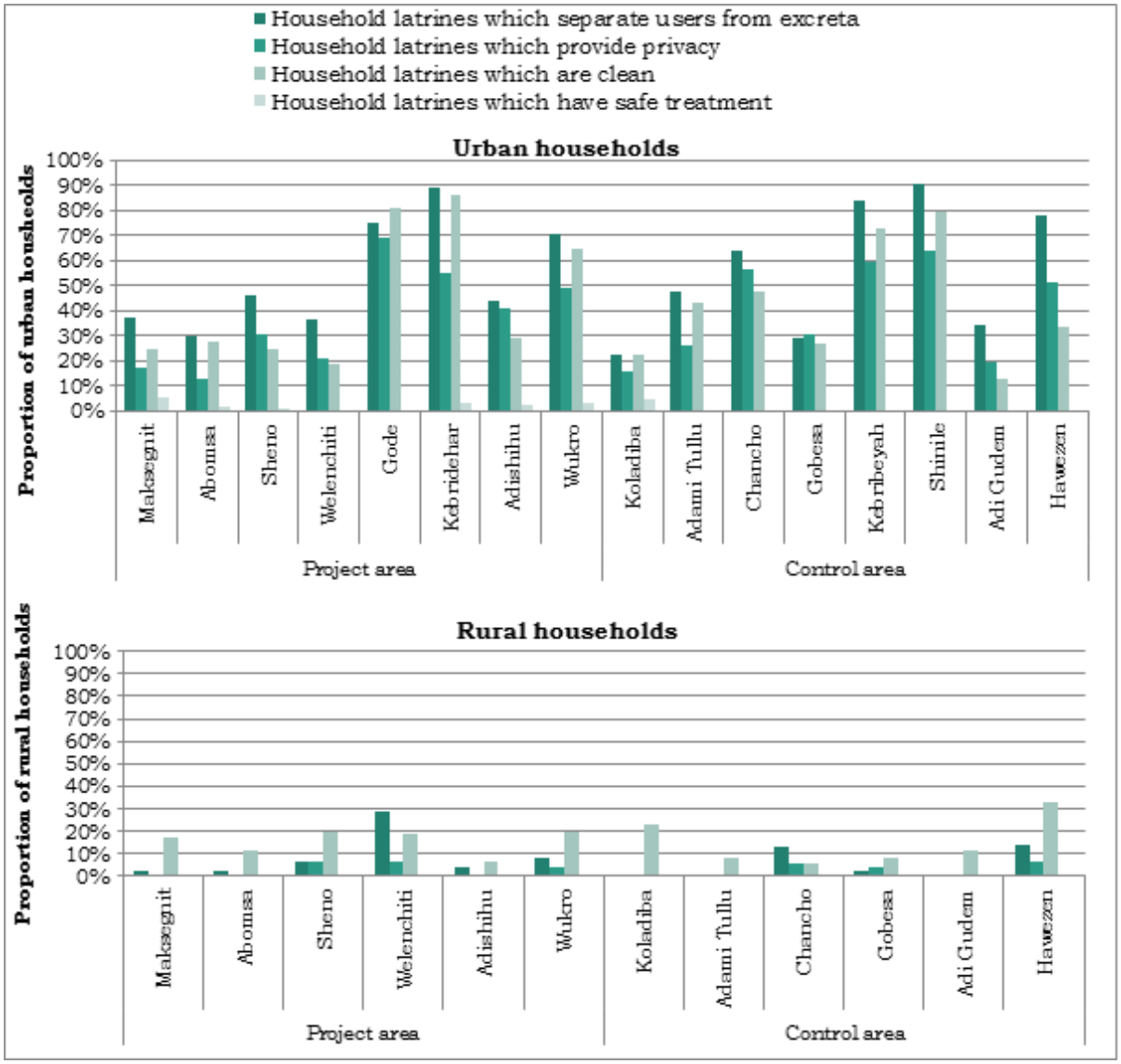


Figure 17: Rural sanitation coverage



However, even households which have access to improved sanitation facilities do not necessarily have access to sanitation services which provide privacy, are clean and which have safe treatment of the human waste (See figure 18) This figure shows that only very few households have access to sanitation facilities with safe treatment of the human waste.

Figure 18: sanitation service levels

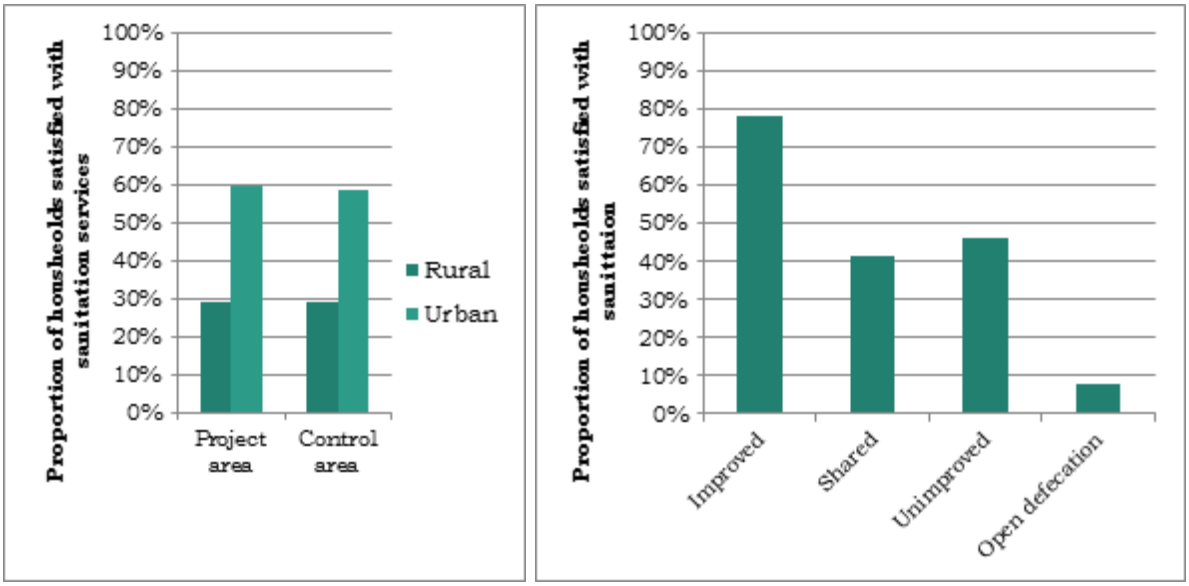


User satisfaction with sanitation services

Users were asked about their satisfaction with the following aspects of their sanitation services: privacy, safety, comfort and cleanliness. Almost half of users of unimproved sanitation facilities indicated to be satisfied with all fours of these aspects. A little more than 20% of users of improved sanitation facilities indicated not to be satisfied with at least one of the aspects mentioned above.

The proportion of users satisfied with their sanitation service was statistically significantly higher in the urban areas of the towns than in the rural areas surrounding the towns. No significant difference was observed between the project and control towns.

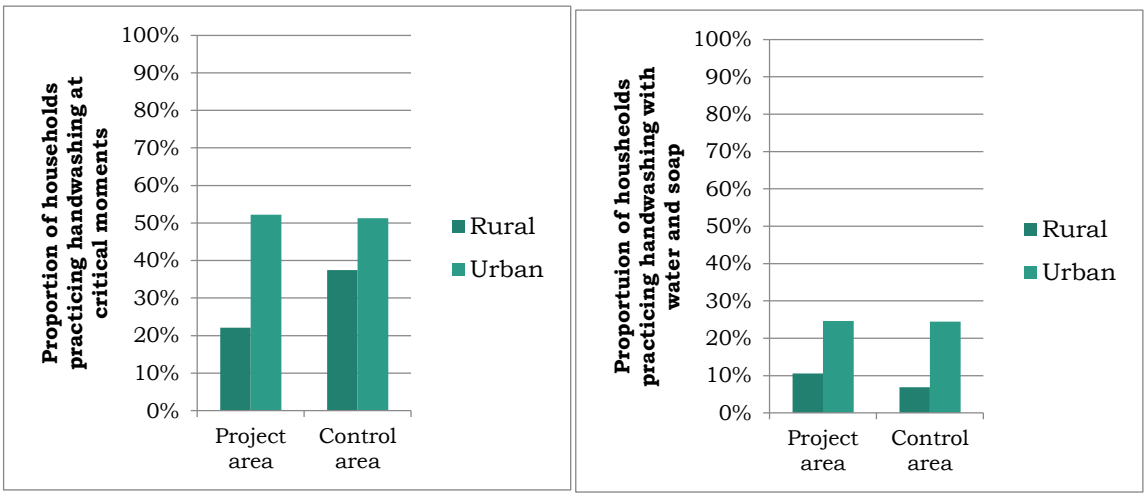
Figure 19: User satisfaction with sanittaion



Hand washing

Both in the project towns and well as the control towns, Only a bit more than half of respondents who reported to practice hand-washing at the 6 critical moments in the urban areas. Only about a quarter of respondents demonstrated to wash hands with water and soap or ash. In the rural areas surrounding the towns this proportion was even lower.

Figure 20: Handwashing practices (Left: Proportion of respondents which wash hands at all crucial moments; Right: Proportion of respondants who showed practicing handwashing with soap)



Solid waste management

Three of the project towns (Shano, Wukro, Welenchiti)) and four of the control towns (Hawezen, Kola Diba, Chancho, Adi Gudem) have a waste management organisation. Table 8 gives an overview of these waste management organisations.

Table 9: Waste management

Town	Type of waste management oragnisation	Number of staff	Number of residential clients	Number of institutional clients	Number of commercial clients	Waste treatment
Sheno	Micro enterprise (micro)	3	80	0	0	Dumping at official dumping site
Wukro	Micro enterprise (micro)	24	7180	0	150	Composting
Welenchiti	Micro enterprise (micro)	3	400	5	70	Burning
Hawezen	Micro enterprise (micro)	10	2500	0	100	Dumping at official dumping site
Kola Diba	Social enterprise, facilitated by NGO/CSO	4	300	0	0	Burning
Chancho	Individual	8	32	0	5	Dumping at official dumping site
Adi Gudem	Municipality	10	20000	0	50	Dumping at unofficial location

There is no liquid waste collection, transportation or treatment facility in any of the towns. Some of the towns occasionally arrange to bring a vacuum truck from nearby bigger cities, like Addis Ababa and Gondor, which are mostly used by business and commercial facilities.

4.5 Institutional sanitation and hygiene services and practices

Overview of institutions

All towns and their surrounding rural areas have schools and health facilities. The project towns Welenchiti, Sheno, Abomsa and Wukro each have a prison as well. Adi Gudem, Maksegnit and Wukro each have a TVET college. Wukro also has two colleges (Wukro Poly Agriculcheral College and Wukro St Mary College) and Koladiba has a technical and vocational training school. Public latrines were found in project towns Wukro (3) and Adishihi (2) and control town Hawezen (2).

The project towns Wukro and Gode have the higher number of institutions. This is not surprising as these are the two biggest towns considered in this study.

Figure 21: Number of institutions in urban areas

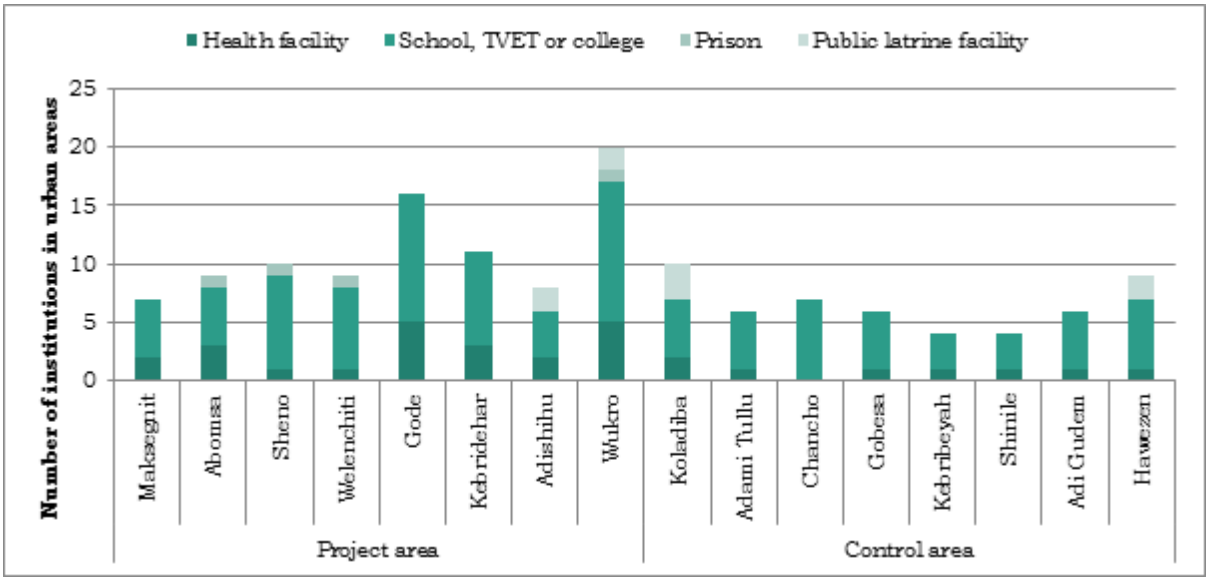
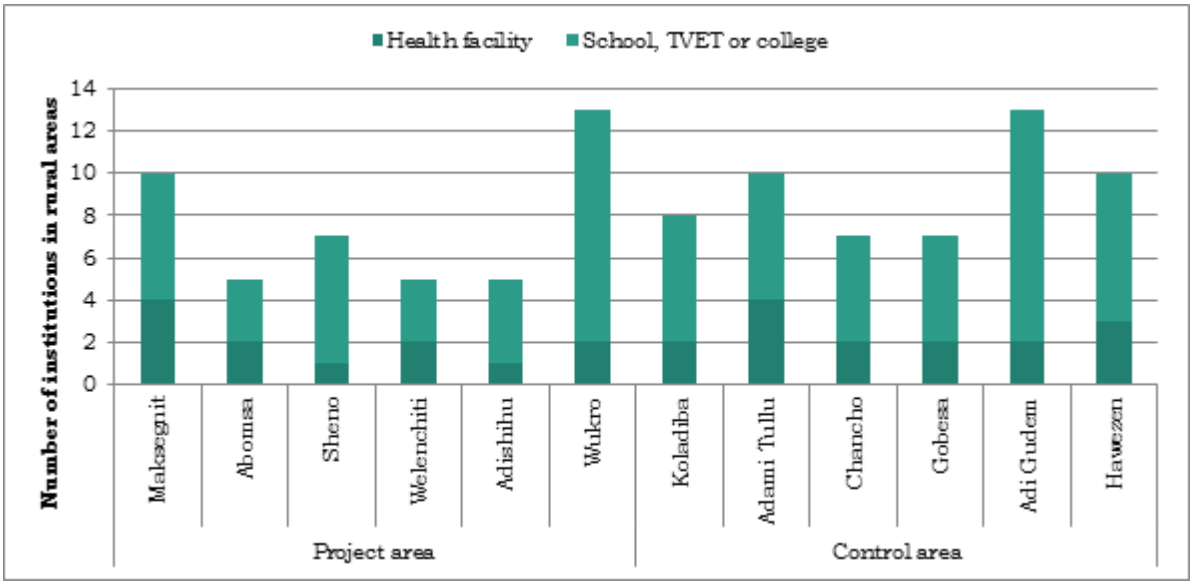


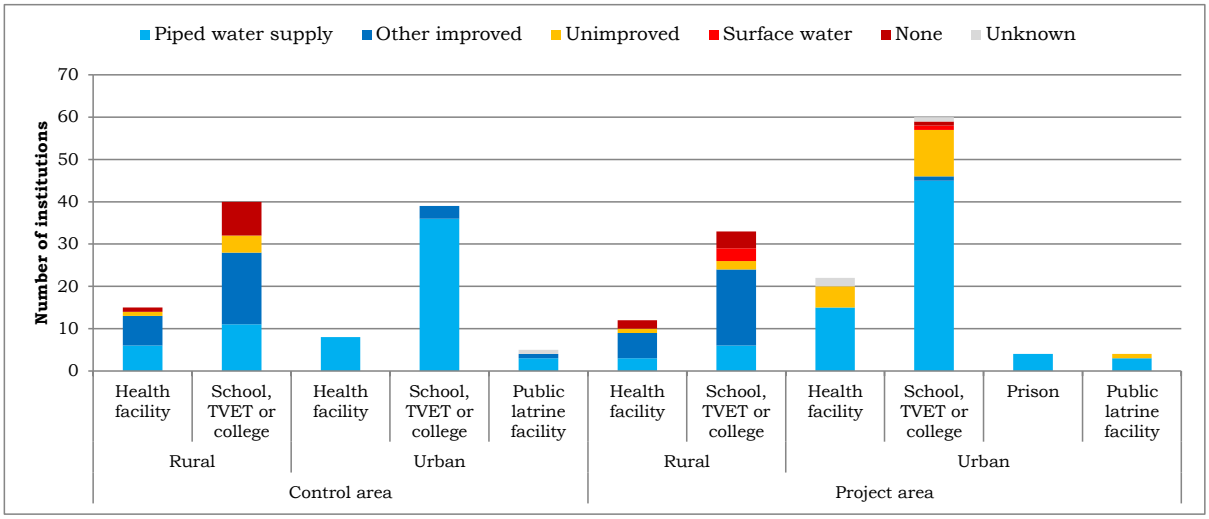
Figure 22: Number of institutions in rural areas



Institutional water supply

All four prisons and most health facilities and school in the urban areas of the towns depended on piped water as their main source of water supply. In the rural areas, many institutions depended on other improved water sources, like handpumps.

Figure 23: Institutional water supply



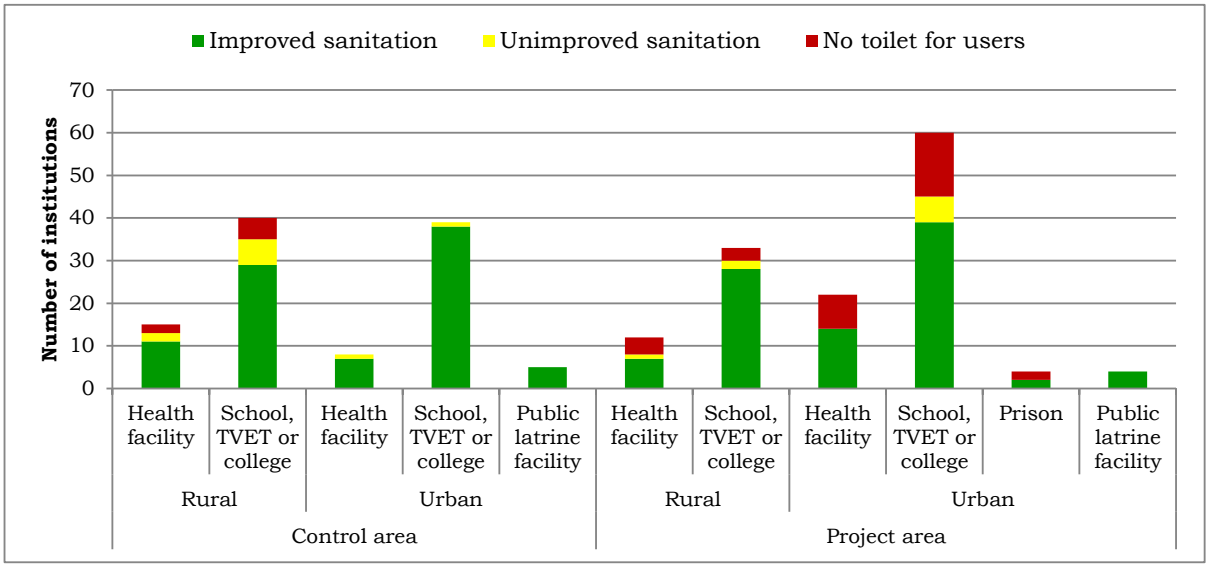
However, it should be noted that for half of the rural schools and two thirds of the rural health facilities the improved water source was not **functioning** at the time of the assessment. Overall, only 15% of rural health facilities and 30% of rural schools have functioning improved water supply facilities within their compound. In the urban areas, about half (49%) of schools and 57% of health facilities had functioning improved water supply facilities within their compound. The prison in Abomsa does not have water supply in the compound, but depends on piped water supply from outside the compound. The other three prisons did have a functioning piped water connection within their compound.

Institutional sanitation

All institutions in the urban areas of the control towns have sanitation facilities, while several institutions in the urban areas of the project towns do not. A small proportion of rural schools and health facilities in both the project as well as the control towns does not have sanitation facilities.

The Abomsa prison, which does not have water supply within the compound, also reported not to have latrine facilities of its 424 male and 14 female inmates. Also the Welenchiti police Centre reported not to have sanitation facilities for its 32 inmates. 14 of the 57 health facilities and 23 of the 172 schools did not have sanitation facilities either.

Figure 24: Institutional sanitation



As shown in the table below, not all institutions have separate latrines for men and women. Also, not all institutions provide private facilities, especially in the project areas. Also, only relatively few institutions have sanitation facilities which are considered clean and even less have safe disposal of the human waste. About half of the institutions reported that they have sanitation facilities which are used by all male and female users. Only few institutions have hand washing facilities and facilities for the disposal of menstrual health materials.

Table 10: Institutional sanitation

	Control area					Project area					
	Rural		Urban			Rural		Urban			
	Health facility	School, TVET or college	Health facility	School, TVET or college	Public latrine facility	Health facility	School, TVET or college	Health facility	School, TVET or college	Prison	Public latrine facility
Number of institutions	15	40	8	39	5	12	33	22	59	4	4
Institutions with sanitation facilities which separate users from excreta	12 (80%)	27 (68%)	8 (100%)	37 (95%)	5 (100%)	7 (58%)	26 (79%)	13 (59%)	42 (71%)	2 (50%)	4 (100%)
Institutions with separated sanitation facilities for males and females	3 (20%)	24 (60%)	5 (63%)	35 (90%)	2 (40%)	2 (17%)	20 (61%)	7 (32%)	33 (56%)	2 (50%)	2 (50%)
Institutions with sanitation facilities which provide privacy	12 (80%)	28 (70%)	8 (100%)	33 (85%)	5 (100%)	7 (58%)	22 (67%)	14 (64%)	29 (49%)	2 (50%)	3 (75%)
Institutions with clean sanitation facilities	4 (27%)	7 (18%)	6 (75%)	10 (26%)	3 (60%)	4 (33%)	13 (39%)	6 (27%)	11 (19%)	1 (25%)	0 (0%)
Institutions with safe disposal of human waste	1 (7%)	2 (5%)	4 (50%)	11 (28%)	1 (20%)	0 (0%)	0 (0%)	4 (18%)	10 (17%)	0 (0%)	2 (50%)
Institutions for which all males were reported to use sanitation facilities	7 (47%)	21 (53%)	6 (75%)	31 (79%)	3 (60%)	3 (25%)	16 (48%)	10 (45%)	26 (44%)	2 (50%)	0 (0%)
Institutions for which all females were reported to use sanitation facilities	9 (60%)	21 (53%)	6 (75%)	31 (79%)	3 (60%)	2 (17%)	14 (42%)	10 (45%)	27 (46%)	2 (505%)	0 (0%)
Institutions with hand washing facility with water and soap	2 (13%)	1 (3%)	2 (25%)	3 (8%)	0 (0%)	1 (8%)	1 (3%)	2 (9%)	4 (7%)	2 (50%)	0 (0%)
Institutions with menstrual hygiene disposal facilities	2 (13%)	3 (8%)	5 (63%)	8 (21%)	1 (20%)	3 (25%)	6 (18%)	11 (50%)	10 (17%)	0 (0%)	0 (0%)

Institutional solid waste management

Two of the health facilities in Wukro and the prison in Welenchiti reported to have their solid waste collected by external agents. The majority of other schools and health centres burn their solid waste in their compound, while almost 10% of schools and health facilities burn their solid waste outside the compound.

For two health facilities in Wukro medical waste is collected by external agents. One health facility in Adi Gudem dumps medical waste within the compound and three in Gode, one in Maksegnit and one in Welenchiti burn their medical waste outside the compound. The remaining health facilities burn their medical waste within the compound.

Figure 25: Medical waste dumped within the compound of a health facility

5. Recommendations and next steps

The surveys undertaken have established a baseline for the quasi-randomised control trial to assess impacts of the One WaSH Plus programme in the targeted small towns. Follow-up activities within the framework of the independent monitoring and knowledge management services provided by IRC/ Hoarec include:

- Preparation of an accompanying powerpoint presentation to provide key figures and tables from this report (and some that were not included due to space constraints) in an alternative format for presentation.
- To provide access to the baseline survey dataset and documentation to the One WaSH Plus project team, project partners and wider as desired. Currently only uncleaned data is available to the MoWIE in Akvo FLOW (since data was collected using the MoWIE instance), and key findings have been made available in towbn factsheets.
- baseline survey data will be further used (with additional primary data collection in April/May 2015) for sustainability checks of service delivery arrangements within the 8 towns.
- To review gaps in the baseline study and collect additional information either from existing data sources or new data collection. One example is with respect to other water quality parameters (e.g. Flouride is a known problem in some project towns). Data collection for upcoming sustainability checks (around April/ May 2015) provides an opportunity to cost-effectively collect additional data to fill such gaps or where additional data points over time are desired.
- To review potential to collect additional data prior to the midline and endline surveys with respect to variables that are expected to be seasonally variable (e.g. microbial water quality). The study has identified microbial contamination (E. coli was the selected indicator) as a major concern but this is likely to vary consideration on both seasonal and shorter term time-scales (associated with phased supply to town zones and intermittent supplies). Water quality testing could be supplemented during follow-up visits, or town water utility staff trained to use simple tests and collect additional data.
- IRC/ Hoarec to already begin detailed planning and allocate resources for the focused midline survey and a more comprehensive endline survey. Where possible, plans will be established and detailed with preparations made during 2015.
- To prepare and submit at least one article to an academic journal based upon the key findings of the baseline survey.

5. References

Central Statistical Agency (2014). *Ethiopia Mini Demographic and Health Survey 2014*. Addis Ababa, Ethiopia: Central Statistical Agency

Dagnew Tadesse, Assefa Desta, Aberra Geyid, Woldemariam Girma, Solomon Fisseha, Oliver Schmoll (2010). *Rapid assessment of drinking water quality in the Federal Democratic Republic of Ethiopia: country report of the pilot project implementation in 2004-2005*. Geneva: WHO/ UNICEF.

6. Annexes

Annex 1: Baseline data collection guidelines

See attached document (version 13 October 2014)

Annex 2: Baseline survey details, Oromia

Details of baseline survey		
Intervention: towns (satellite villages/kebeles)	Abomsa (Homba, Dambaka Iftu, Shamo Gado) Sheno (Lay Kombolcha, Mogoro, Itisa & Injifano, Zango, Adadi Mato) Welenchiti (Tiri Bireti, Digalu Wanga, Tadacha)	8-13 October 2014 22-29 September 2014 30 September – 7 October 2014
Control: towns (satellite villages/ kebeles)	Adami Tulu (Gobajocho, Anano Shisho, Haleku Chancho (Chancho Buba, Eco Efo Babo, Guto Ilamu) Gobessa (Hanuf Jawe, Helamakana, Zenbaba Hela)	20-23 October 2014 24-29 October 2014 14-19 October 2014
Coordinator/ supervisor	Lemessa Mekonta	T: 0911115897
List of enumerators (home town in brackets)	Mengistu Tefera Urge (Sheno) Dereje Yadete (Sheno) Kasim Abdella (Abomsa) Ibsa Fayissa (Abomsa) Midakso Ragassa (Welenchiti) Badhaso Kacha (Welenchiti)	T: 0910099955 T: 0921129262 T: 0922074082 T: 0923688349 T: 0912150653 T: 0910242370

Annex 3: Baseline survey details, Tigray/Amhara

Details of baseline survey		
Intervention: towns (satellite villages/kebeles)	Maksegnit (Bahir Ginb/Bahir ginb),Jayra/Jayra, Chinchaye/ Chinchaye degolo, Tsion/Tsion Seguage, Seguage/Tsion seguage)	3-8 November 2015
	AdiShuhu (Lalay Atsela 1/Atsela, Lalaey Atsela 2/Atsela, Amblaje-Wogenen/Atsela, Kola seasat/ Atsela & Melaeso/Tekeha)	1-6 December 2015
	Wukro (Maytewaro/Aynalem, Dengolo/Dengolo, Korir/dengolo, Tsehala/T. Adikisandid &Lalay wukro/T. Adikisandid	24-29 November 2015
Control: towns (satellite villages/ kebeles)	Koladiba (Atikilit-Telefit, Chilo-Salje and Jangua kebles)	10-15 November 2015
	Hawuzen (Selam, Suluh & Maykado kebeles)	18-22 November 2015
	Adigodom (Ara Asegeda, Mesanu & Fikir Alem kebeles)	8-12 December 2015
Coordinator/ supervisor	Michael Abera	T: 0912116677
	Gedefaw Ayenew	T: 0911178648
List of enumerators	Hailemariam Endalamew	T: 0910120379
	Muluken Aragew	T: 0918038979
	Teame Abay	T: 0913070477
	Mehariew Nibret	T: 0918706520
	Hailu Meresa	T: 0925062024
	Getenet Ashagrie	T: 0914750690

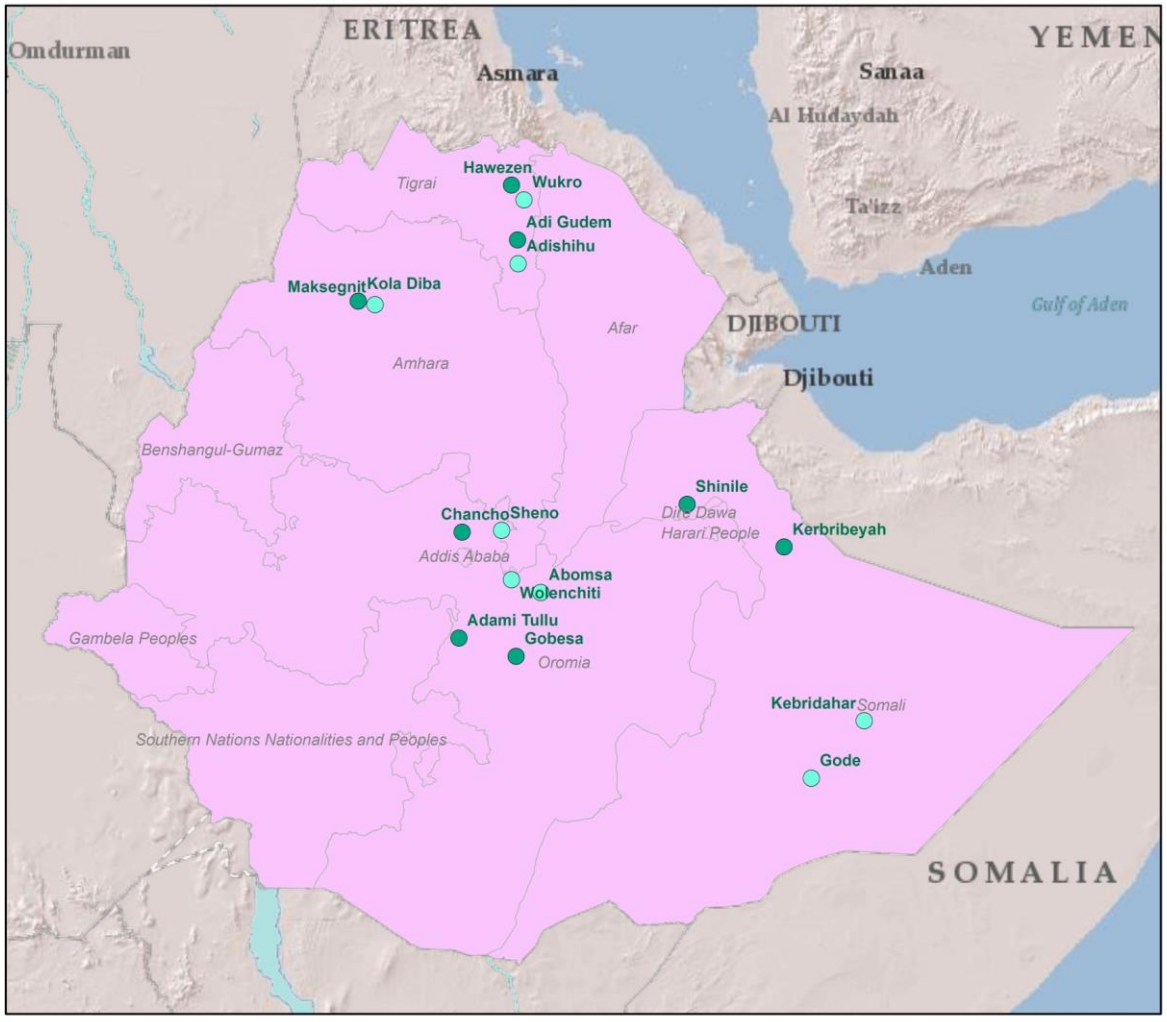
Annex 4: Baseline survey details, Somali

Details of baseline survey		
Intervention: towns	Kebridahar Gode	10-13 November 2014 23-30 November 2014
Control: towns	Kebribayah Shinile	15-17 November 2014 18-20 November 2014
Coordinator	Moh'ed A. Bihi	T: 0912623221
Supervisors	Mukhtar Sh. Hussein Muse Harun Hassan	T: 0915749611 T: 0910109535
List of enumerators	Ahmed Dahir Moalin Abdiasis Ibrahim Bihi Ramadan E. Ismael Abdiwasac A. Hussein	T: 0915077218 T: 0915217975 T: 0911072526 T: 0915008971

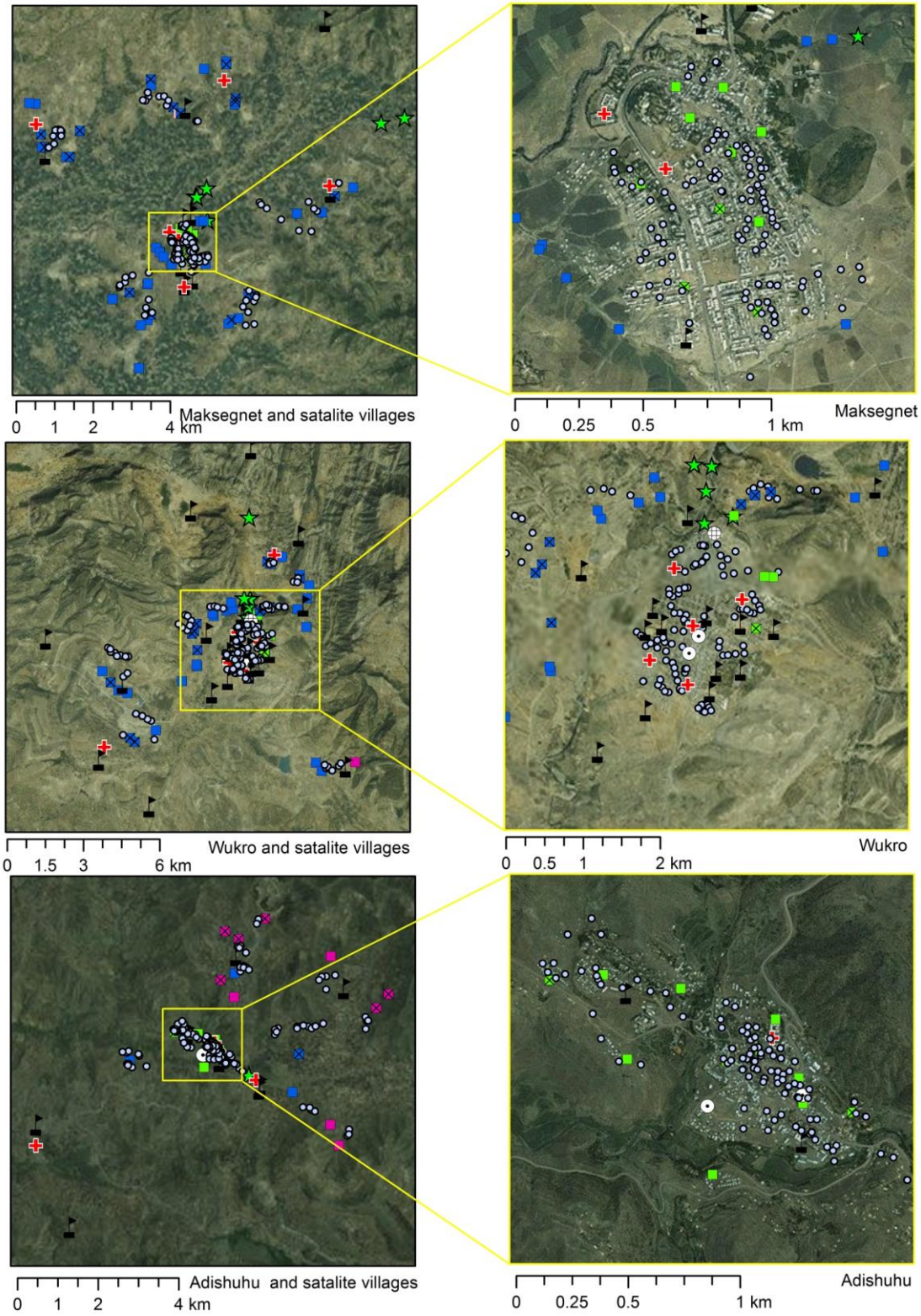
Annex 5: Surveys

See attached document

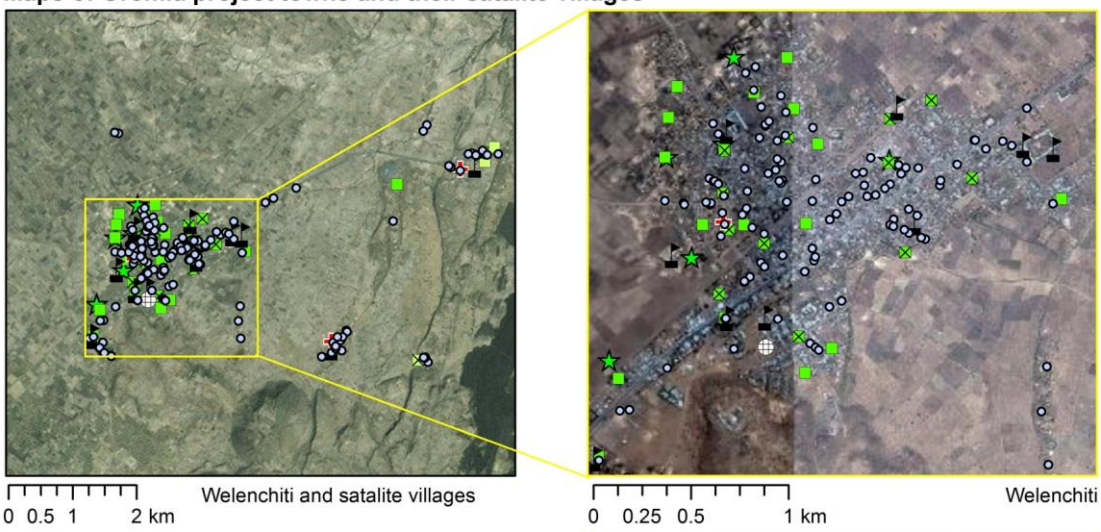
Annex 6: Maps of control towns

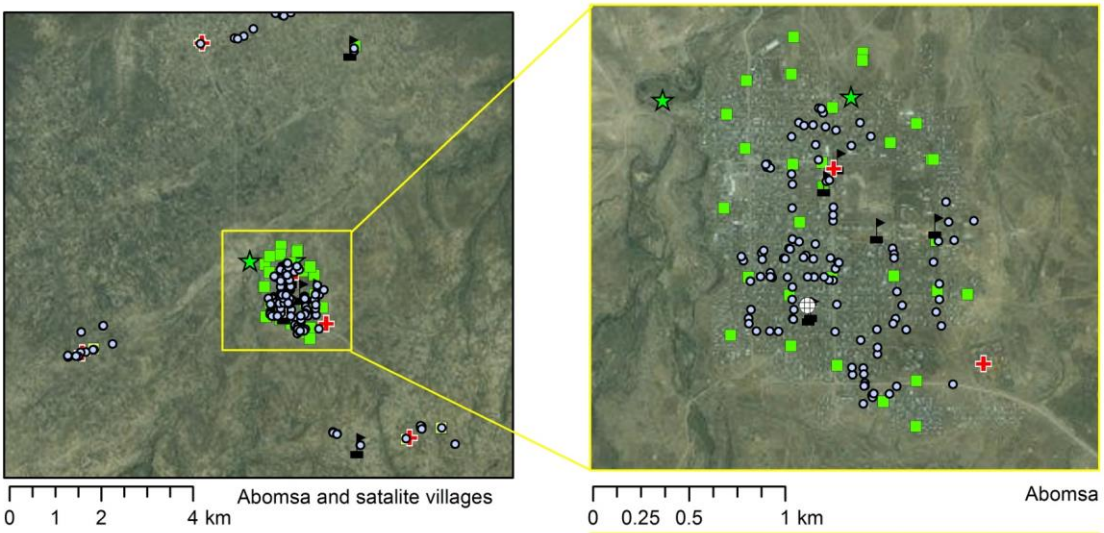


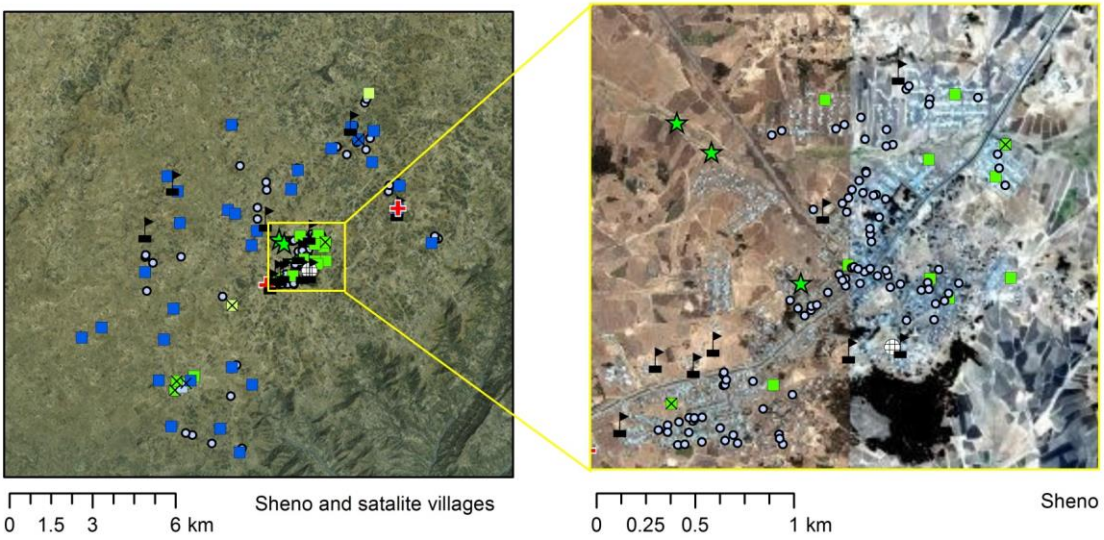
Maps of Amhara and Tigray project towns and their satalite villages



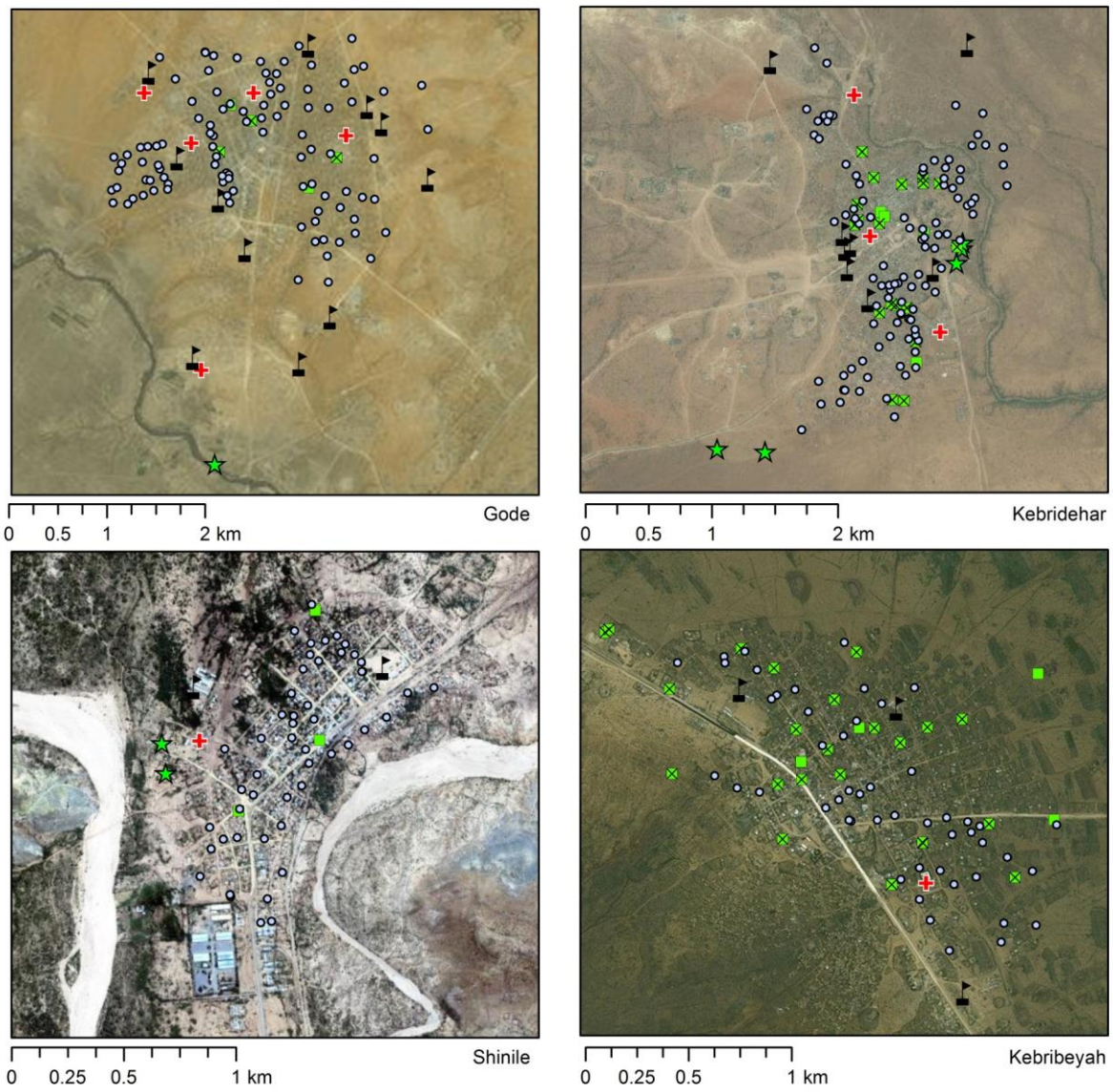
Maps of Oromia project towns and their satalite villages







Maps of Somali region project and control towns



Legend

- Urban piped scheme water source

Water point

Type

- unknown
- Handpump
- Hand dug well without handpump
- Tap(s) - not connected to town piped scheme
- Tap(s) - connected to town piped scheme
- Protected on-the-spot spring
- Unprotected on-the-spot spring

Functionality

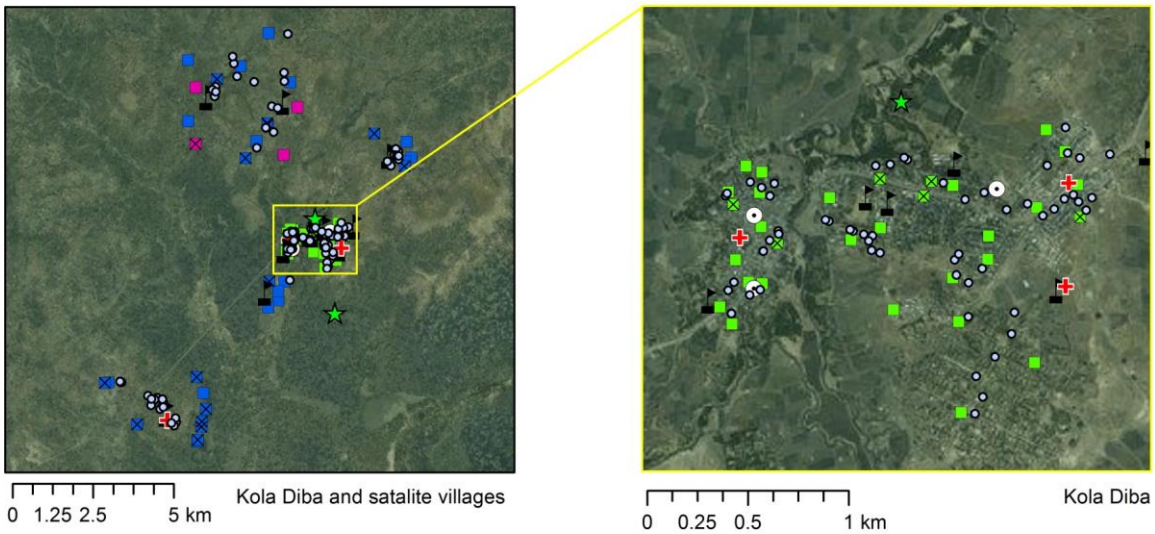
- Not functional or abandoned
- Sampled household

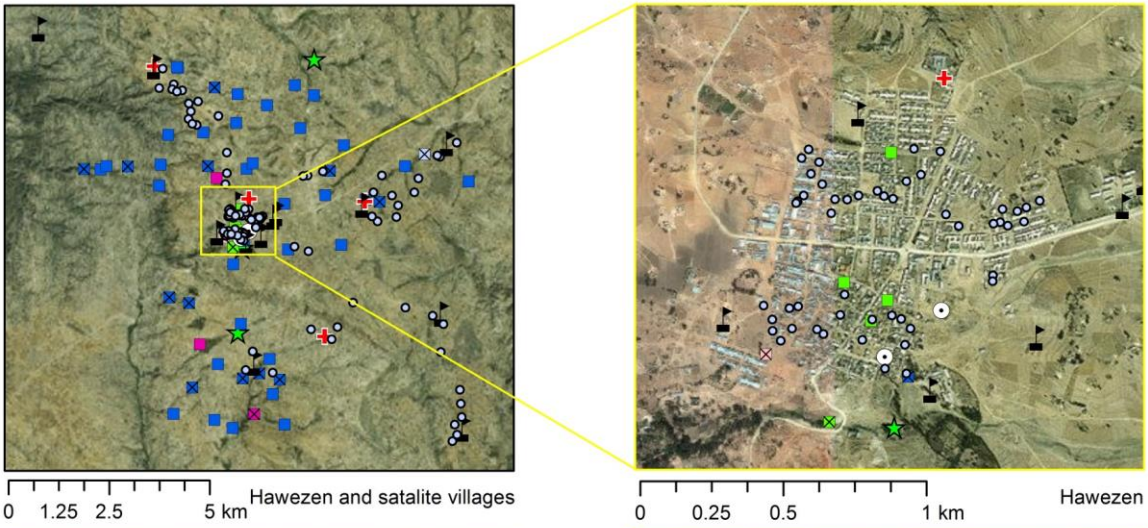
Institutions

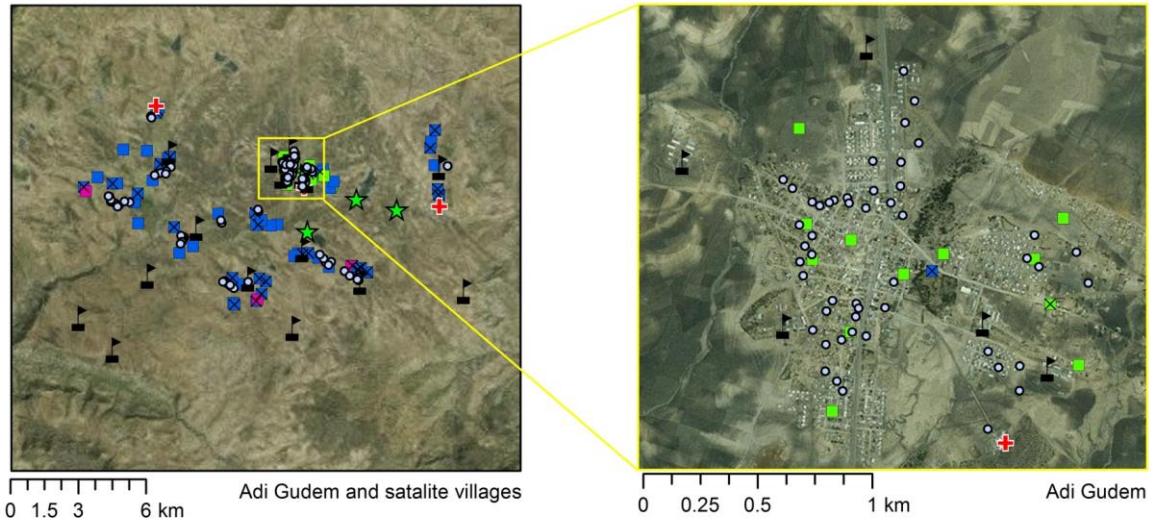
Type of institution

- Health facility
- Prison
- Public latrine facility
- School, TVET or college

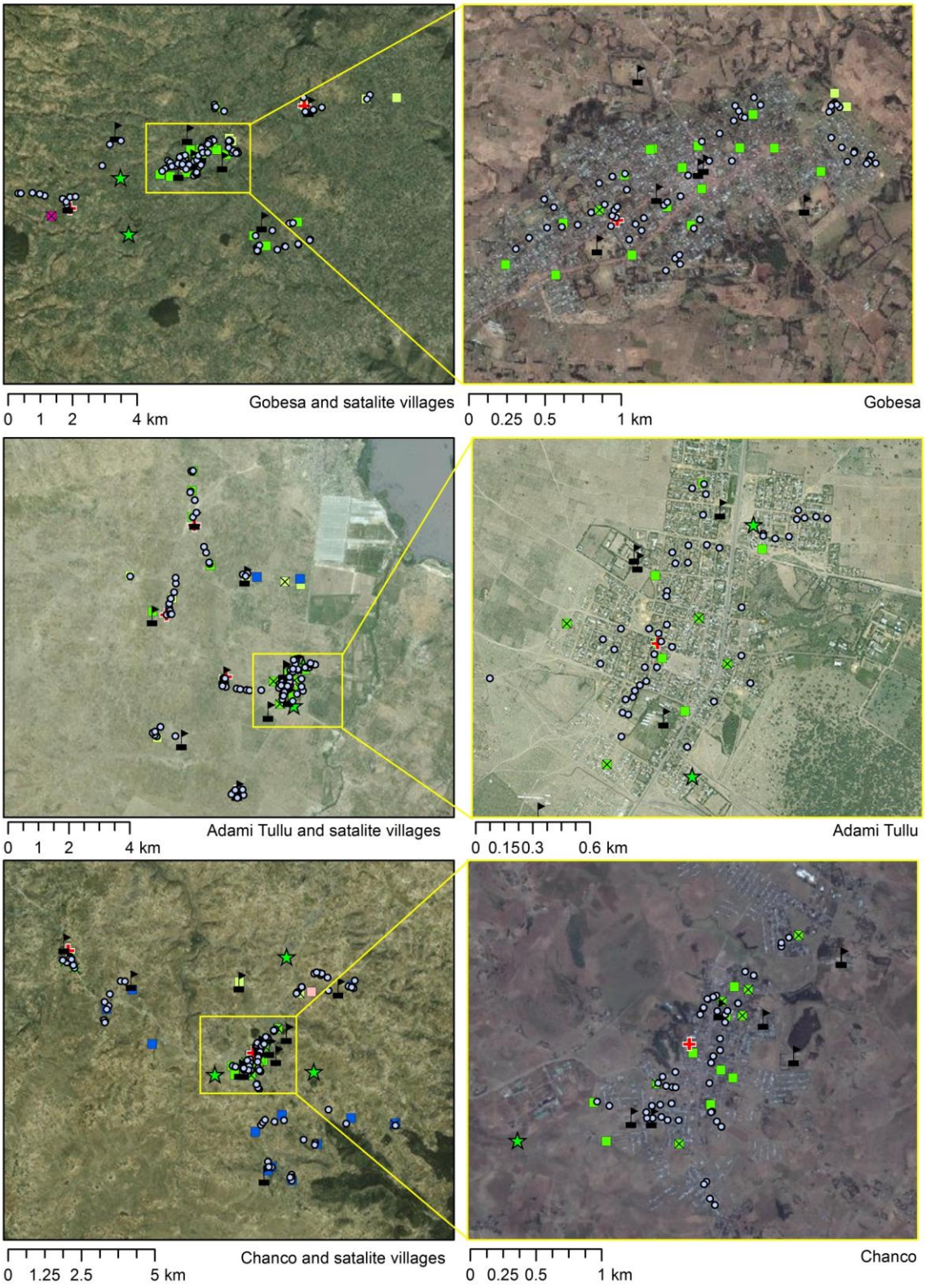
Maps of Amhara and Tigray controll towns and their satalite villages







Maps of Oromia control towns and their satalite villages



Annex 6: Number of administered surveys

		Urban water scheme	Urban water source	OWP water point	Water quality test, urban	Water quality test, rural	Institutional WASH	Waste collector	hh urban	hh rural	hh Total
Project area		**8**	**30**	**285**	**36**	**24**	**149**		**807**	**294**	**1101**
Amhara Region	Maksegnit	1	6	64	7	4	19		99	49	148
Oromia Region	Welenchiti	1	6	34	5	4	14	1	102	51	153
	Sheno	1	3	53	3	4	17	1	102	47	149
	Abomsa	1	2	35	5	2	14		102	47	149
Somali Region	Gode	1	1	5	4		19	0	101		101
	Kebridehar	1	5	27	5		12	0	101		101
Tigray Region	Adishisu	1	1	25	5	5	16		100	50	150
	Wukro	1	6	42	3	5	38	1	100	50	150
Control area		**8**	**26**	**316**	**30**	**31**	**114**		**396**	**307**	**703**
Amhara Region	Koladiba	1	2	66	5	5	19	1	50	49	99
Oromia Region	Adami Tullu	1	2	25	1	5	16		46	56	102
	Gobesa	1	2	27	2	4	13		53	51	104
	Chancho	1	3	33	2	5	14	1	49	55	104
Somali Region	Kebribeyah	1	9	27	4		4	0	49		49
	Shinile	1	2	4	4		5	0	50		50
Tigray Region	Hawezen	1	3	56	6	5	21	1	50	50	100
	Adi Gudem	1	3	78	5	7	22	1	49	46	95
	Grand Total	**16**	**56**	**601**	**66**	**55**	**263**		**1203**	**601**	**1804**

About…

This report summarises and presents the initial analysis of a baseline study of water, sanitation and hygiene services in 16 small towns across 4 regions of Ethiopia (Amhara, Oromia, Somali, Tigray). The study was part of a quasi-randomised control trial to assess the impacts of the One WaSH Plus programme being implemented by the UNICEF and the Government of Ethiopia. Data collection was undertaken during the period October to December 2014.