Baseline Survey of Peri-Urban Sanitation and Hygiene in Cotonou, Abomey-Calavi, and Porto-Novo, Benin

APRIL 2015

About WASHplus

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

Recommended Citation

WASHplus. 2015. Baseline Survey of Peri-Urban Sanitation and Hygiene in Cotonou, Abomey-Calavi, and Porto-Novo, Benin. Washington DC: USAID/WASHplus Project.

Acknowledgments

WASHplus would like to express our gratitude to Alain Zomadi of Colter Ingenierie, WASHplus M&E Specialist Dr. Orlando Hernandez, and WASHplus Benin Coordinator Armand Aguidi, for the labor involved in designing and carrying out this study. Thanks also to Catherine Bocher of FHI 360 for translating the document from French to English, and to WASHplus Program Officer Sarah Yagoda, for contributing considerably to the production of the document in both languages. Finally, WASHplus would like to acknowledge and thank the tireless enumerators and patient residents that participated in the study.

Contact Information

WASHplus
FHI 360
1825 Connecticut Ave NW
Washington, DC 20009
202.884.8000
www.WASHplus.org
contact@washplus.org

COLTER Ingénierie-Conseils
01 BP 5835 Cotonou/BENIN
Tel: +229 – 21 00 79 43
Email: benin@colter-ic.com

This study is made possible by the generous support of the American people through the United States Agency for International Development (USAID) Bureau for Global Health under terms of Cooperative Agreement No. AID-OAA-A-10-00040. The contents are the responsibility of FHI 360, and do not necessarily reflect the views of USAID or the United States Government.

Table of Contents

List of Tables

List of Figures

ACRONYMS

EA	Enumeration Areas
GHI	Global Health Initiative
INSAE	National Institute of Statistics and Economic Analysis
JMP	Joint Monitoring Programme
NGO	Nongovernmental Organization
RGPH	General Population and Habitat Census
SONEB	Société Nationale des Eaux du Bénin
WASH	Water, Sanitation, and Hygiene

Introduction

Worldwide, diarrheal diseases cause over 1.5 million deaths per year, mostly in children under 5 years of age (Boschi-Pinto, 2008). Benin is no exception.

Lack of safe drinking water and sanitation and inadequate hygiene are the principal global causes of diarrheal diseases estimated at 4 billion annually; 2.5 million Beninese use unimproved or shared latrines, and 5.2 million do not have any latrine and defecate outdoors (WSP 2012).

Joint Monitoring Programme (JMP) estimates in 2010 for the water, sanitation, and hygiene (WASH) sector in Benin indicate better access to water than to sanitation for the entire country. Only 25 percent of households relied exclusively on unimproved or surface water sources. However, 56 percent of households defecate in the open. This means that throughout the country lack of access to sanitation was twice as high as the lack of access to safe drinking water sources. According to the same source, urban areas were, as we might expect, generally better served than rural areas. But the data reported to JMP still indicate that 28 percent of households in urban areas defecate in the open.

Benin is a country with rapid urban growth whose urban population will soon reach 50 percent of the entire population. By rural exodus and immigration, people come in a continuous flow and settle in crowded and/or flood-prone peri-urban areas in the coastal south. They build unplanned urban settlements along the entire length of the coast, up to and even beyond Porto-Novo. Among the effects of this uncontrolled urbanization: blocked drainage of rainwater to the lagoons and the sea, flooding, and lack of safe drinking water and access to sanitation. Seasonal cholera is an annual reality, and in 2010 became a humanitarian disaster.

Diarrhea and malnutrition are closely related to the extent that one exacerbates the other. In addition, UNICEF/Benin recently announced that the majority of unvaccinated children under the age of 5 live in urban areas.

Almost no WASH data exist for the unplanned peri-urban areas and the poorest neighborhoods of Cotonou, Abomey-Calavi, and Porto-Novo. Given the health impact on households without access to water, sanitation, and hygiene, it is critical to obtain a better understanding of the magnitude of the problem in these areas. This information will help develop a strategy to improve water supply and sanitation as well as hygiene practices, which will lead to the improvement of the health status of poor households in urban areas.

It is in this context that this household survey was implemented in three peri-urban areas of the cities of Cotonou, Abomey-Calavi, and Porto-Novo to generate the information needed to design such a strategy.

USAID/Benin funded this study through the global USAID/WASHplus project. As part of its health sector strategy and in accordance with the achievement of Millennium Development Goal 7, USAID/Benin launched a five-year program known as the Global Health Initiative (GHI) in October 2012. The target population of GHI will include urban and peri-

urban populations from Cotonou, Abomey-Calavi, and Porto-Novo as it has been shown that vulnerable groups in these areas have less access to basic health services than rural populations in Benin.

Survey Objectives

The overall objective of this survey is to measure access to drinking water and sanitation facilities, and to assess the basic hygiene practices of urban and peri-urban populations.

Specifically it will determine:

- The proportion of households using an improved sanitation facility
- The proportion of households in which there is a hand washing device near a toilet equipped with water and soap
- The proportion of households in which there is a hand washing device near the kitchen equipped with water and soap
- The proportion of households who treat drinking water correctly
- The proportion of households who store treated drinking water correctly

Methodology

Overall Sampling Strategy

The WASHplus program coordinator in Benin established a list of peri-urban districts in Cotonou, Porto-Novo, and Abomey-Calavi—coordinated with USAID/Benin's intended GHI target neighborhoods—using a census of flood prone zones. According to the study protocol, eight districts were to be selected. However, the initial census identified a total of 10 districts, some of which had only four or five enumeration areas (EA). It was therefore decided to include all areas in the study.

From this list of districts and with the help of the National Institute of Statistics and Economic Analysis (INSAE), an exhaustive list of EAs from the General Population and Habitat Census of 2012 was established. Thus, a total of 37 EAs was obtained. With this list, the COLTER IC team contacted INSAE in accordance with the recommendations of the National Statistical Council,[1] to obtain, the number of households in each EA. The number of households per EA ranged between 96 and 785. To facilitate creating a grid pattern for data collection teams, EA's whose size exceeded 200 households were divided in half or more. This resulted in reasonably sized geographical areas for the identification and selection of households. In the field, EA maps were then divided according to this information. However, given the lack of clarity[2] on the exact location of households, WASHplus decided to select households based on the systematic method.

[1] The protocol for this study has been validated by the Benin National Statistical Council (Conseil National de la Statistique du Benin) before its submission to the National Ethics Committee for Health Research of the Institute of Advanced Biomedical Sciences (Comité National d'Ethique de la Recherche en Santé de l'Institut des Sciences Biomédicales Avancées (ISBA)).

[2] Given that the census was just completed, the data are not yet entered. However, the totals have been calculated, giving an exact idea of the number of households in the EA.

Thus, for each sub-EA, the total number of households was divided by 10 to obtain the sampling interval, or standard interval between participants. A random number between one and the sampling interval was selected. This number was used as the number of the first household selected. The following households were selected by adding the sampling interval in succession. Investigators were instructed to clean their sub-EA systematically to be able to crisscross the area well and to ensure that all households had a chance to be selected. In the end, 10 households by sub-EA were drawn. Random selection makes it possible for the sample to represent the diversity of households that may exist in the population, even if each sample drawn from a given population has a reality gap vis-à-vis the areas of interest. Every sample is likely to confront this gap.

The following table shows the distribution of districts and enumeration areas of the three cities in the study as well as the number of households drawn by EA. It is important to bear in mind that the size of the sample does not have to represent a percentage given to each enumeration area. The sample size is calculated on the assumption that the sample reflects the estimated percentage of households in a peri-urban population that would have a selected location for washing hands. Given the available information, it was estimated that this percentage would be around 65 percent, so we wanted this percentage to be reflected in our sample. This calculation was made using the 2.0 software CSurvey with a margin of error of 5 percent, which means that the actual population value could vary between 60 percent and 70 percent. Similarly, for this calculation a cluster effect of 2.0 was estimated, which required a doubling of the number of households to be surveyed. Finally, we chose a confidence interval of 95 percent. This means we accept a 5 percent margin of error on the probability that the result is false.

Table 1: Distribution of EA, sub-EA, and households surveyed by municipality, borough, and district

Municipality	Borough	District	EA	Sub EA	Households surveyed	Total
Cotonou	1st	Avotrou	10	19	190	
	2nd	Minontchou	4	6	60	**349**
	6th	Ladji	4	10	100	
Porto-Novo	1st	Accron	2	9	88	
	1st	Avassa	1	4	40	
	1st	Houéyogbé-Gbédji	2	9	91	**351**
	3rd	Foun Foun Tokpa	3	13	132	
Abomey-Calavi	Abomey-Calavi	Tokpa Zoungo	6	6	60	**155**

	Godomey	Togoudo (lakeside)	2	2	20	
	Akassato	Akassato (lakeside)	3	8	75	
TOTAL			**37**	**85**	**857**	**855**

The estimated population in the districts selected for the sample is presented in Annex 1.

Practical Implementation of the Survey

Preparatory Activities

- **Test and proofreading of questionnaire**

The field survey was carried out using a questionnaire divided into five sections. Section 1 addresses issues related to housing and family characteristics, section 2 addresses issues related to water, section 3 deals with issues related to hygiene, section 4 addresses issues related to sanitation, and section 5 addresses issues related to households' exposure to information about hand washing, treatment of drinking water, sanitation, and the respective sources for this information. The questions were reviewed and some were reformulated to ensure a better understanding. Also, the questionnaire was translated into two local languages: Fon and Yoruba.

- **Information about authorities and populations**

Before the implementation of field activities, a process of informing all concerned stakeholders was conducted. Thus, the research team formally approached local authorities (neighborhood or village chiefs) from the selected study EAs and requested their cooperation.

Various measures of information and sensitization of communities covered by the survey were also implemented to promote the acceptance of the field work, which greatly reduced the reluctance of populations during the investigators' visits.

The following table presents the list of key stakeholders who received information about the planned study.

Table 2: List of stakeholders contacted to inform them of the study

- Ministry of Health: issued the authorization to conduct the study
- INSAE: studied the protocol and issued scientific approval
- The Ethics Committee: examined the protocol and issued ethical approval
- District delegates: informed of the study and appointed people to help investigators identify the boundaries of the areas

- **Recruitment of data collectors**

Sixteen data collectors were selected for this study (men and women), with at least high school (BAC) + 2 years in one of the social sciences and speaking/writing ability in the languages currently spoken in the three cities covered by the study. The 16 data collectors were selected from 20 candidates preselected on the basis of their curriculum vitae, their field experiences, their tested psychometric skills (teamwork, attendance, work quality, good investigator skills, openness and initiative, availability, etc.) and their experiences regarding household surveys.

Qualifications for team leaders included a minimum of a high school diploma (BAC) + 4 years that COLTER IC's database of employees identified as having proven experience in similar studies. The Mission Chief held an interview with each one to ensure their availability for the duration of the study.

- **Training of data collectors and pretest of questionnaire**

The training of data collectors took place in Cotonou and ran four days under the supervision of the principal investigator. The training agenda included the context of the survey, questionnaires, sampling procedures for households at cluster level, and collection methodology. The first two days of training were devoted to methodological and ethical aspects, the study of questionnaires, the reading of EA cards, individual and pair practice using questionnaires, and translation of questions into local languages (Fon and Yoruba). At this stage, the questionnaires were carefully studied to allow participants to familiarize themselves with the content.

A pretest in the field of all the survey procedures was scheduled on the third day of training, in three EAs[3] of Cotonou. All participants in this exercise were divided into three different teams according to their tasks in the field (data collectors or team leader).

During the pretest, three EAs were identified and household members of selected clusters surveyed. Each team practiced trying to find the selected households, conducting interviews and applying the methodological procedures. After the pretest, the length of administration of the questionnaire was reassessed.

The fourth and final day of training was devoted to a debrief of the pretest, the integration of observations on the questionnaires for finalization, final selection of 16 data collectors, and practical arrangements for arrival in the field.

During this process, 20 preselected data collectors were given two assessments: the first after the second day of training and the second following the pretest (fourth day). The top 16 were selected as members of three data collection teams and the others were placed on the waiting list in case of any potential dropouts.

In addition to the information provided at this training, other handouts, such as the investigator's manual, the team leader's manual, EA cards, and chlorine test kits, facilitated the participants' understanding of various presentations made by the training consultants.

[3] These EAs were not selected for the survey.

- **Establishment of field teams and roles of data collection staff**

The teams from Cotonou and Abomey-Calavi were each composed of five data collectors and one team leader, and the one in Porto-Novo had six data collectors and one team leader.

The team leaders' role was to:

- Inform local authorities of the arrival of the team in the area
- Ensure that the data collectors have the necessary equipment in sufficient quantities (questionnaires and accessories) before arrival in the field
- Provide an interface between the data collectors and the home office
- Coordinate team travel logistics
- Develop a daily schedule in line with the travel schedule and difficulties encountered in the field
- Assign to each agent the area to survey
- Supervise data collection, that is, monitor how the collectors conduct interviews, and overcome any difficulties encountered in the field
- Ensure that the data collectors stay within the boundaries of the survey
- Check the questionnaires and provide updates during the daily debriefing
- Keep a field journal and report progress and difficulties encountered to home office
- Make sure that the questionnaires are packed up by cluster and transmitted to COLTER IC staff

As for the data collectors, it was their responsibility to:

- Find the households of the EA to survey
- Administer questionnaires to cluster households
- Follow the team leader's instructions
- Participate in daily meetings
- Contact the team leader in case of problems
- Follow the methodology used for the study
- Ensure the completeness of the questionnaire

Data Collection

- **Identification and location of survey areas**

At this stage, the team leader conducted the complete identification of the EA, including boundaries and important identifiers. He made sure that all team members could orient themselves properly. Once the limits of the EA were correctly identified, and under the

supervision of the team leader, the team conducted the enumeration of households. To do this, the EA was divided among the different team members, and they went to each house or compound to identify the number of family members living there. They collected the name of the head of household and the number of people in the household. Once the team leader had an exhaustive list of households in the EA, he then proceeded to select participating households. Below are the steps taken to systematically select 10 households among all households of the EA:

- The first step is to calculate the sampling interval (ratio of total number of households in the EA divided by 10)
- Proceed with random selection of the first household to survey (draw a number between 1 and the sampling interval)
- After each selection, add the interval to determine the next household to survey
- Repeat until you have selected 10 households to survey

In the event that a household selected according to the sampling interval was not available, it was replaced by the household that followed immediately in the enumeration list. Similarly, if this last one was not available, it was replaced by the household that followed immediately on the list until completion of the interview. The household to interview next was the one retained by the application of the sampling interval.

It is only when the data collectors clearly identified the scope of the survey (cluster of 10 households) that they could proceed with the interviews applying the standards that they were taught to respect. Team members divvied up the selected households in the EA and surveyed them one after the other. Each data collector surveyed an average of five households per day.

- **Travel procedures for data collectors**

Members of a same field team traveled together. Once the list of households had been finalized in a particular EA, they proceeded to collect data in all selected households before tackling another enumeration area.

- **Using the questionnaire**

Household interviews used a structured questionnaire. The questionnaire is available separately. The data collector first obtained consent from the head of household or his representative. S/he then proceeded to conduct the interview and fill in the questionnaire.

To be eligible for this survey, respondents needed to meet the following requirements:

- Be the wife of the household head, the household head, or his representative
- Be at least 18 years old
- Live in one of the districts selected for the study

For the most reliable results in the field, all efforts were made for the selected households to be interviewed, with up to two follow-up visits if all household members were absent before replacing the selected household.

Data Management and Quality Control

Each data collection staff member received a unique identifier. Each team received all maps of clusters it had to visit. These maps identified the precise boundaries of each cluster to visit. Data were collected via the questionnaire. At the end of each interview the data collector verified the completeness of information as well as the skips. The households surveyed have a unique identifier to ensure confidentiality of data. Each evening a debriefing of the data collection was done and filled out questionnaires were sent to team leaders to verify. Questionnaires from each cluster were put together, packaged, and sent to staff from COLTER IC. Staff verified 10 percent of questionnaires by city and made recommendations to team leaders, who passed them to their collection teams for implementation.

Ethical Considerations

The present study was conducted in accordance with fundamental ethical principles, such as respect for the person, honorable intentions,[4] and fairness. The survey data are treated as anonymous and confidential. Also, the participation of all respondents was strictly voluntary. People visited were free to accept or refuse to participate in the administration of the questionnaire. During training of field staff, emphasis was placed on the need to obtain informed consent of the respondents and to avoid any form of coercion. Through the support and supervision of team leaders, complete confidentiality of interviews was guaranteed. The circular and the consent form were read in the respondent's language and a copy was provided to the participating households.

Difficulties

Apart from small difficulties inherent in any data collection exercise (eligible persons not at home, unavailability of respondents, reluctance…), rain presented the main difficulty. Data collection took place in the small rainy season, which had some minor impact on data collection. However these disturbances have in no way undermined the quality of data collected.

Entry and Data Cleaning

Ten agents were screened to perform data entry using the EpiData 3.1 software. They received a day of training after which the top eight were selected. The input operation itself (first and second input) lasted 10 days. At the end of the second entry, a comparison of the two bases was conducted to highlight differences in the records. We then compared the two records to the physical data in the questionnaire and proceeded to correct the erroneous base. The same process was applied each time that the same questionnaire was recorded differently in the two bases.

At the end of the first data cleaning, the data were exported to the SPSS software to control for consistency and completeness. To this end, a quality assurance program was designed to verify the internal consistency of responses according to the logic of the questionnaire. The

[4] Adhering to the best interests of the study while at the same time avoiding putting it in danger or at risk (moral, social, financial, etc.).

quality assurance program was applied to the database and all data entries were checked, cleaned, and corrected. This allowed for a more efficient cleaning as shown in this screenshot.

Image 1: Sample of cleaning program

```
*** Q202

temporary.
select if  (Q201>=6 AND NOT missing(Q202)) OR (Q201<6 AND  missing(Q202)).
list IDENTIF  NOMENQ NOMCEQ COM   Q201 Q202.
use all.
*

*** Q203

temporary.
select if missing(Q203).
list IDENTIF  NOMENQ NOMCEQ COM .
use all.
*

*** Q204

temporary.
select if  (Q203=0 AND NOT missing(Q204)) OR (Q203=1 AND  missing(Q204)).
list IDENTIF  NOMENQ NOMCEQ COM   Q203 Q204.
use all.
*
```

Source: Data cleaning program from the *Enquête de Base en Hygiène Péri Urbaine et Sanitaire au Bénin* COLTER IC 2013

Data Analysis

Data analysis followed several steps to comply with the client's needs. First we examined the sociodemographic characteristics of heads of households who responded to the questionnaire. This allowed us to know their profile as well as the characteristics of households. Next, based on the assets owned by the household, we used principal component analysis to create a socio-economic index with three categories (lower, middle, and upper). The list of assets used to construct the index appears in the table below. The weight of each asset is shown. This weight varies between 0.001 and 0.999. Only assets with a weight higher than 0.30 were included in the index. A score was assigned to each household based on its assets. The distribution of these scores was used to create categories with an equivalent number of respondents by level. Thus, a third of respondents were in the low category, another third in the middle category, and the rest in the upper category.

Table 3: Assets used for the construction of the socio-economic index

Assets	Weight of goods in the construction of the index
Fan	0.802
Gas stove	0.754

DVD/CD player	0.745
Dish/decoder	0.738
Electric iron	0.700
TV set	0.674
Computer	0.594
Hi-Fi	0.513
Car/truck	0.498
Motorcycle	0.452
Radio	0.450
Improved stove	0.281
Kerosene lamp	0,073

Two types of data analysis were performed: descriptive and inferential. In the descriptive phase, all variables were considered to give researchers an idea of the distribution of responses. The analysis in this phase permitted the building of a profile of study participants from socio-demographic variables such as gender, age, socio-professional status, ownership status, characteristics of housing, property ownership, etc. In this phase, we also addressed variables such as access to water, sanitation, and facilities for hand washing with soap; some knowledge of hygiene practices; and access to sources of information on WASH. One objective of this analysis was to establish the baseline for WASH indicators that the WASHplus project typically follows. In the inferential phase, some variables were crossed to better understand the WASH situation in peri-urban areas of Cotonou. The reader will find the results of these analyses in sections that follow. The results are presented in three sections: household and family characteristics, key program indicators, and other variables of interest.

Main Results of the Study

Housing and Family Characteristics of Surveyed Households

Distribution of Households by Municipality

Table 4: Distribution of respondents by municipality

Municipality	Sex of respondent		Number of households surveyed
	Women	Men	
Cotonou	311	38	349
Porto-Novo	315	37	352
Abomey-Calavi	135	20	155
Total	**761**	**95**	**856**

The table above shows the distribution of households by municipality. In Cotonou, from the random selection made, households visited were in the 1st, 2nd, and 6th boroughs, in Porto-Novo they were in the 1st and 3rd boroughs, and in Abomey-Calavi in the boroughs of Godomey, Abomey-Calavi, and Akassato.

The surveyed population consists of 88.9 percent women and 11.1 percent men. These men, for the most part heads of households were surveyed because women were absent during data collection visits. Most survey questions relate to objective data (e.g., water source, ownership of property, latrine, etc.). Some variables were collected via observation (e.g., presence of necessary supplies for washing hands). We felt that these data could be provided by either the husband or the wife. Moreover, our experience shows that women are generally better informed on matters related to WASH. Approximately 19 percent of women surveyed called themselves "head of household." The distribution of relationships between the women surveyed and the head of household appears on the following table.

Table 5: Relationship between the respondent and the head of household

Relationship between the female respondent and the head of household	Proportion (N=761)
Declared herself to be head of household	18.7
Wife of head of household	72.5
Daughter of head of household	6.0
Sister of head of household	1.1
Mother of head of household	0.5
Daughter-in-law of head of household	0.5

Other relationship	0.7
Total	100.0

Housing

Nearly three-quarters (74.4 percent) of households visited live in compounds (housing for large or extended families), just over one-fifth (21.3 percent) live in detached houses, and only 3.5 percent of households live in apartments.

Nearly nine out of 10 households (86.4 percent) have brick walls for the main room. Only a tiny portion of households have walls made of mud brick (5.1 percent), of bamboo (3.6 percent), or of wood (2.1 percent), respectively.

With regards to the roof of the housing, the most common types of materials are sheet metal (91.1 percent), concrete slabs (6.1 percent), and tile (2.2 percent), respectively.

Materials used most for the floor of the main room are cement (88.7 percent), tiles (6.5 percent), and sand (2.8 percent).

Level of Education

Nearly three respondents out of five (58.6 percent) are educated. Table 6 below shows the educational level of respondents according to the highest level attained.

Table 6: Distribution of respondents according to their level of education and gender

Level of education	Sex of the respondent		Total percentage (N=856)
	Women	Men	
Uneducated	44.3	17.9	41.4
Primary	25.8	27.4	25.9
Secondary (lower)	14.8	17.9	15.2
Secondary (second cycle)	8.3	14.7	9.0
Higher	6.8	22.1	8.5
Total	100.0	100.0	100.0

This table shows that 41.4 percent of respondents have no education, 25.9 percent have primary level, 24.2 percent have secondary level, and 8.5 percent have a higher education. Only 47.1 of the respondents know how to read and write. It also shows that men have reached a higher level of education more frequently than women respondents (Chi2=41.8, p=.00).

Property Ownership of Respondents

The majority (54.6 percent) of surveyed households owned the houses in which they live, a little over one-third (34.3 percent) rents, and 11.1 percent are hosted.[5]

Almost all renters (98 percent) pay their rent monthly. Whether tenants or owners, 27.2 percent of households made their decision to live in their home based on access to water and a latrine. But 63.8 percent of households decided to live in their home for reasons other than access to water and/or a latrine. The homes of two out of five households surveyed (41 percent) are flooded during the rainy season, but only 12.2 percent are able to move during the rainy season.

Occupational Status of Heads of Households and Respondents

Table 7 shows the distribution of professions practiced by the heads of households according to women respondents who do not consider themselves heads of households.

Table 7: Socio-professional status of the head of household reported by the women surveyed

Profession	Proportions (%) (N=714)
Laborer	41.2
Civil servant	17.4
Driver/Taxi-Moto	11.6
Small business owner	8.4
Store employee	8.4
Retailer	8.0
Fisherman	2.5
Other	2.5
Total	**100.0**

During the last 12 months preceding the survey, 94.1 percent of respondents had a job that earned a salary. This situation has improved and 98.4 percent of persons surveyed during the study had a job at that time. Table 8 below shows the socio-professional profile of the respondents.

Table 8: Distribution of respondents according to their socio-professional profile

Profession	Proportions (%) (N=856)
Laborer	37.0

[5] They live in someone else's home for free.

Civil servant	16.0
Retailer	15.8
Driver/Taxi-Moto	9.9
Store owner/small business	8.5
Employee in a store	2.6
Housekeeper	1.3
Employee in a restaurant	0.7
Housewife	0.5
Other	7.7
Total	**100.0**

A little over a third of people surveyed for this study are laborers (37 percent), followed by civil servants (16 percent), retailers (15.8 percent), taxi-moto drivers (9.9 percent), and small business owners (8.5 percent). Other trades were recorded in relatively low proportions.

In regards to which member of the couple contributes most to the family's income, regardless of the source, in 76.8 percent of households, men have the highest income compared to only 22.3 percent of households for women.

Assets Owned by Households

Table 9 shows the assets owned by the households surveyed. They are organized in three categories (leisure, utility, and transportation). In each category, the goods are shown in descending order of frequency.

Table 9: Assets owned by households

Types of Assets	Assets owned	Proportion of households (%) N = 856
Leisure goods	Radio	82.1
	DVD/CD player	50.5
	Television set	66.7
	Satellite dish/decoder	20.8
	Hi-Fi	10
	Video recorder	7.5
Utilitarian goods	Mobile phone	95.5
	Improved stove	52.5

Types of Assets	Assets owned	Proportion of households (%) N = 856
	Kerosene lamp	44.6
	Fan	40.3
	Gas stove	22.3
	Electric iron	18.2
	Refrigerator	9.8
	Computer	9.6
	Generator	3.5
	Fixed telephone line	1.8
	Washer	0.4
Transportation goods	Motorcycle	64.0
	Car/truck	10.0
	Bicycle	4.8
	Boat/canoe	1.9

The most frequently owned household asset is the mobile phone (95.5 percent), regardless of its use (private or professional). Radio and television are available in just over four out of five households (82.1 percent) and in two out of three households (66.7 percent), respectively. Half (50.5 percent) of the households surveyed have a DVD/CD player. Regarding transportation, 64 percent of households have a motorcycle, 10 percent have a car or truck, 4.8 percent a bicycle, and 1.9 percent a boat or a canoe. For cooking the improved stove is used by 52.5 percent of households against 22.3 percent using a gas stove.

Although 44.6 percent of households have kerosene lamps, it should be noted that 73.8 percent of households use electricity from SBEE (utility) as their main source of lighting. Households also own other goods such as fans (40.3 percent), satellite dishes (20.8 percent), electric irons (18.2 percent), Hi-Fis (10 percent), computers (9.6 percent), refrigerators (9.8 percent), and video recorders (7.5 percent).

Level of Economic Well-Being

The level of household economic well-being was calculated from asset data (radio, television, Hi-Fi, satellite/cable box, VCR, DVD/CD player, refrigerator, gas stove, computer) using principal components analysis. A quality weight (or score) was assigned to each of these assets and housing characteristics, and generated from a principal component analysis. These scores have been standardized according to a standard normal distribution with mean 0 and standard deviation 1. The total score was calculated for each household, and individuals were

ranked according to the total score of the household in which they reside. The population sample was then divided into thirds, each tertile corresponding to a level ranging from 1 (the poorest) to 3 (the richest). Table 5 presents the results of the distribution of households by districts according to their socio-economic level.

Table 10: Distribution of households by district according to their level of socio-economic welfare

Municipalities	Districts	Socio-economic level		
		Lower %	Middle %	Upper %
Abomey-Calavi	Akassato (Houekegbo)	57.1	28.6	14.3
	Akassato (Houekehonou)	45.6	42.6	11.8
	Godomey-Togoudo (côté lac)	10.0	40.0	50.0
	Tokpa-Zoungo	28.3	38.3	33.3
Total Abomey-Calavi		**34.8**	**40.0**	**25.2**
Cotonou	Avotrou	6.9	30.7	62.4
	Ladji	44.0	42.0	14.0
	Minontchou	18.3	26.7	55.0
Total Cotonou		**19.5**	**33.2**	**47.3**
Porto-Novo	Accron	48.9	34.1	17.0
	Avassa	40.9	36.4	22.7
	Founfoun Tokpa	42.4	24.2	33.3
	Houéyogbé-Gbèdji	52.3	29.5	18.2
Total Porto-Novo		**46.3**	**29.5**	**24.1**

Household Drinking Water Supply

Sources of Water Supply

Access to drinking water is an important requirement for good hygiene in households. The water used in households surveyed in the study came from several sources (Figure 1).

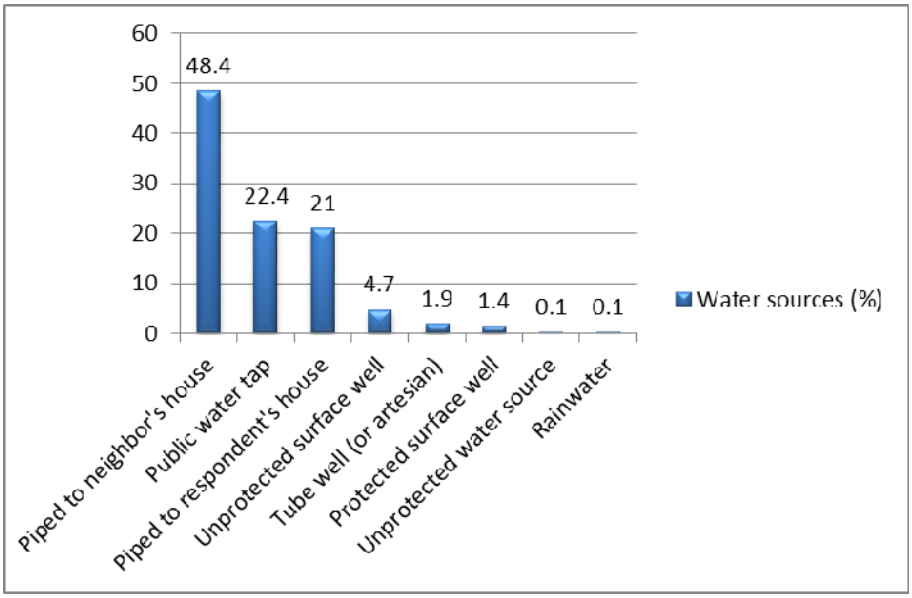


Figure 1: Distribution of households by source of water supply

Three sources of water are frequently used by households: piped water that comes into a neighbor's house (48.4 percent), a public water tap or hydrant (22.4 percent), and water piped into the respondent's house (21 percent). Other water sources, including unprotected wells (4.7 percent), are also used by households, in relatively small proportions.

The following table shows the distribution of water sources by municipality. This information is presented as information only because the sample size does not allow us to generalize by municipality.

Table 11: Proportional distribution of drinking water sources by municipality

Water sources	Abomey Calavi N 155	Cotonou N =349	Porto-Novo N =352
Pipe at neighbor's house	15.5	34.1	77.0
Public pipe	56.8	29.2	0.6
Pipe at the house	3.2	36.7	13.4
Unprotected well	11.6	0.0	6.2
Artesian well/borehole equipped with a pump	10.3	0.0	0.0
Protected well	2.6	0.0	2.3
Water from protected source	11.6	0.0	6.2
Rainwater	0.0	0.0	0.3

Total	100	100	100

More than nine out of 10 households (93.7 percent) pay for drinking water. Among them, 94.9 percent pay for water based on volume compared to only 5.1 percent who pay a fixed monthly sum.

According to households surveyed, water is bought by basin (42.7 percent), by bucket (27.5 percent), by jerry can (13.4 percent), and by cubic meter (16.3 percent) when it is bought directly from the Société Nationale des Eaux du Bénin (SONEB). In the three municipalities, SONEB provides drinking water in nine households out of 10 (91.5 percent). It should be noted that households that obtain drinking water from neighbors also buy it from them. In other instances, the heads of household and the homeowners were also cited as distributors to a lesser extent (5.5 percent) when drinking water is from a well.

In households, other water sources are used for needs other than drinking (for example to wash hands, cook, and other household tasks). Of more than 10 sources cited by households, water from protected surface wells (18.2 percent) and those of unprotected surface wells (57 percent) are the most utilized.

To make water potable, certain households (5.8 percent) use methods to treat water at home. Household practices for treating drinking water are shown in the Table 12 below.

Table 12: Water treatment in households according to principal source of drinking water for the household

Principal source of drinking water for the household	% of households that reported treating their drinking water
A pipe that comes into the house	3.3
A pipe that comes into the house of a neighbor	3.1
Public water tap/ public water hydrant	8.3
Borehole equipped with a pump/artesian well	6.2
Protected well	33.3
Unprotected well	25.0
Water from unprotected source	0.0
Rainwater	0.0

Knowledge of Methods of Water Treatment at Home

To measure the general knowledge of drinking water treatment methods at home, we asked the households to cite the methods that they know.

Figure 2 below shows responses from the respondents.

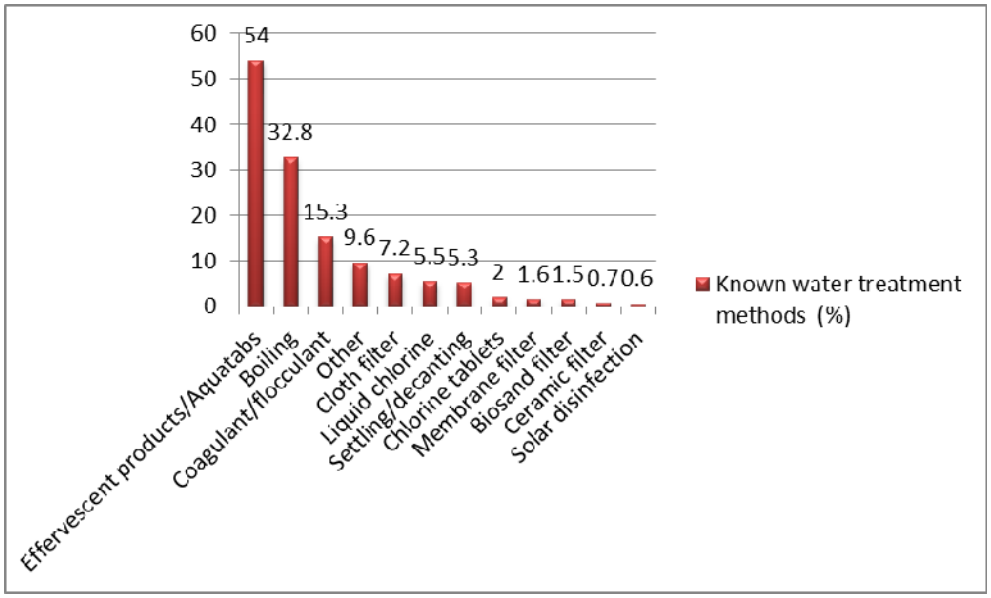


Figure 2: Distribution of respondents according to their knowledge of methods to treat drinking water

In data from Figure 2, it is clear that the two most known methods of household water treatment were boiling (32.8 percent) and using Aquatabs and other effervescent products (54 percent). Methods such as the use of coagulant/flocculants (15.3 percent) and cloth filters (7.2 percent) are known in relatively small proportions. The category "other" takes into account products such as kaolin, charcoal, permanganate, etc. (9.6 percent).

Water Treatment at Home

Only a minority of households (5.8 percent) treat water at home so that it is potable. No statistical association has been found between household water treatment and socio-economic group (Chi2=0.86, p=.0.65). Reasons given by these households for treating water are rooted in beliefs and not in true knowledge about water quality. These include: campaign messages promoting health (42.6 percent), household habit of treating drinking water (40.4 percent), having the treatment product at home (2.1 percent), and the fact that it is largely accepted that the sources of water are not safe for drinking without treatment (21.3 percent).

On the other hand, those who don't treat the water evoke reasons such as: the lack of information on water treatment (5.8 percent), no tradition of having treated water at home (5.5 percent), unavailability of a treatment product (0.7 percent), the water source is considered to be clean and therefore it does not need to be treated before drinking (85.2 percent), and no reason (2.2 percent).

During the survey, households were asked who treats the water, and what treatment methods are used. Figure 3 shows methods of treatment used by households.

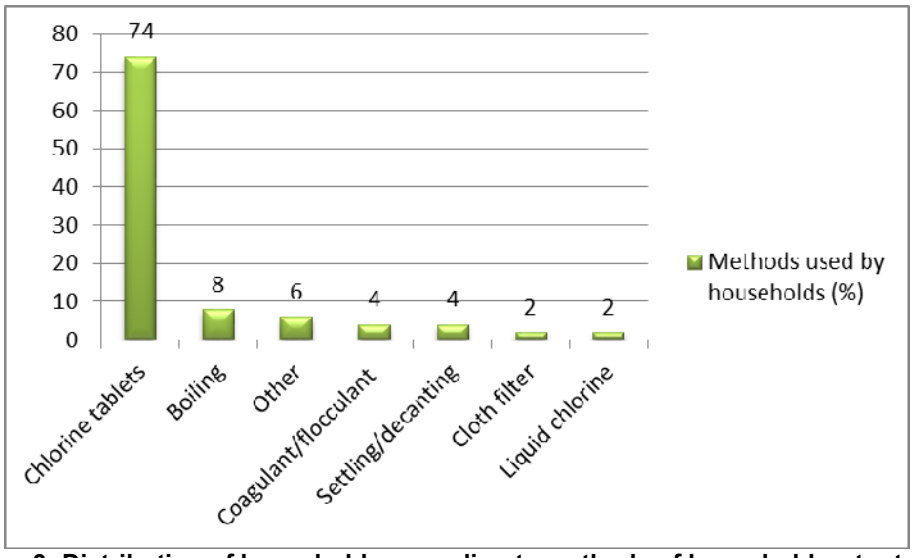


Figure 3: Distribution of households according to methods of household water treatment

There is a statistical relationship between the source of drinking water and treatment practices. Households who use a pipe, private or public, tend not to treat water. In addition, those who use an artesian well or a borehole with pump, an unprotected well or surface water tend to treat. The relationship between these two variables, source of water and treatment of water, is shown in the following table. The relationship is statistically significant or Chi2 value is 52.8 and the probability of .00. However, 85 percent of households who have not treated their water report that they don't do it because the source provides safe water to drink and therefore the need to treat the water does not exist. Only 5 percent say they have never treated drinking water at home, and 6 percent reported not being aware that they needed to treat it. That is to say, they tend to trust the source. Furthermore, no statistical relationship was detected between household water treatment and socio-economic level. (Chi2=0.86, p=0.65.)

Table 13: Relationship between the source of drinking water and its treatment at home

Source of drinking water	Treatment of drinking water		Total (N=854)
	No (N=804)	Yes (N=50)	
Pipe at home, at the neighbor's, or a hydrant	71.5	38.0	69.6
Artesian wells	21.9	32.0	22.5
Unprotected wells	1.9	2.0	1.9
Protected wells	1.0	8.0	1.4
Unprotected source	3.7	20.0	4.7
Total	100.0	100.0	100.0

Three out of four households (74 percent) use effervescent chlorine tablets/Aquatabs for water treatment. Other methods are used by less than one household out of 10. The “other" category includes products such as kaolin (6 percent).

However, it should be noted that all methods used are not effective to purify water. Among the many methods reported being used by households, only three are able to treat water (if used correctly): boiling, liquid chlorine, or effervescent chlorine tablets (including Aquatabs).

Boiling is a traditional method of treating water. This method, if used correctly, can provide safe drinking water to a household that has no other option. Boiling will kill pathogenic germs, but it doesn’t have a lasting effect. Therefore, if the water is not properly handled, it can be recontaminated. Boiled water should, therefore, be safely stored and used within one to two days.

As for chlorination, it is a simple and effective way to disinfect water. It consists of introducing chlorine products (chlorine tablets, bleach) into water to kill any micro-organisms it may contain. After a contact time of about 30 minutes, water is considered safe. It remains safe for a few hours or days (depending on storage conditions) with the residual chlorine.

Thus, of the small minority of respondent households 5.8 percent (50/856) that treat water at home, 82 percent (41/50) use effective treatment methods.[6] However, the results of residual chlorine tests made in households that treat water show that only 76 percent (38/50) of these households used chlorination. We found that the average concentration of chlorine in water is 3.49 mg/l, which seems very high given the fact that according to the World Health Organization (WHO), concentration of free chlorine in treated water should be 0.2 to 0.5 mg/l. It is likely that over-chlorination is occurring due to chlorination of tap water, which in principle is already chlorinated. Also note that the average number of days during which households continue to drink the treated water is 6.4 days. Poor water treatment practices were observed in a minority of households (8 percent) (16/50) that mix treated with untreated water whenever they replenish the water in the container. Only 4.6 percent (39/856) of households from the three municipalities treat drinking water properly.

There is a statistical relationship between knowledge of Aquatabs and its use. Those who know of Aquatabs are more likely to use them. This relationship is significant so that Chi2=19.2 and p=0.00. This relationship is shown in the following table.

[6] Meaning when all required steps are respected.

Table 14: Relationship between knowledge of Aquatabs and treatment of water at home

Report knowing about Aquatabs as a known method for home treatment of drinking water	Home treatment of drinking water		Total
	Yes (N= 804)	No (N =50)	
Yes	84.0	52.1	46.0
No	16.0	47.9	54.0
Total	100	100	100

Storage of Drinking Water in Homes

All efforts to make water safe to drink are useless if it is not stored or handled properly. During the survey, information was collected on the conditions of storage and handling of drinking water. Several containers are used by households to store drinking water (Figure 4).

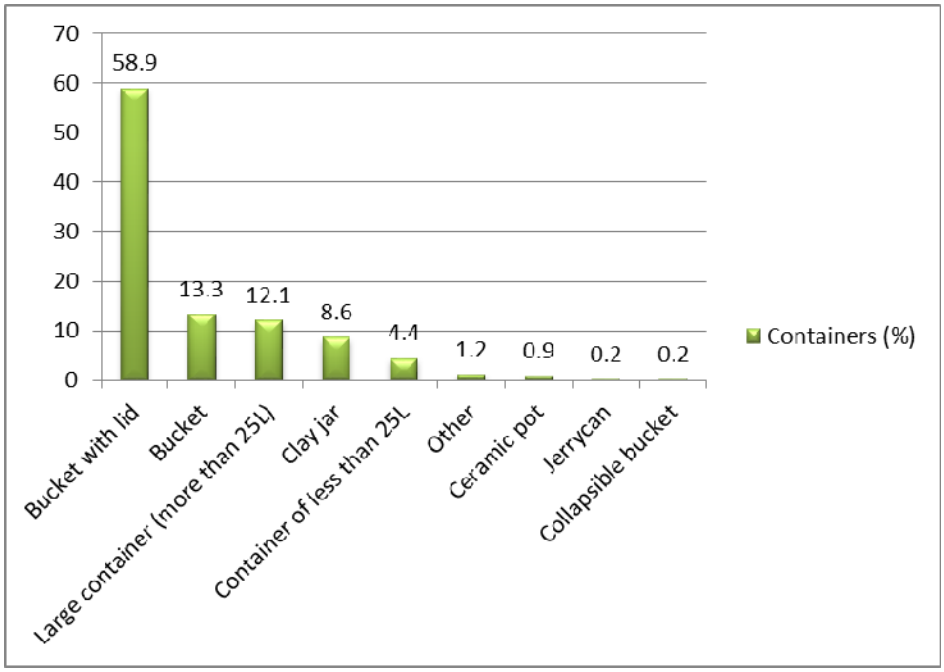


Figure 4: Distribution of households according to storage containers used for drinking water

Buckets (72.2 percent), containers below or above 25 L (16.5 percent), and clay jars (8.6 percent) are the most used by households for storing drinking water.

From the results of observations made by data collectors in households, it appears that in the overwhelming majority of cases, the containers used are closed/covered (96.5 percent), with tight fitting lids (92.5 percent), clean on the outside (86.6 percent), and out of reach of animals (93.6 percent). Only 0.6 percent of vessels observed had a tap.

Looking at households where the container used to store water is both closed with a tight fitting lid and clean on the outside, and out of reach of animals, we realize that 73.5 percent of households in the three municipalities store their drinking water properly.

There is a statistical relationship between the use of a covered container to store water and socio-economic status as the use of a cover goes from 93.8 percent in the lower socio-economic group to 97.1 percent in the intermediate group and 98.9 percent in the higher group (Chi2=11,1, p=.00). Also, we found a statistical relationship between the use of a tight-fitting lid and socio-economic status. The presence of a tight-fitting lid goes from 87.1 percent in the lower socio-economic group to 90.9 percent in the intermediate group and 98.9 percent in the upper group (Chi2=27.7, p=.00).

Household Hygiene

The practice of hand hygiene is central to household hygiene in general. The key behavior of hand hygiene is washing hands, especially with soap. Within households visited, data have been collected on the availability and the various uses of soap. Nearly 94 percent of households visited had soap available at the time of the interview. The following chart provides information on the most commonly used types of soap in most households.[7]

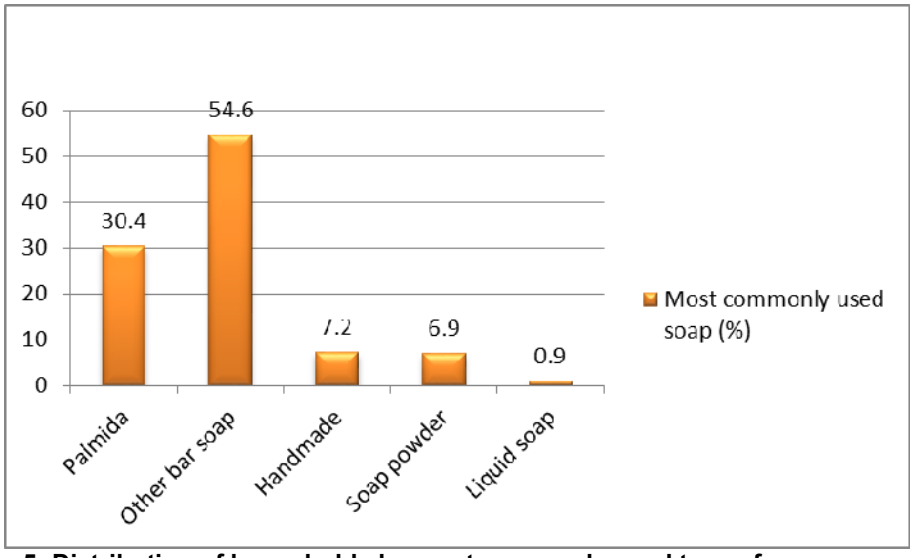


Figure 5: Distribution of households by most commonly used type of soap

In almost all households (98.5 percent), soaps used are purchased by the head of household or his/her spouse. The soap purchased is used to wash clothes (98.6 percent), to bathe (95.2 percent), wash children (63.1 percent), wash the buttocks of children (9.1 percent), wash the hands of children (11.9 percent), wash hands after using the toilet (35.9 percent), wash hands before feeding children (11.8 percent), wash hands before cooking (13.1 percent), and wash hands before eating (26.3 percent).

Hand washing is a practice that surveyed households are very aware of, but regrettably the act of washing hands with soap and water is not yet a regular habit for many people, and children are not properly taught to use soap to wash their hands.

[7] We do not have information on the usage of each type of soap as this was not a question posed.

We recognize that researching hand washing is a challenge as some respondents tend to report what is expected socially instead of reporting actual practice. A way to address this challenge is to ask people how often hand washing is practiced in different circumstances. Table 15 shows the distribution of respondents' answers when asked to use four types of frequency for each circumstance: never, sometimes, often, and always. In addition, we wanted to study the difference between the practice of rinsing hands without using soap, and the practice of washing hands where soap is used. The comparison between rinsing and washing is also presented in Table 15. This table shows us respondents' own statements about rinsing and washing at critical circumstances to avoid diarrhea. For example, 67.8 percent said they always wash their hands before eating compared to only 21.3 percent who reported doing so with soap. In the same way, 64.7 percent said they always wash their hands before feeding a child, compared to 22.7 percent who reported doing so with soap. A similar trend can be found when it comes to circumstances where there is the risk of coming in contact with feces. So for example, 74.3 percent claimed to rinse their hands after using the toilet, but only 47.8 percent said they always do it with soap. Washing hands with soap certainly merits strengthening.

Table 15: Circumstances of rinsing (simple wash) or washing hands (wash with soap) in households according to respondents' own statements

Circumstances		Never (%)	Some times (%)	Often (%)	Always (%)
When you wash your face at sunrise	Rinse	39.3	25.1	15.7	20.0
	With soap	**63.8**	**24.6**	**5.7**	**5.8**
When you wash or empty the potty of a child	Rinse	2.8	9.7	27.1	60.4
	With soap	**7.4**	**22.4**	**30.4**	**39.8**
After going to the toilet	Rinse	0.6	5.7	19.4	74.3
	With soap	**5.1**	**18.0**	**29.1**	**47.8**
Before eating	Rinse	0.4	5.6	26.3	67.8
	With soap	**17.4**	**38.2**	**23.1**	**21.3**
Before cooking	Rinse	8.2	27.5	30.4	34.0
	With soap	**17.5**	**47.8**	**20.6**	**14.1**

Circumstances		Never (%)	Some times (%)	Often (%)	Always (%)
Before feeding children	Rinse	0.9	7.4	27.0	64.7
	With soap	**14.1**	**35.0**	**28.2**	**22.7**
After any task where I had to use my hands	Rinse	1.9	42.1	30.0	26.1
	With soap	**7.1**	**57.7**	**22.0**	**13.2**
After touching an animal	Rinse	16.6	34.0	19.9	29.6
	With soap	**24.8**	**40.3**	**16.0**	**18.9**
After cleaning the bottom (feces) of my child	Rinse	1.9	7.1	21.5	69.5
	With soap	**7.4**	**18.0**	**30.4**	**44.3**
After cleaning the toilet	Rinse	4.7	6.0	12.1	77.2
	With soap	**7.5**	**9.7**	**23.9**	**58.9**
After having taken care of a sick person	Rinse	12.9	32.5	18.2	36.4
	With soap	**18.3**	**35.6**	**18.1**	**27.9**
Other occasions	Rinse		4.1	27.0	68.9
	With soap		**12.7**	**38.0**	**49.4**

Note: proportions in bold are the answers to hand washing with soap

However, in order to wash hands, households must have the necessary supplies to do so. These include the presence of a mobile or stationary hand washing device, soap, and water. These devices should exist in one or more places in the home, especially near places where food is handled or where people come in contact with feces.

To complete information on the practice of hand washing we used an objective indicator to verify the presence of a hand washing station with or without required supplies, water and a washing product—either a soap bar, liquid soap, or even ashes. These indicators are objective because they are based on actual existence of a hand washing station and nearby supplies. The

indicator is different from previous indicators that are based solely on the interviewees' responses.

UNICEF's Multiple Indicator Cluster Survey and USAID's Demographic and Health Surveys use this indicator when carrying out their surveys in developing countries. We tried to determine how many hand washing stations had necessary products for the practice of hand washing with soap and if these stations are located in a place accessible to all family members, near the kitchen or the toilet. The following table shows the results obtained concerning the presence of the supplies mentioned. In this table, the denominator used is the total number of households visited in order to compare the different hand washing stations for the entire sample. In the following section we will find a discussion of accessibility to latrines. However, the results on the presence of a hand washing station near latrines are shown here to collect all information on this subject in the same section of the report. We note the low number of households where these stations existed and the low percentage of households where the devices were equipped with water and/or soap during our visit.

Table 16: Percentage distribution of hand washing stations in several locations in the house and supplies observed by location (N=856)

	Station usually used by family members	Station near the area of food preparation	Station near the toilet
Households having a corner dedicated to hand washing	29.4	16.7	8.3
Water availability	27.1	15.8	7.9
Availability of soap	23.0	13.2	6.3
Availability of water and soap	22.1	12.9	6.2

To assess the key moments when household members actually wash their hands, respondents were asked to name activities after which they wash their hands, without making suggestions. The responses obtained are summarized in Table 17 below. These results reaffirm the need for people to know the moments when hand washing with soap is critical. Note that only 25.4 percent of respondents feel that hand washing is key before preparing food. Similarly, only 34.0 percent felt that it was key before feeding a child. Both are relatively low percentages.

Table 17: Key moments of the day to wash hands

Moments	Proportion of households (%)
After going to the toilet	87.6
After doing poo	66.2
Before eating	93.8
After cleaning a child or washing out a diaper	13.8
After cleaning the toilet	42.1
After touching any utensil used for cleaning the house	8.2
After cleaning a chamber pot	15.1
Before preparing food	25.4
Before feeding a child	34.0
After touching or having cared for a patient	14.0
After eating	61.6

These data are consistent with the previous table, confirming that, although households are aware of the usefulness of this practice, it takes time to become a habit.

When asked what motivates household members to wash their hands with water and soap or detergent, their spontaneous responses were:

Table 18: Factors motivating hand washing in households

Motivational Factors	Proportion of households (%)
Prevent disease	86.8
Prevent diarrhea	32.5
Remove germs	36.1
Prevent dust from entering the mouth	12.7
Prevent dust from entering the food	3.3
It smells good	1.6

In four out of five households (86.8 percent), hand washing is done to prevent disease. However, health is not a sufficient factor to motivate hand washing with soap. The presence of a functional device for hand washing has a lot to do with it.

Among the 86.8 percent of households claiming to wash their hands because of disease, only 24.6 percent have a hand washing station equipped with essential supplies (soap and water) near the kitchen.

Other lesser reasons, but related to the first, are the prevention of diarrhea (32.5 percent) and the elimination of germs (36.1 percent).

Sanitation in Households

Household sanitation depends largely on the accessibility of hygiene infrastructure (latrine, shower) in the household. This is particularly important when the household has young children, including children under five years old, when they are most vulnerable. 59.5 percent of households visited during this survey have a child younger than five years old and 45.3 percent have a child under three years old. So, the majority of children under the age of five are children less than three years old.

Management of Feces

During the survey, respondents were asked, "The last time your child under 3 years of age pooped, where did he go?"

Figure 6 summarizes the responses recorded from households.

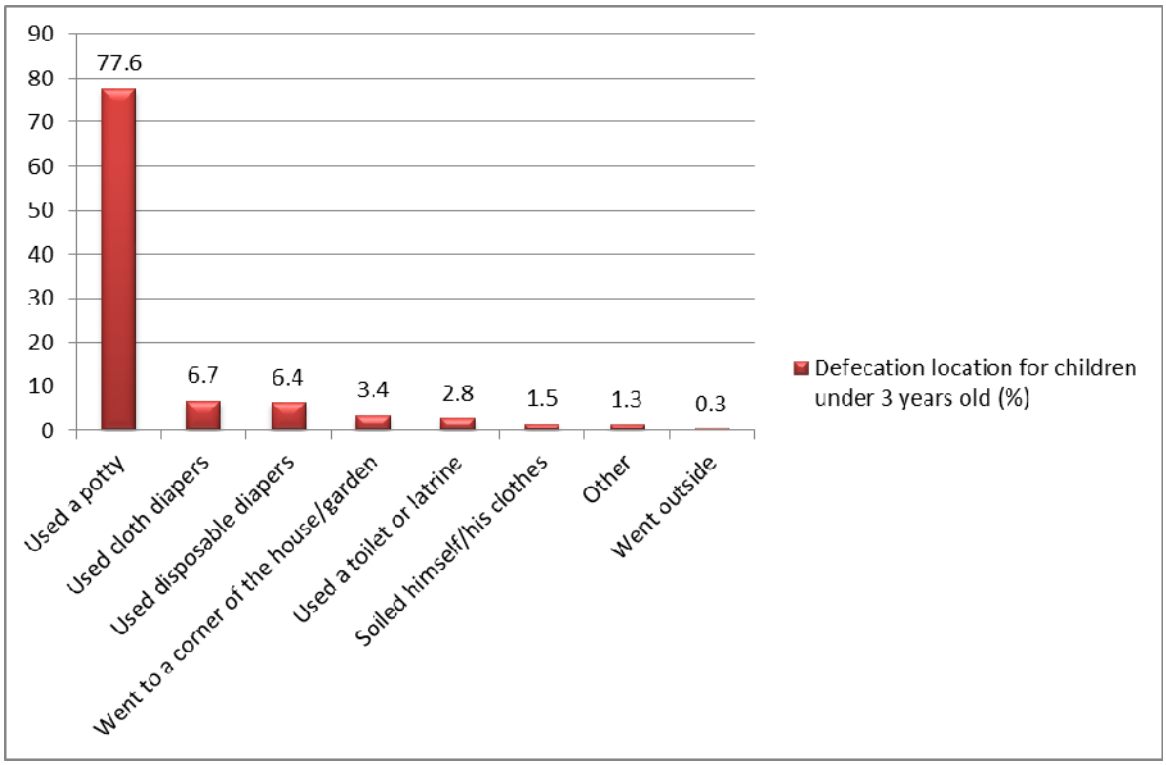


Figure 6: Distribution of households by places of defecation by children under the age of 3

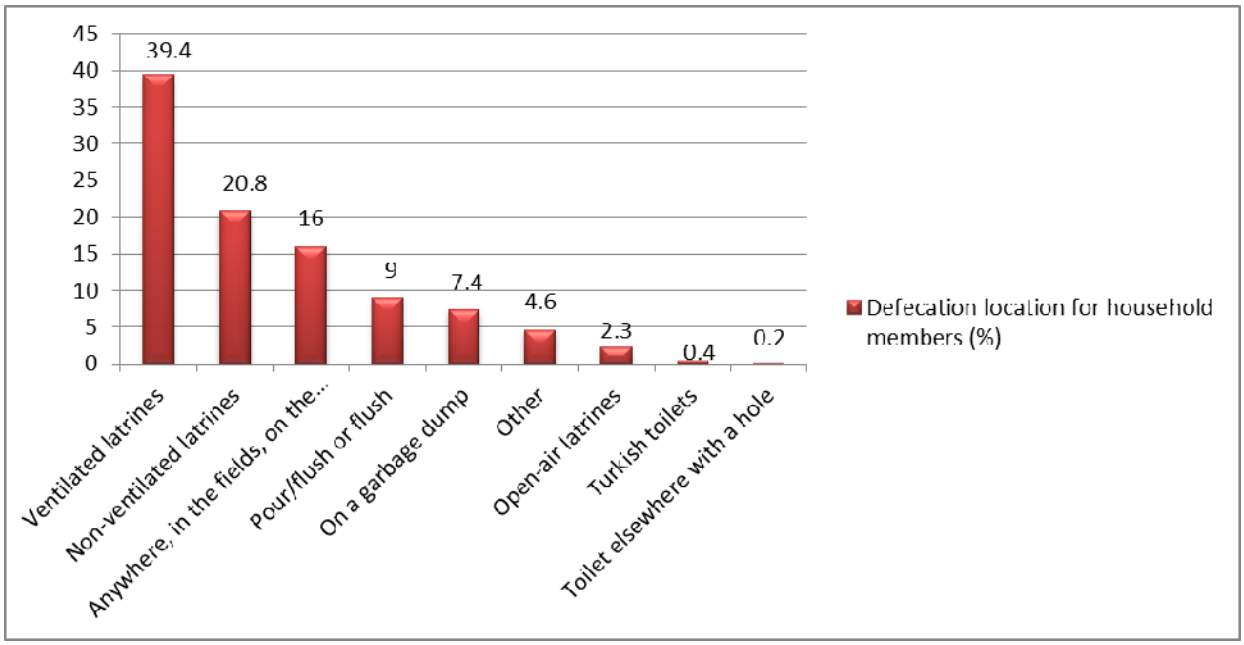
A little more than three-quarters of households (77.6 percent) used a potty. Cloth diapers (6.7 percent) and disposables (6.4 percent) were rarely used. Other unsavory means were used and are found in the "Other" category (1.3 percent): garbage piles, in plastic bags, and on the ground.

Once the child has finished pooping, parents dispose of the feces in different places: toilet/latrines (66.8 percent), garbage dumps (20.4 percent), or garbage cans (3.4 percent). They are also thrown out with wastewater (3.1 percent) or disposed of in "Other" places (4.1 percent) such as the bush, in the lagoon, in the lake, in gutters, and in swampland.

According to respondents, in four out of five households (80.7 percent) children's feces are disposed of by the head of household or his/her spouse, and in just over one in 10 households (12.6 percent) by the sons or daughters of the head of household. They are also disposed of by other relatives (6.7 percent) of the household members surveyed.

The respondents were also asked, "Where do family members go when they need to defecate?" Figure 7 summarizes the responses recorded on defecation areas used by household members surveyed. In this figure, the section "Ventilated Latrines" includes ventilated latrines and ventilated improved pit latrines.

Figure 7: Distribution of households by place of defecation for family members



More than seven out of 10 households (74.3 percent) use sanitation facilities. The remaining households use either fields, the beach, plastic bags (16 percent), or dumpsites (7.4 percent). The rest (4.6 percent) use swampy areas, the lakeside, public drains, the lagoon, or at times, private for-fee or hanging latrines.

For anal cleansing, households use several means. These are newsprint (40 percent), water (38.6 percent), toilet paper (19.6 percent), and leaves (1.4 percent).

Availability of Toilets in Households

Information was collected during the survey about who put in the toilets used by households, hence the question "Did your household install the toilet that you are using?" Answers from the respondents are summarized in the Total column of the table below. In addition, the crossing of this question with the question of home ownership produces the following results. Among homeowners, a little more than one-third (34.5 percent) did not have a toilet compared to four households out of nine (45.4 percent) who installed a toilet in their house. We note that one-fifth (20.1 percent) of these homeowners were not responsible for the installation of toilets in their homes. This is the case with households that live in family homes in which they are considered to be the owners or co-owners. For renters, 76.2 percent did not install the toilets that are in the houses where they live, only 0.7 percent are responsible for installing toilets in their home, and a little more than one-fifth (23.1 percent) do not have a toilet. In lodged households, 53.7 percent did not install toilets in the house where they live, only 6.3 percent are responsible for installing toilets in their home, and four-tenths (40.0 percent) do not have a toilet in their house.

Table 19: Distribution of households according to the person responsible for installing latrines and the title of ownership of the house

Installation of toilets by the household	Title of ownership of the house			Total
	Owner %	Renter %	Lodged %	
No, they were already there	20.1	76.2	53.7	43.1
Yes	45.4	0.7	6.3	25.7
The household does not have a toilet	34.5	23.1	40.0	31,.2
Total	100	100	100	100

At the household level when the decision was made to install latrines, in nearly nine households out of 10 (87.7 percent) it was made by the head of household or spouse. This decision was taken in 8.2 percent of households by the parents of the head of household or spouse and in 4.1 percent of households (renting) by the owners.

Regarding the location of toilets, the owners made the decision in a little less than half of households visited (47 percent), heads of households or spouses made it in one-third of households (34.1 percent), and in almost one-fifth of the households visited (18.8 percent) other actors such as parents of head of household or spouse and previous renters made the decision.

Figure 8 provides information on the location of toilets in households.

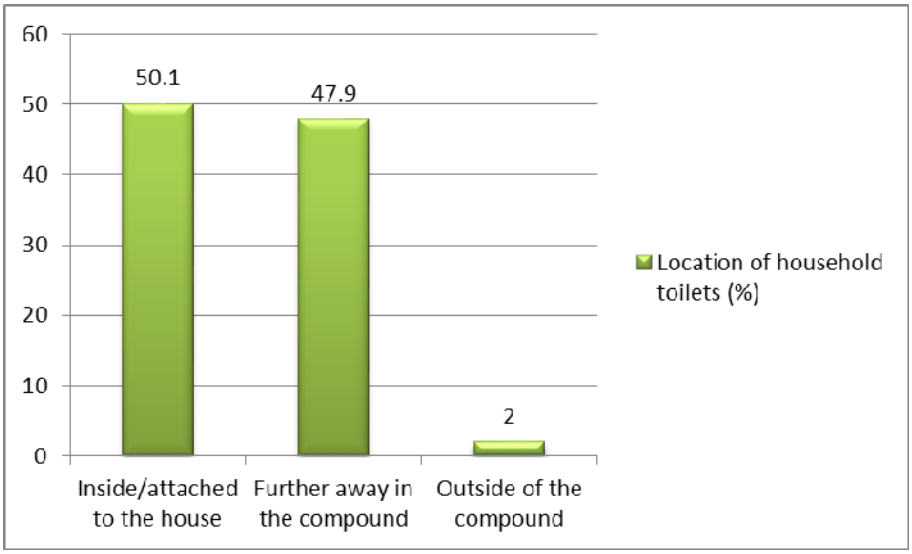


Figure 8: Distribution of households by location of toilets in the household

Half of households visited (50.1 percent) have their toilets inside or attached to their house, a little less than half (47.9 percent) have theirs elsewhere in the compound, usually in the courtyard, and only 2 percent, outside of the property.

According to the responses obtained from respondents, less than a quarter (22.4 percent) of toilet pits has been emptied recently. Two-thirds of the emptied pits (66.6 percent) are emptied once a year. Others are emptied with regular frequency such as once a month (0.8 percent), once every two months (0.8 percent), or once every three months (2.3 percent). Still others, grouped in the section "Others" (35.6 percent), are emptied twice a year, once every two years, and once every three years. The average cost of one emptying is 44,500 CFA. Pit emptying is more common in households where the latrine is shared with other families (Chi2=6,3; p=0.00); among renters (Chi2=12,38; p=0,00); in houses that flood (Chi2=26,3; p=0,00); and in families with a better socio-economic status (Chi3=9,1; p=0,01).

In regards to the place where the sewage sludge is dumped, nine households out of 10 (90.2 percent) reported not knowing where it is emptied. On the other hand, one household out of 10 (9.8 percent) said that the toilets are flushed into rivers and the ocean. All emptied toilets are still in use.

Regarding shared toilets, two households out of three (65.9 percent) share their toilets with other households. The average number of households that share the same toilet is five.

In the three municipalities of the study, nearly seven households out of 10 (69.7 percent) use an improved sanitation infrastructure.

Principal Reasons to Build or Not to Build Toilets

We asked households with toilets for three main reasons why they built their toilets. Figure 9 below shows the responses of households interviewed.

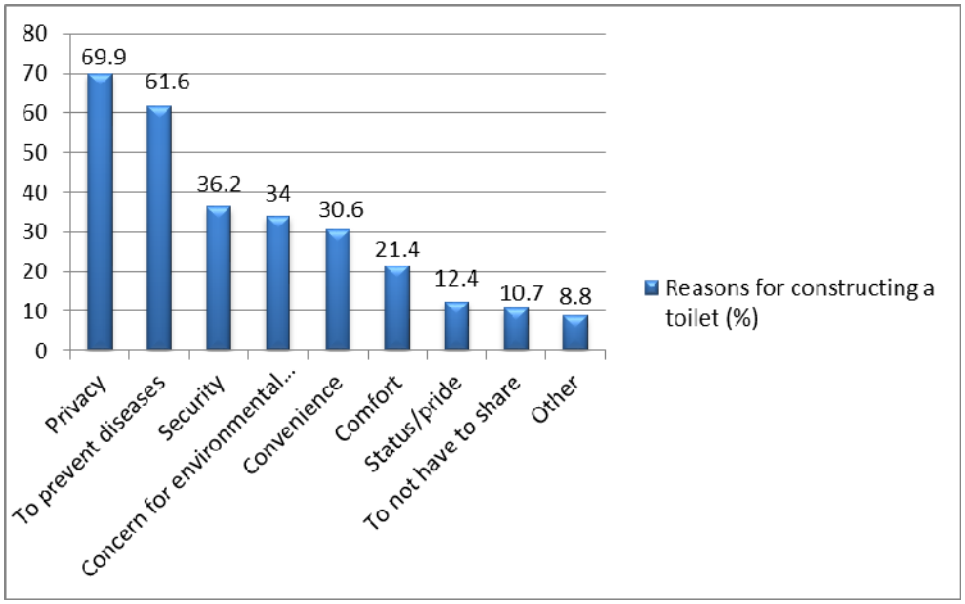
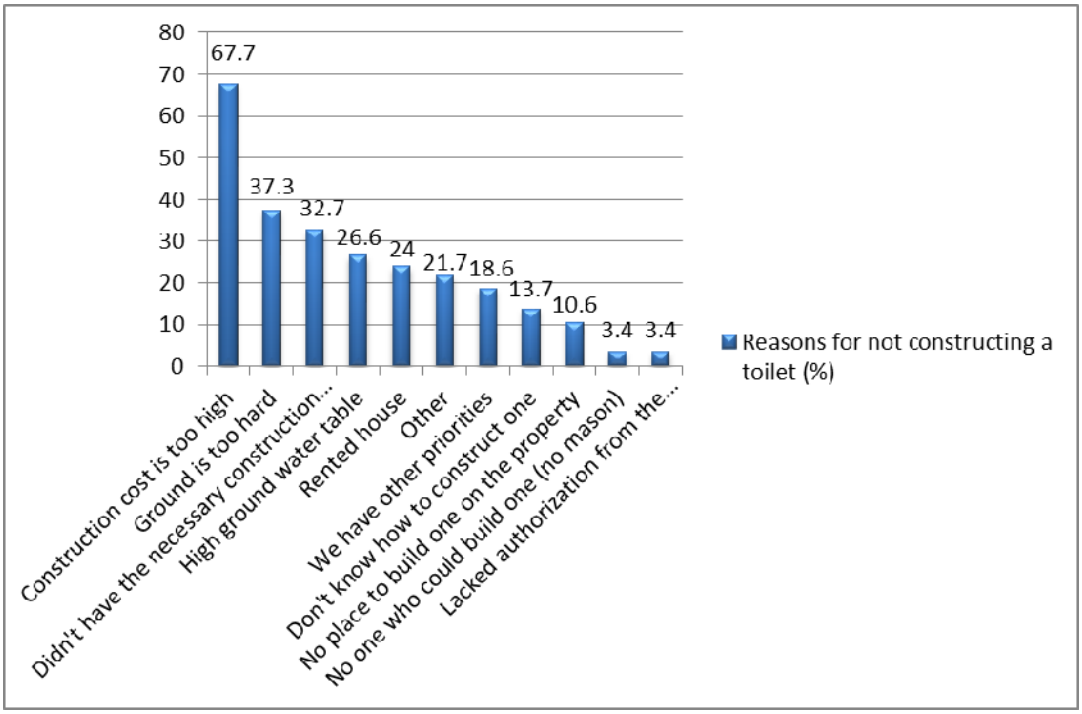


Figure 9: Distribution of households according to principal reasons for building the toilets

Households mentioned the following three reasons most to justify building toilets: privacy (69.9 percent), disease prevention (61.6 percent), and security (36.2 percent).

Households that do not have toilets mention the reasons below (Figure 10).

Figure 10: Distribution of households by principal reasons for not building latrines



The high cost of construction of latrines (67.7 percent) is by far the most common reason households justified not building the toilets. While more households in the lower socio-economic status (71.5 percent) than in the higher socio-economic status (52.6 percent) give this reason, the difference is not statistically significant. Next, the nature of the soil (37.3 percent) and the fact that the household does not have the necessary supplies to build latrines

(32.7 percent) are mentioned. Other reasons are listed in smaller proportions as indicated in the graph. The "Other" category (21.6 percent) is comprised of those who do not have toilets (one-fifth of respondents) among other reasons—the delay in resettlement operations; the effects of flooding during the rainy season; the refusal of some tenants to contribute, upon request of the owner, to build toilets; and zoning and resettlement issues.

In households, feelings of satisfaction or dissatisfaction regarding the use of the latrine were recorded, depending on where the household defecates. In fact, 32.5 percent of households are very dissatisfied with the place where they defecate, 12.9 percent are somewhat dissatisfied, 2.7 percent have no opinion, 22.7 percent are rather satisfied, and 29.3 percent are very satisfied.

Reasons for dissatisfaction are summarized in Figure 11.

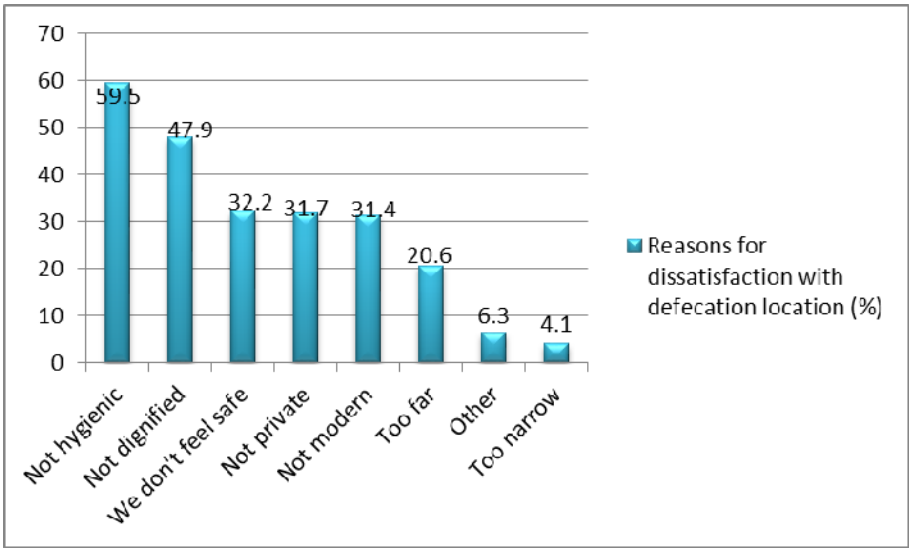


Figure 11: Distribution of households by reasons for dissatisfaction in the use of a latrine

The reason most cited, by three out of five households interviewed (59.5 percent), is that the defecation site is not hygienic. The section "Other" (6.3 percent) takes into account reasons such as: the latrine is full or almost full, latrine has no door, latrine has a defective door, too many people use the latrine, flooding, latrine is dirty, lacks a vent pipe, and does not allow privacy. It should be added that the response about privacy is very uncommon, but is relevant especially in the case of shared latrines that are very close to living quarters where the person using the latrine is known by all.

Reasons for satisfaction are summarized in Figure 12

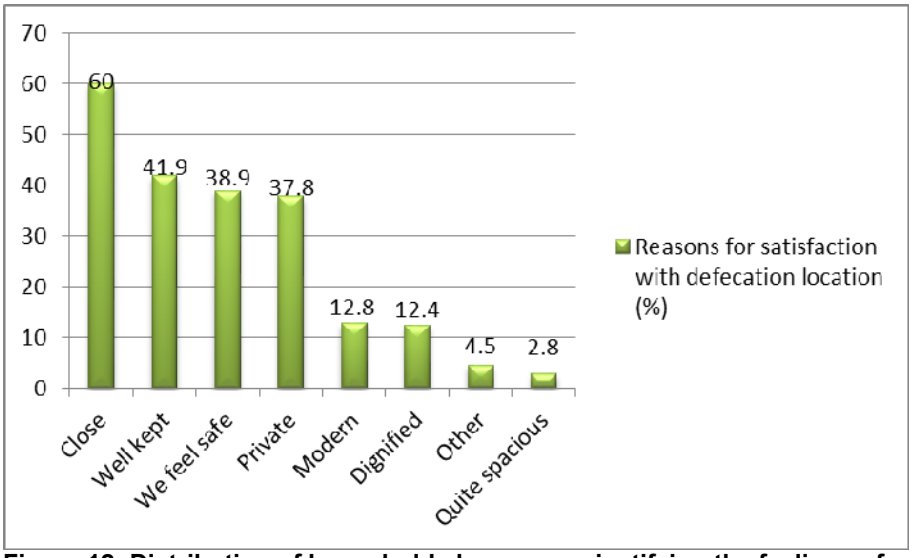


Figure 12: Distribution of households by reasons justifying the feelings of satisfaction of households that use the latrine

The proximity of the place (60 percent), maintenance (41.9 percent), safety (38.9 percent), and the fact that the site provides a sense of privacy (37.8) are the satisfaction factors households mention the most.

Despite the fact that almost a third (31.2 percent) of households interviewed do not have a latrine and that nearly two-thirds (59.5 percent) have decried hygiene conditions, only a quarter of households (25.7 percent) surveyed seem to want to do something to change their present situation regarding access to a latrine.

To change the current situation, households made the following suggestions: building private latrines (29.1 percent), improving private latrines owned by the household (15.9 percent), asking the owner to build a latrine (15.5 percent), asking for community help to build latrines (0.5 percent), and requesting assistance of government or outside sources to improve the sanitation situation (24.1 percent). Actions that are covered under the section "Other" (15 percent) include moving the household, emptying the latrine, and/or covering the latrine.

Only 7.6 percent of households interviewed intend to install or change their sanitation facility in the next six months.

More than the majority (69 percent) of households thinks that sanitation is a problem in their district. They mention reasons such as: open defecation (52.5 percent), odor (55.8 percent), presence of feces everywhere (25 percent), unhealthy environment (44 percent), lack of health services (50.3 percent), lack of resources (33.5 percent), and "Other" reasons (5.2 percent)—flooding of toilets in the rainy season, high level of ground water, full toilets not emptied, defecation in bags, the proliferation of flies, and occupancy of swamp areas.

Observation of Households Toilets

Condition of Toilets

Data collectors asked householders who owned toilets if they could observe their facilities. In response to the question, “May I see your toilets?” nine out of 10 households (90.1 percent) responded in the affirmative. Only 5.3 percent of toilets observed were built during the 12 months that preceded the survey. From observation of the distance between the toilets and the dwelling, it appears that 85.4 percent of toilets are in the homes, 2.6 percent in the yard, 11.1 percent at a distance less than or equal to 20 meters from the house, and 0.9 percent more than 20 meters from the house.

Of the toilets observed, 96.5 percent have walls, 90.6 percent have a roof, 88.6 percent allow privacy, 69 percent keep their door closed, and 64 percent are a series of toilets with more than one entrance to allow several persons to use them at the same time. Two elements observed help make them more accessible to children: squat toilets with a smaller hole (6.4 percent) maybe by chance and toilets with a lower seat (63.6 percent). Fewer than half (45.9 percent) of latrines visited had a covered hole.

In the latrines the following conditions were observed: (using a flashlight) fecal matter was observed in squat holes in 50.2 percent of cases, anal cleansing products (23.6 percent), wet seats (43.8 percent), grey colored seats (12.9 percent), bad smells (36.5 percent), presence of flies (21 percent), and cockroaches (16.3 percent).

According to respondents, only 3.6 percent of toilets are flooded during the rainy season. Remember that flooded houses are more common in Cotonou. When latrines are flooded, household members go to defecate in a dry public place (30 percent), in the lake (30 percent), in a private dry place (15 percent), in a plastic bag (15 percent), on a dump site (5 percent), or in the flooded latrine (5 percent).

Also during the observation, an assessment was made of latrine maintenance, namely the floor, the hole cover, and the anal cleansing material (toilet paper for the most part). Figure 13 below shows the results of observed toilet maintenance. The graph shows the cumulative percentages by component.

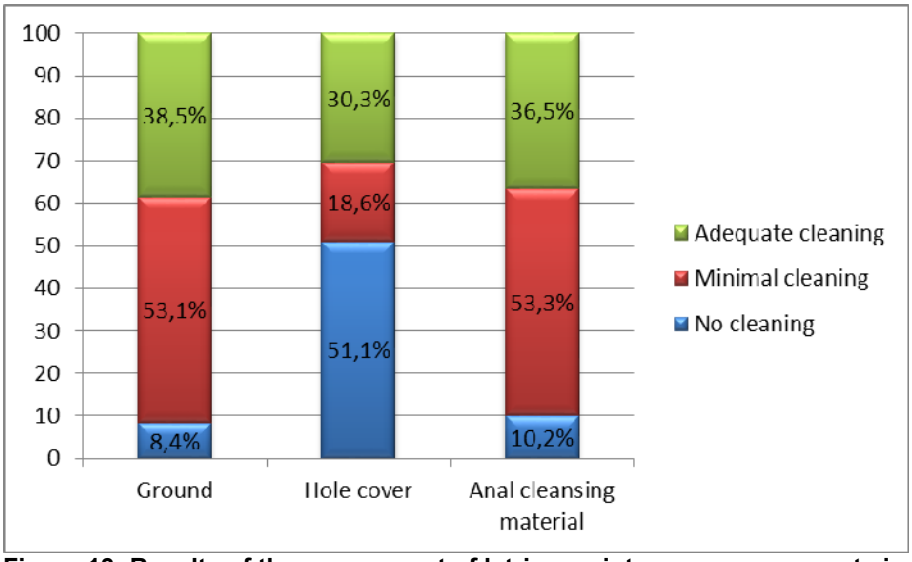


Figure 13: Results of the assessment of latrine maintenance components in observed latrines

In general, observations showed that only about a third of latrines had been adequately cleaned. Thus, each latrine component only receives an approximate cleaning: 53.1 percent for the floor, 18.6 percent for the hole cover, and 53.3 percent for the anal cleansing material.

In nearly one out of two households (48.6 percent) a broom was noted near the toilets. Finally, feces in the observed toilets go mainly into septic tanks (58.6 percent) and dry holes (39.4 percent).

Psycho-Social Determinants of Latrine Ownership

To measure psycho-social determinants of latrine ownership, the respondents were read a series of statements to elicit their opinion. Responses obtained are shown in Table 20 below.

Table 20: Household opinions on latrine ownership

Statements	Do not agree	No opinion	Some-what agree	Strongly agree
It makes the owners appear modern	7.0	8.2	28.7	56.1
It makes the owners respectable members of the community	5.0	7.9	29.8	57.2
It makes the owners respected by people who visit them	2.0	4.3	30.6	63.1
It makes the owners more appreciated	3.5	6.5	30.9	59.1
It makes the members of the household proud	1.1	3.3	22.8	72.9
It allows women to have privacy at any time of the day	0.8	0.5	12.9	85.8
It helps keep the shared compound areas clean	2.2	5.0	21.4	71.3
It doesn't reduce the number of flies in the house	44.9	10.3	19.2	25.6
It allows you to go relieve yourself easily when you are sick	0.9	4.0	25.4	69.7
It allows you to go relieve yourself easily when you are old	1.8	3.9	27.8	66.5
It reduces the possibility of disease in the household	2.1	3.0	25.6	69.2
It gives toilet users a little more privacy	0.1	0.8	18.5	80.5
It's annoying to go to the "john" every time to do your business	71.9	14.0	3.9	10.2
It avoids the dangers of having to go do your business at night in the bush	0.5	0.1	11.8	87.6
It's really hard to maintain latrines so that they are always operational	59.4	12.5	17.7	10.4
It is difficult to maintain them so that they are always clean	60.7	10.8	17.8	10.8

Summary Table of Survey Indicators

A summary table of indicators has been generated according to socio-economic groups. Socio-demographic factors were used to establish socio-economic levels, and an analysis was made for each income level. The socio-economic levels were established using the conventional method of creating a wealth index. The data were subsequently processed by municipality to explore the differences among Cotonou, Abomey-Calavi and Porto-Novo.

Table 21: Key indicators by household socio-economic level

Indicators	Socio economic typology			All subgroups combined (N=856)	Pearson Chi-square [8]	p
	Lower (N=245)	Intermediate (N=263)	Upper (N=278)			
% of households using an improved sanitation facility	45.3%	69.1%	94.5%	69.7%	164.675	.01
% of households with a station for hand washing equipped with essential supplies (soap and water) near the toilets	1.1	1.1	14.2	5.5	63.584	.01
% of households with a station for hand washing equipped with essential supplies (soap and water) near the kitchen	10.9	16.0	39.1	22.1	75.597	.01
% of households treating drinking water correctly	3.2	6.0	4.5	4.6	2.689 <	Not significant
% of households storing drinking water correctly	60.0	70.2	90.0	73.5	68.427	.01
A p value of .01 means that the relationships are highly significant, meaning improved infrastructure is more commonly found in the upper socio-economic group.						

Table 22 below provides a specific summary of each of the three municipalities of the study.

[8] The Chi-square seeks to establish the relationship between two categorical variables. Sex is a categorical variables because it would group individuals into one of two categories: men or women. This would be a dichotomous categorical variable. Socioeconomic quintiles would also be a categorical variable. In this case, it would not be dichotomous. Chi-square can be used to explore the relationship between the two types.

Table 22: Presentation of key indicators by municipality

Indicators	Municipality			Together (N=856)	Pearson Chi-square	p
	Abomey-Calavi (N=155)	Cotonou (N=349)	Porto-Novo (N=352)			
% of households using improved sanitation infrastructure	51.6%	79.9%	67.6%	69.7%	42.106 > 9.21	.01
% of households with a station for hand washing with essential supplies (soap and water) near the toilets	1.3	8.6	4.3	5.5	12.780	.01
% of households with a station for hand washing with essential supplies (soap and water) near the kitchen	16.1	28.4	18.5	22.1	13.880	.01
% of households who treat their drinking water properly	7.7	5.4	2.3	4.6	8.471	.02
% of households who store their drinking water properly	64.5	78.5	72.4	73.5	11.117	.01
All associations reported are statistically significant. The improved facilities and better practices are more commonly reported in Cotonou.						

Table 23 below combines the variables of the two tables above.

Table 23: Presentation of indicators by municipality and by household socio-economic levels

Indicators	Municipalities											
	Abomey Calavi				Cotonou				Porto-Novo			
	poor	average	wealthy	Pearson Chi-square	poor	average	wealthy	Pearson Chi-square	poor	average	wealthy	Pearson Chi-square
% of households using improved sanitation infrastructure	20.4	58.1	84.6	39.148 > 9.21	48.5	71.6	98.8	83.48 > 9.21	52.1	73.1	90.6	Significant .01 level
% of households with a station for hand washing with essential supplies (soap and water) near the toilets	0.0	0.0	5.1	6.026 > 5.991	0.0	1.7	17.0	28.092 > 9.21	1.8	1.0	12.9	Significant .01 level
% of households with a station for hand washing with essential supplies (soap and water) near the kitchen	1.9	4.5	9.7	19.915 > 9.21	7.4	14.7	46.7	52.703 > 9.21	14.1	20.2	24.7	Not significant
% of households who properly treat their drinking water	7.4	8.1	7.7	0.018 < 4.605	5.9	6.9	4.2	0.964 < 4.605	0.6	3.8	3.5	Not significant
% of households who store their drinking	57.4	58.1	84.6	9.201 >	52.9	73.3	92.7	48.001	63.8	74.0	87.1	15.323 Significant

Indicators	Municipalities											
	Abomey Calavi				Cotonou				Porto-Novo			
	poor	average	wealthy	Pearson Chi-square	poor	average	wealthy	Pearson Chi-square	poor	average	wealthy	Pearson Chi-square
water properly				7.824				> 9.21				.01 level

Exposure to Information Messages on Hygiene and Sanitation Practices

During this survey, information was also collected on the exposure of households to information messages on hygiene and sanitation practices as well as on sources of this information. Data show that only one in five households (19.6 percent) received information on washing hands during the 30 days preceding the survey. Figure 14 below summarizes the main sources of information received by the households.

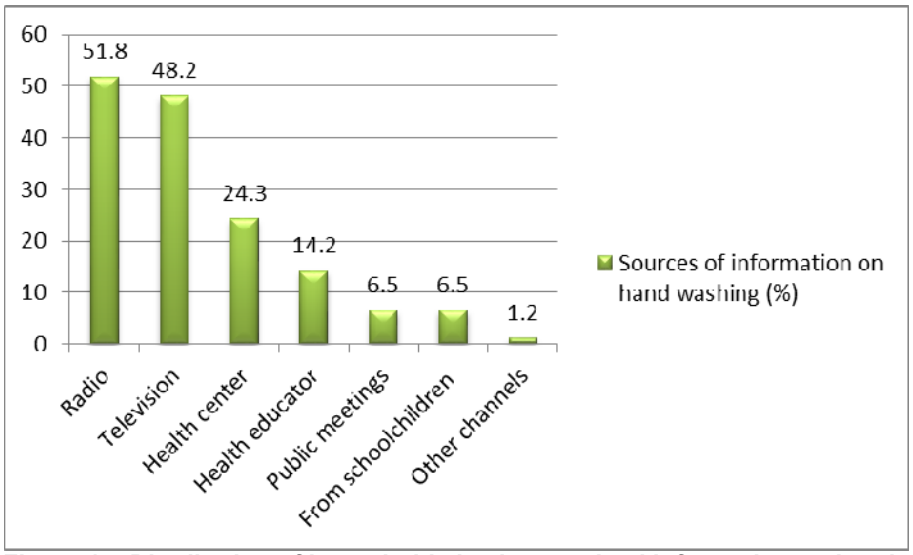


Figure 14: Distribution of households having received information on hand washing by source of information

As illustrated in the figure, the most common sources of information to households are the radio (51.8 percent) and television (48.2 percent), and to some extent health centers (24.3 percent).

Regarding the treatment of drinking water, only a quarter of the households surveyed (24.7 percent) received information on water treatment during the 30 days preceding the survey. Sources of this information are practically the same as those for hand washing (Figure 15).

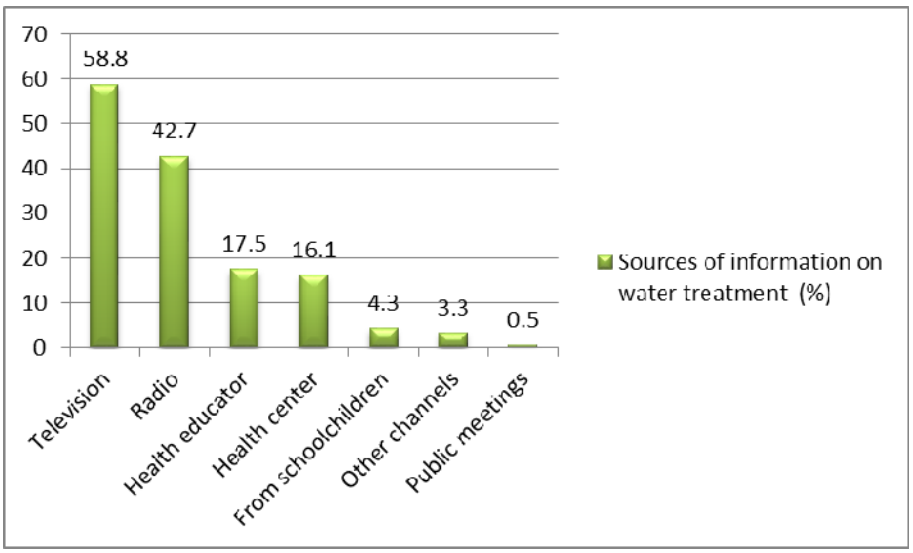


Figure 15: Distribution of households who received information on water treatment by source of information

Regarding sanitation, only one-fifth (20.4 percent) of respondents had seen or heard about sanitation during the 30 days preceding the survey. Sources of information received by these households are shown in Figure 16:

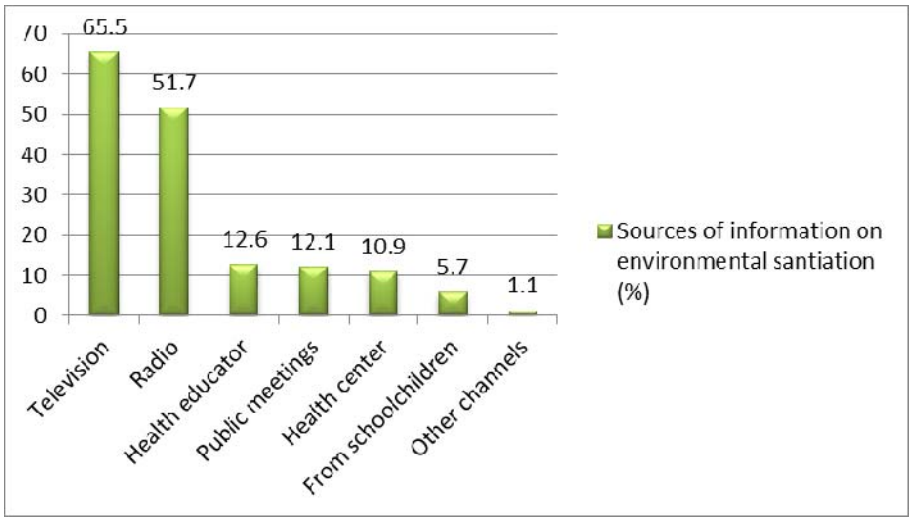


Figure 16: Distribution of households having received information on sanitation by source of information

Whether for hand washing, water treatment, or sanitation, television and the radio remain the two most cited sources of information by the households.

The households surveyed were rarely visited by health educators for sensitization on the practice of open defecation (2.1 percent) or the daily maintenance of toilets (4 percent).

As for information on hydro-fecal diseases, a little less than a third (27.4 percent) of households reported having received information on diarrhea or cholera in the 30 days that preceded the survey. The most cited sources of information were the radio (59.4 percent), television (44.9 percent), and the health center (40.6 percent).

Conclusion

Data from this study indicate that certain populations from the municipalities of Cotonou, Porto-Novo, and Abomey-Calavi lack basic hygiene and sanitation infrastructure even though they live in urban areas. The overall acceptability of conditions varies from one municipality to another. The results of the study reveal that nearly seven out of 10 households surveyed use an improved sanitation facility. The problem is less acute in Cotonou (79.9 percent) and Porto-Novo (67.6 percent) than in Abomey-Calavi (51.6 percent). Although households recognize the importance of hand washing in preventing certain diseases, the act of washing hands with water and soap at key moments is still far from being a habit in many households. Hand washing stations exist in very few households, depending on whether the hand washing station is located near the kitchen or toilet. In Cotonou, the availability of hand washing stations is 28.4 percent near the kitchen compared to 8.6 percent near the toilets; in Porto-Novo, 18.5 percent have hand washing stations near the kitchen compared to 4.3 percent near the toilets; and in Abomey-Calavi, 16.1 percent of households have facilities near the kitchen compared to 1.3 percent near the toilets.

Regarding household supply of drinking water, in nine out of 10 households surveyed the drinking water comes from the distribution network of SONEB. Only a minority of households drinks water from other sources, including wells. Only 5.8 percent of households treat drinking water. Results of chlorine tests made in households that used chlorination show the average concentration of chlorine in the water as 3.49 mg/l, which is very high considering the World Health Organization standard of free chlorine concentration of treated water is 0.2 to 0.5 mg/l. Also, the average number of days that the households continue to drink treated water is 6.4 days. A poor household practice of mixing treated water with untreated whenever the water is renewed in the container was also observed. All these reasons explain the alarmingly low percentage of households that properly treat their drinking water. This indicator is 5.4 percent in Cotonou compared to 7.7 percent in Abomey-Calavi and 2.3 percent in Porto-Novo.

Regarding proper storage of drinking water, nearly three out of four households (73.5 percent) store their drinking water properly. This indicator is 78.5 percent in Cotonou, 72.4 percent in Porto-Novo, and 64.5 percent in Abomey-Calavi.

All these indicators that characterize the current state of hygiene and sanitation in these peri-urban districts surveyed also change depending on the socio-economic level of households.

To reduce the health vulnerability of households in the study population, it is necessary that appropriate interventions be implemented in the peri-urban neighborhoods. To this end, radio, television, and to some extent health centers, appear to be the most appropriate channels for disseminating information and awareness messages, according to data from the study.

Endnotes

Boschi-Pinto C, L. Velebit, and K. Shibuyac. 2008. Estimating Child Mortality Due to Diarrhoea in Developing Countries. *Bulletin of the World Health*, 86:710–717.

Water and Sanitation Program. 2012. Economic Impact of Poor Sanitation in Africa.

Annex 1 – Population from Sampled Districts

Municipality	Districts	Population
Cotonou	AVOTROU	17,318
	MINONTCHOU	7,145
	LADJI	8,409
Abomey-Calavi	GODOMEY TOGOUDO	60,034
	TOKPA ZOUNGO	11,090
	HOUEKEGBO	1,718
	HOUEKEHONOU	1,770
Porto-Novo	ACCRON	5,350
	AVASSA	1,715
	FOUN FOUN TOKPA	3,412
	HOUEYOGBE GBEDJI	1,638
TOTAL		**119,601**

The Survey Questionnaire is available separately on request from contact@washplus.org

WASHplus
FHI 360
1825 Connecticut Ave NW
Washington, DC 20009
202.884.8000
www.WASHplus.org
contact@washplus.org

Supportive Environments for Healthy Communities