CSF R.D.Congo
Consultance Statistique & Formation

USAID DU PEUPLE AMERICAIN

MercyCorps

Final Evaluation of the Food security for Goma Multi-Year Assistance Program (MYAP)

Goma and Nyiragongo Territory

North Kivu Province, Democratic Republic of the Congo

October 2010

Mercy Corps Evaluation
Conducted by CSF-D. R. Congo

This evaluation is made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of CSF and Mercy Corps and do not necessarily reflect the views of USAID or the United States Government.

Final Evaluation
Food Security for Goma
Multi-Year Assistance Program

Goma, Nyiragongo Territory

North Kivu Province, Democratic Republic of the Congo

October 2010

Consultance Statistique & Formation

083, Avenue du Lac Kivu, Himbi II, Goma, Democratic Republic of the Congo

E : balolech@yahoo.fr

T : +243 997132653

Contents

Acknowledgements

Mercy Corps would like to thank all the people who contributed to the completion of this evaluation. In particular:

- The local administrative authorities of Nyiragongo Territory and Goma who facilitated the field work;

- All the investigators who collected the data necessary for this evaluation, and the data entry team for their dedication to this evaluation;

- To the members of the target communities who were willing to participate in the household survey;

- USAID for financing the evaluation and the program.

Mercy Corps DRC would also like to make a special thank you to two volunteers who edited the translated version of this report: Maria Ali-Adib and Jessica Wiseman.

Summary

In August 2008, Mercy Corps began the implementation of a Multi-Year Assistance Program (MYAP), titled “Food Security for Goma”, funded by USAID’s Food for Peace program, in North Kivu province, Democratic Republic of the Congo. The province continues to be destabilized by ongoing conflict between armed groups, which has resulted in the displacement of an estimated 800,000 people. The population of Goma, the capital of North Kivu Province, continues to increase as the conflict-affected migrate towards the town, seeking refuge and economic opportunities. It is estimated that there are now over 600.000 people in Goma, with the population expected to reach 750.000 by 2015.

Goma’s water, sanitation and hygiene (WASH) capacities are insufficient relative to the needs of its growing population. During its baseline study, Mercy Corps found that there was limited access to water (which was often of poor quality), that sanitation infrastructure was almost non-existent, and that there is a general lack of appropriate hygiene knowledge and practice. As expected with these findings, the incidence of diarrhea and other water- or hygiene-related illnesses was widespread. These diseases weaken the body and reduce its ability to effectively absorb and benefit from food, which in turn has contributed to the prevailing food security problem.

During the first two years of implementation, MYAP Mercy Corps has focused on: improving access to sanitation (through the construction of household and community latrines); raising hygiene levels (through community sensitization and education); and increasing access to water (through the construction of houses with gutters and tanks to catch rainwater). Currently, after extensive and detailed planning, the most crucial component of the program - the extension of the local water supply network - is poised to commence. This will entail the construction of a key water pipeline 7 km from a new tank, and will extend water distribution lines into those sectors targeted by the program. Food-for-Work and Food-for-Training opportunities to will be offered to participant beneficiaries.

The program’s overall objective is to improve food security for 16.900 vulnerable households in 14 urban and peri-urban communities in North Kivu Province; and to reduce the incidence of water-borne diseases among children under 5 by 25% by increasing access to potable water and to hygiene and sanitation infrastructure.

This objective will be realized through two interim results:

1. Increased access to durable water sources
2. Increased levels of hygiene and sanitation.

The Food Security and Water, Hygiene and Sanitation evaluations for the Nyiragongo area took place in October, at which time Mercy Corps evaluated an additional eight neighborhoods (or districts) in Goma for indicators of MYAP’s performance. The evaluation focused in particular on: determining the quantity of water supplied to households; examining water conservation indicators; analyzing household water usage; and assessing levels of sanitation and personal hygiene. In addition, the study aimed to analyze the knowledge and the practices of households at risk of water-related illness, two years into the implementation of the project, which has run numerous sensitization campaigns around these issues.

The situation in Nyiragongo territory plays out a vicious circle of several reactive factors. Living conditions are difficult: poor purchasing power; poor education; poor access to information; low

quality housing; overcrowded households; insufficient access to latrines; or, where they are available, latrines that are poorly constructed and maintained, access to potable water etc .all contribute to an inadequate base level of hygiene and sanitation, and an increased prevalence of water-related illnesses within the community.

In 2008, Mercy Corps began to provide access to sensitization, and it now appears that the means of illness prevention are understood, but not adequately practiced. Illness and disease, which could be avoided, impose significant costs on households in terms of medical expenses and lost productivity, and can thus render life very difficult for caregivers and dependents, as well as for those afflicted. Very poor living conditions prevail where these illnesses are chronic or recurrent, where recovery is compromised by the long-term physical deterioration this causes.

In Nyiragongo, 47% of households rely on agriculture for subsistence versus 56% in 2008.
In the districts of Goma surveyed, 3 % of households rely on agriculture.

The mean annual income per person is US $360, an increase from US$327 in 2008

In this final evaluation in Nyiragongo, 33% of the least poor of the households sampled had a mean Household Dietary Diversity Score (HDDS) of over 4.21, and therefore well above that of 3.81, which was the target HDDS score set in 2008 for performance monitoring. The target score was achieved for 100% of households surveyed.

The Months of Adequate Household Food Provisioning (MAHFP) score in 33% of the least poor of the households surveyed in Nyiragongo was 8.8 and therefore well above that of 7.8, which was the 2008 target MAHFP score for performance monitoring, and was met by 92% of the households surveyed.

In the Goma districts surveyed, the mean HDDS was 4.8, which met the target HDDS. The mean MAHFP score of 8.95 also met the target set by the program.

The households surveyed indicated low water usage in 2008, averaging 7 liters per person per day in Nyiragongo, and 11 liters per person per day in the Goma districts.

In 2008, in Nyiragongo, six out of ten households (60%) traveled for more than 30 minutes to their nearest water source; whereas the 2010 study indicates that this figure has dropped to 47%. 44% of households now have access to sufficient water, versus 33% in 2008.
In the Goma districts, 56% of households travel for more than 30 minutes to their nearest water source, and only 40% of households are able to access sufficient water. In general, water that is both available and accessible is of poor quality, particularly in Nyiragongo.

The cost, or burden, of transporting water is essentially assumed by women: the study indicated that in Nyiragongo in 2010, 78% of those responsible for transporting water from its source to the home are mothers and young girls. This is a drop from the 2008 figure of 89%.

In 2010, 55% of households in Nyiragongo were found to rely on rainwater for drinking water, as opposed to 44% in 2008. We note a positive increase of 25% from the survey results. This

reflects the impact made by the program's provision to households of sheet metal and construction of gutters for the capture of rainwater.

64% of target households now treat rainwater for drinking, versus 51% in 2008.

As in 2008, households surveyed in 2010 in Nyiragongo reported numerous cases of malaria, worms and diarrhea, all of which are closely linked to water quality. Similar patterns were also observed in the Goma districts, though to varying degrees.

The incidence of diarrhea in children under 5 has decreased significantly, dropping from 22% in 2008 to just 3% in 2010.

40% of households surveyed are aware that diarrhea may be prevented through improved hygiene around the handling of food and drinking water. However, 49% stated that they did not know how to reduce the risk of developing diarrhea.

When asked about how to reduce the risks of contracting malaria, 16% responded 'by sleeping under a mosquito net', but only 4% said 'by sleeping under an insecticide-treated mosquito net'.

Poor household hygiene levels in Nyiragongo are indicated by lice infestations, estimated at 18% in 2010 versus 17% in 2008, roaches at 34% compared to 29% in 2008, and bedbugs at 33% compared to 37% in 2008. In Goma, the figures are 4%, 58% and 31% respectively.

It was observed that the majority of household plots are not well-kept, and that techniques for the treatment of waste are not applied, in spite of the beneficiary communities' assertions that they have been participating in the sensitization campaigns conducted by local facilitators trained by Mercy Corps. The communities indicate greater understanding and awareness of these issues, but poor know-how in terms of implementation, hence little visible impact.

Mercy Corps' work on the ground, however, is clearly visible, from the construction of community latrines, private latrines for the vulnerable, gutters and plastic reservoirs, and from the communities' recognition of the sensitization campaigns in both Nyiragongo and Goma, as well as their desire for change. The communities are united in their expressed determination that their newly-acquired knowledge be implemented.

The following activities are ongoing:

- To continue to set-up and implement projects around the prevention of water-borne illness and disease, e.g. reduction of malaria incidence through the distribution of insecticide-treated mosquito nets
- To continue above all to support community education on the prevention of water-borne illness and disease, such as diarrhea, and on precautions to be taken during the treatment of contaminated water
- To strongly encourage the implementation of projects related to water supply, or the construction of reservoirs for the capture of rain water, which can be treated to be potable and will help to reduce the burden of women responsible for water transport.
- To reinforce and support education programs that aim to impact choices around hygiene and sanitation, with an aim to improving general conditions
- To implement and support projects aimed at improving the construction of latrines and the treatment of waste

Tables list

Figures List

List of Equations

List of Annexes

1 INTRODUCTION

1.1 Context and justification

North Kivu Province is home to approximately 6 million people, occupying 47,250 km^2 of land; a population density of roughly 127 people/km^2. The major urban centers of the province are Goma, Masisi, Mweso and Kirotshe to the south of the province, and Rutshuru, Lubero, Butembo and Beni to the north. The predominant ethnic groups are the Nande, Hutu and Hunde, whose subsistence centers on agriculture, and the Tutsi who are cattle-owners and breeders.

For over a decade, North Kivu has been plagued by armed conflict, which frequently compromised the effective planning and implementation of projects. But since the launch of the Amani Leo program, which has attempted to give voice to dissident parties, the province now enjoys a degree of peace.

The conflict however has given rise to major humanitarian problems, not least of which are an increase in sexual violence against women and young girls, and a greater incidence of HIV/AIDS in the east. The conflict has also directly contributed to a sharp rise in malnutrition, recurring cholera epidemics, very high rates of population displacement, and an overall increase in poverty.

One of the key elements contributing to food insecurity which prevails in North Kivu is poor access to potable water, which limits the body's ability to benefit from food. 54% of Congolese across the country do not have access to adequate potable water. Mercy Corps' findings in 2007 indicate that these figures are even higher in North Kivu, particularly in the villages and districts of Kibati, Ndosho, Munigi, Mudja, Rusayo, Lac Vert and Mugunga. The percentage of people in Goma with access to supposedly-potable tap water has always been low, and was further impacted by the volcanic eruption in 2002, which destroyed the water supply system. This in turn has contributed to the spread of water-borne illness and disease, such as worms (verminosis) and diarrhea.

These factors led Mercy Corps to apply to USAID's Food for Peace program for funding for a three-year water, sanitation and health project to be implemented in the town of Goma. Funding was secured, and a survey was conducted at the outset of the project October 2008, in order to determine the project's base indicators. A second survey in October 2010, sought to evaluate the impact of the first two years of the project's implementation.

1.2 Objectives of the 2010 survey

The program evaluation survey of beneficiary communities in Nyiragongo territory and in eight districts in Goma ran between September 28 and October 5 2010. Its objectives were:

- To evaluate program performance, based on the objectives and indicators stated at the outset
- To evaluate the extent of involvement of partners and stakeholders in program activities
- To assess the program's impact in quantitative and qualititative terms
- To evaluate the extent to which community capacity-building had so far contributed to reducing food insecurity and improving access to and the quality of basic services.

1.2.1 Target Population

The program's target population consists of vulnerable households (including both displaced and local families) in seven districts or villages on the outskirts of Goma in Nyiragongo Territory, as well as eight districts within Goma itself. These districts participated in extensive sensitization campaigns on water, hygiene and sanitation with Mercy Corps. Heads of households and/or their spouses were approached to participate in the study. In the qualitative survey, targeted respondents chiefly consisted of male and female adults living in the communities in which the study was conducted.

The survey was carried out with the collaboration of the North Kivu health department, CSF-D.R. Congo, and local administrative authorities.

1.2.2 Sampling and processing of quantitative data

Random sample selection

The survey drew on a representative sample of 900 households. Systematic random polling was conducted in 15 districts/villages (7 on the outskirts of Goma, 8 in Goma). To begin with, the first house selected for polling in each district or village was randomly drawn and was either the first or the third house closest to the entrance of the district/village. Thereafter, every third house was surveyed until a total of 60 households had been reached in each district/village. As in 2008, it was not possible to create a register of all households belonging to each district/village, nor to construct a complete population register. Sampling principles were instead applied to the conducting of direct interviews on the ground. This ensured that each household surveyed was selected at random.

The following formula was used to calculate the sample size:

$$n \geq \frac{Z^2 \times p\,(1-p)}{D^2}$$

$$n \geq \frac{1{,}96 \times 1{,}96 \times 0{,}5 \times 0{,}5}{0{,}04 \times 0{,}04} = 600{,}25$$

Z = Z score = 1.96 for a 5% level of risk.

p = degree of variability estimated at an outer limit of 50%

D = estimated margin of error = 4% or 0,04,

The survey's sample size of 900 households was therefore well above the minimum required, and permitted significant statistical conclusions to be drawn. To maximize efficiency, 15 interviewers, 3 supervisors and 1 study coordinator were deployed.

Villages/districts were selected along the following five axes:

Axis 1: Ndosho, Mugunga and Lac Vert
Axis 2: Munigi and Kibati
Axis 3: Mudja and Rusayo
Axis 4: Katoyi, Majengo, Murara, Virunga and Bujovu
Axis 5: Mabanga Sud and Mabanga Nord

Figure 1. Map of region and axes along which survey was conducted

Staff who would be working on the evaluation received three days of training, between 25- 27 September 2010, which covered:

- Survey objectives
- Methodology
- Fundamental rules of conduct governing contact with communities
- Observation techniques; qualitative data collection through focal groups and targeted interview techniques
- The role and tasks of survey staff
- The explanation and translation of the questionnaire
- Role plays and simulation

A pre-survey exercise was organized in Keshero on the final day of training as a practical exercise aimed to give participating survey staff a hands-on opportunity to gain an understanding of the types of difficulties likely to be faced during the survey proper, and to ensure that the survey questions had been accurately translated into the local language.

The survey itself took place between September 28 and October 5 2010. It was conducted primarily in Kiswahili, and the report was produced in French.

1.2.3 Collection, coding, analysis and reporting of data

The survey covered water, health and sanitation issues and was based on the responses of interviewees to a standardized set of questions. Interviewers had been trained to encourage and accurately note detailed responses. The data collected comprises responses to the household questionnaire (ref. appendix 3).

The survey was conducted house to house. Interviewers had been recruited on the basis of their experience, understanding of field practices, and overall reliability on the ground. Recruitment was overseen by CSF-RDC, with preference given to applicants who had been involved in the 2008 survey. The final selections were made through individual interview. As noted earlier, training was followed by a practical pre-evaluation test run.

The coordination of the survey was supervised by Jean-Claude Balolebwami and Bahati Muhashirwa, of CSF-DRC. Collected data was codified and encoded at CSF-DRC in SPSS. Data analysis was performed by Jean-Claude Balolebwami in SPSS 12.1, Excel 2007 and/or EPIINFO 200X. The report was produced by Jean Balolebwami with the assistance of Bahati Muhashirwa.

To compare means where variances were homogeneous, variance analysis tests (ANOVA) were carried out. Where Bartlett tests found variances to differ significantly, non-parametric Kruskal Wallis tests were used for the comparison of means.

For small samples, the Student test was used to compare two means. When comparing proportions, Chi-squared tests were employed. These comparisons only applied to the seven villages/districts in Nyiragongo covered by the initial survey in 2008.

1.2.4 Collection and analysis of quantitative data

Introduction

This section of the report presents the findings of the focus groups held in the various villages/districts covered by the survey: Kibati, Lac Vert, Mudja, Mugunga, Munigi, Ndosho, Rusayo, Katoyi, Bujovu, Majengo, Murara, Virunga, Mabanga Nord, Mabanga Sud, and Kasika. Fifteen focus groups were conducted. They comprised male and female heads of household, and members of local associations.

The aim of the focal group discussions was to gain an understanding of the feelings, attitudes and opinions of the target communities on the following:

1. Communities' access to potable water, and the quality of the water available to them
2. The transmission and carriers of water and hygiene-related disease
3. Community perception of water and hygiene-related diseases
4. Enhancing community awareness about water, hygiene and sanitation issues

The study thus indicated what water sources were available for community use, how accessible these sources were in terms of distance, availability and rate of water supply, what the community understood about various water treatment methods, conservation, quality assessment etc. It also gave an indication of the communities' depth of understanding regarding the transmission of hygiene-related disease.

Data collection

To attain a comprehensive understanding of the problems faced by communities, male and female heads of household and key members of several community organizations were selected through 'convenience sampling', at a sample size of 12 for each site. At each session, a moderator was designated to organize and observe the discussions. To maximize efficiency, the following steps were taken:

- The creation of focus groups of 12 participants
- Under the supervision of the moderator, interviews were conducted as discussions that followed a pre-developed guide to questions
- The taking of notes
- Compiling reports

Focus group discussions were between 50 and 60 minutes long. In order to preserve confidentiality and avoid external influences, interviews were conducted in quiet and private spaces. At each meeting, the moderator welcomed participants, explained the reasons for the focus group, and explained the general rules of discussion, namely:

- To speak clearly, one speaker at a time
- Everyone should try to participate as fully as possible
- There are no right or wrong answers
- Everyone is entitled to an opinion

- Anonymity and confidentiality are guaranteed

Limitations of the methodology and potential areas of bias

1. The 'no response' bias: meetings were held between 9 a.m. and 5 p.m., which meant that some heads of household who would have been included in the survey were not able to attend (at work, or in the fields etc).

2. The 'refuse to participate' bias: this is often the case on the ground, but it was found that this survey was generally well received at the villages surveyed. This highlights the communities' willingness to collaborate on future projects.

3. The translation bias: the translation of questions from French to Kiswahil can lead to imprecise interpretation. This is why a significant chunk of staff training was dedicated to translating the questionnaire, and staff responsible for conducting the survey were asked to keep the original French version to hand for easy reference.

4. The 'interviewer' bias: survey staff can influence participant responses if they are not careful to conceal their own opinions. The staff training sessions attempted to minimize this bias, using role-play to help interviewers to be more aware of their own verbal and non-verbal conduct when speaking with participants.

5. The 'respondent' bias: respondents may feel that certain responses will elicit support or earn favor with survey staff, or may lead directly to concrete benefits, such as money or a job. Interviewers were instructed to explain the objectives of the survey clearly to participants in order to minimize misunderstandings of this nature.

To minimize the risk of bias, the survey coordinator was careful to:

- select experienced staff to conduct the survey
- plan and implement a pre-survey exercise and ensure careful supervision during the survey proper
- on the day of the survey, check that the questionnaire is in order, and provide feedback to interviewers and other survey staff at the end of the day.

2 THE RESULTS OF THE STUDY: QUANTITATIVE DATA

As in 2008, the results are here presented globally, rather than broken down by village/district. For some indicators, the confidence interval was increased to 95%.

2.1 General information – quality of the sampling

2.1.1 Villages/districts surveyed

The survey was conducted in seven villages/districts ("*quartiers*") in Nyiragongo territory, and in eight districts of Goma town, tabulated below:

Table 1. Breakdown of households by village/district, October 2010

Village/District	Number of households surveyed	% of sample
Kibati	60	6.7
Lac Vert	60	6.7
Mudja	60	6.7
Mugunga	60	6.7
Munigi	60	6.7
Ndosho	60	6.7
Rusayo	60	6.7
Bujovu	60	6.7
Murara	60	6.7
Majengo	60	6.7
Virunga	60	6.7
Katoyi	60	6.7
Mabanga Nord	60	6.7
Mabanga Sud	60	6.7
Kasika	60	6.7
Ensemble	**900**	**100,0**

The 2008 survey covered only the first seven villages/districts listed in table 1, all of which are in Nyiragongo Territory. The latter eight districts are within the remit of Goma town.

General characteristics of surveyed households

Gender breakdown

Gender distribution in the villages/districts surveyed is tabulated below:

Table 2. Gender distribution by village/district October 2010 in surveyed households

Village/district	Men		Women		Total
	No. of Persons	% of total	No. of Persons	% of total	
Kibati	189	53%	168	47%	**357**
Lac Vert	181	45%	225	55%	**406**
Mudja	205	51%	195	49%	**400**
Mugunga	215	52%	198	48%	**413**
Munigi	184	47%	205	53%	**389**
Ndosho	225	51%	216	49%	**441**
Rusayo	173	50%	171	50%	**344**
Bujovu	194	50%	196	50%	**390**
Murara	184	50%	184	50%	**368**
Majengo	212	52%	195	48%	**407**
Virunga	212	50%	212	50%	**424**
Katoyi	216	52%	203	48%	**419**
Mabanga Nord	179	47%	201	53%	**380**
Mabanga Sud	223	53%	195	47%	**418**
Kasika	218	50%	217	50%	**435**
Total	**3,010**	**50,2%**	**2981**	**49,8%**	**5,991**

On average, the male to female ratio in 2010 was 50.2% to 49.8%, a shift from 2008 when it was found to be 48% to 52%.

Table 3. Average household size by village/district, October 2010

Village/district	No. of Households	Total no. of persons in surveyed households	Total no. of children under 5 in surveyed households	
			Total number	Average per household
Kibati	60	357	92	1,53
Lac Vert	60	406	182	3, 03
Mudja	60	400	121	2,02
Mugunga	60	413	90	1.50
Munigi	60	389	89	1.48
Ndosho	60	441	112	1.87
Rusayo	60	344	105	1.75
Bujovu	60	390	76	1.27
Murara	60	368	54	0.90
Majengo	60	407	82	1.37
Virunga	60	424	81	1.35
Katoyi	60	419	93	1.55
Mabanga Nord	60	380	57	0.95
Mabanga Sud	60	418	70	1.17
Kasika	60	435	90	1.50
Ensemble	**900**	**5,991**	**1,394**	**1.55**

The 900 households surveyed represented a total of 5,991 individuals, demonstrating an average household size of 6.7. Variance analysis testing showed no significant differences in average household size between villages/districts. This average is fairly consistent with the national average, which is 6 individuals per household.

The average number of children under 5 per household was found to be 1.55, a drop from the 2008 figure of 1.59. Children under 5 constituted 23% of the population surveyed in 2010, down from 27% in Nyiragongo in 2008—then significantly higher than the national average of 20%.

Head-of-household breakdown by gender

The majority of African households are headed by men. This was certainly found to be the case in the Nyiragongo villages/districts surveyed.

Table 4. Head of household breakdown by gender and village/district, October 2010

Village/district	Number of households surveyed	Male head		Female head	
		Freq.	%	Freq.	%
Kibati	60	18	30%	42	70%
Lac Vert	60	9	15%	51	85%
Mudja	60	21	35%	39	65%
Mugunga	60	10	17%	50	83%
Munigi	60	8	13%	52	87%
Ndosho	60	18	30%	42	70%
Rusayo	60	8	13%	52	87%
Bujovu	60	14	23%	46	77%
Murara	60	9	15%	51	85%
Majengo	60	11	18%	49	82%
Virunga	60	16	27%	44	73%
Katoyi	60	13	22%	47	78%
Mabanga Nord	60	20	33%	40	67%
Mabanga Sud	60	9	15%	51	85%
Kasika	60	11	18%	49	82%
Total	**900**	**195**	**22%**	**705**	**78%**

Length of time lived in village/district

Nearly eight out of ten of participants in the survey were women, the majority of whom were the wives of heads of households.

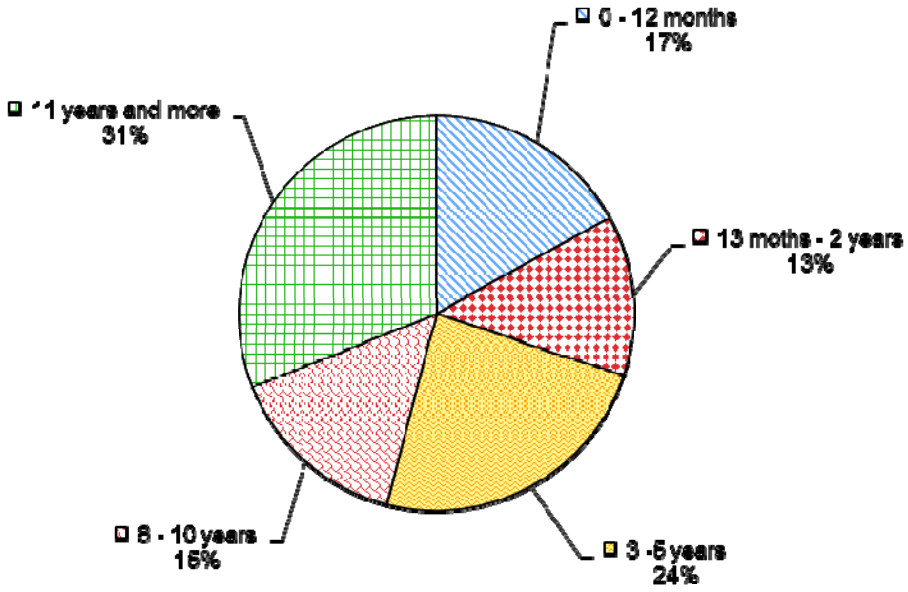


Figure 2. Breakdown of households by length of time lived in village/district

31% of all participants reported having lived in their village/district for 11 years or more, as opposed to 41% of those surveyed in Nyiragongo in 2008.

Population type

Of the 900 households surveyed in 2010, more than eight out of ten (81%) were locals (who were not displaced and not hosting IDPs), one out of ten (10%) were displaced families, 6% were host families, and 3% were returnees or refugees. This is similar to the 2008 findings (although as stated earlier, those were based on a survey of the Nyiragongo villages only).

Displaced families were found to have migrated from several places of origin, the majority from Masisi and Rutshuru Territories. Nearly seven displaced households out of ten (69%) stated that they had planned to stay with host families, as opposed to 46% in 2008. The 31% who did not plan to stay with host families cited the following reasons:

- The return of peace to their places of origin
- Problems with landlords
- Host families lacked the means to support them
- General unhappiness and feelings of discontent in their new location

Table 5. Percentage of owner-occupiers to leaseholders by village/district, October 2010

Village/district Nyiragongo	No. of households	Owner-occupier		Leased	
		2008	2010	2008	2010
Kibati	60	93%	81%	7%	19%
Lac Vert	60	82%	70%	18%	30%
Mudja	60	100%	56%	0%	44%
Mugunga	60	62%	86%	38%	14%
Munigi	60	92%	80%	8%	20%
Ndosho	60	65%	48%	35%	52%
Rusayo	60	87%	92%	13%	8%
Total Nyiragongo	**420**	**83%**	**73%**	**17%**	**27%**
Village/district Goma					
Bujovu	60	-	63%	-	37%
Murara	60	-	58%	-	42%
Majengo	60	-	58%	-	42%
Virunga	60	-	46%	-	54%
Katoyi	60	-	42%	-	58%
Mabanga Nord	60	-	76%	-	24%
Mabanga Sud	60	-	56%	-	44%
Kasika	60	-	63%	-	37%
Total Goma	**480**	-	**58%**	-	**42%**

In the Nyiragongo villages/districts, 73% of those interviewed owned their homes, while 27% lived in rented accommodation. This contrasts with the 2008 figures, when 83% were home-owners, and only 17% lived in rented accommodation. The proportion of home-owners to leaseholders was found to be much lower in the Goma neighborhoods surveyed, where 58% owned their homes, and 42% lived in rented accommodation.

2.2 Household income

2.2.1 Source of income

Table 6. Breakdown of household by primary income source, October 2010

District / village	n	Household primary income source in %					
		Salaried employee	Farmer	Trader	Artisan	Livestock breeder	Other
Kibati	60	7%	52%	8%	3%	0%	30%
Lac Vert	60	3%	47%	13%	5%	5%	27%
Mudja	60	2%	86%	10%	2%	0%	0%
Mugunga	60	13%	25%	13%	12%	0%	37%
Munigi	60	8%	40%	17%	8%	7%	20%

District / village	n	Household primary income source in %					
		Salaried employee	Farmer	Trader	Artisan	Livestock breeder	Other
Ndosho	60	30%	5%	25%	13%	0%	27%
Rusayo	60	8%	59%	20%	0%	0%	13%
Bujovu	60	34%	15%	25%	8%	0%	18%
Murara	60	43%	2%	33%	0%	0%	22%
Majengo	60	43%	3%	20%	12%	0%	22%
Virunga	60	38%	0%	35%	12%	0%	15%
Katoyi	60	43%	0%	33%	7%	0%	17%
Mabanga Nord	60	45%	3%	23%	17%	2%	10%
Mabanga Sud	60	45%	2%	28%	8%	0%	17%
Kasika	60	47%	0%	28%	13%	2%	10%
Ensemble	900	27%	23%	22%	8%	1%	19%

As illustrated in Table 6, livelihoods in Mudja were found to revolve mainly around agriculture, with 86% of households depending on farming for their primary income. Similarly, in Rusayo and Kibati, 59% and 52% of households respectively were found to depend on agriculture as a main source of income.

Overall, nearly three out of ten (27%) of households surveyed depended on earnings derived from employment by others, 23% relied mainly on income derived from agricultural work, and 22% on commerce and trade. Nearly two out ten households surveyed (19%) relied on other sources of income; more than half (53%) were daily workers without access to steady and structured employment; 18% were unemployed; and 5% were ‘stone breakers’ (manually breaking up rocks for use in construction or road-building work).

2.2.2 Average household income

In 2008, monthly household income in the villages/districts surveyed in Nyiragongo was found to range between US $0.89 and US$1811.25. In contrast, average annual income per person in 2010 was US$360, an increase from the 2008 figure of US$327.60. This varied significantly between villages/districts ($p<0.001$)

Among the surveyed population, average income per person per day in 2010 was US$1, up from US$0.91 in 2008. This places the population firmly on the poverty line, as defined by the World Bank’s ‘a dollar a day’ threshold.

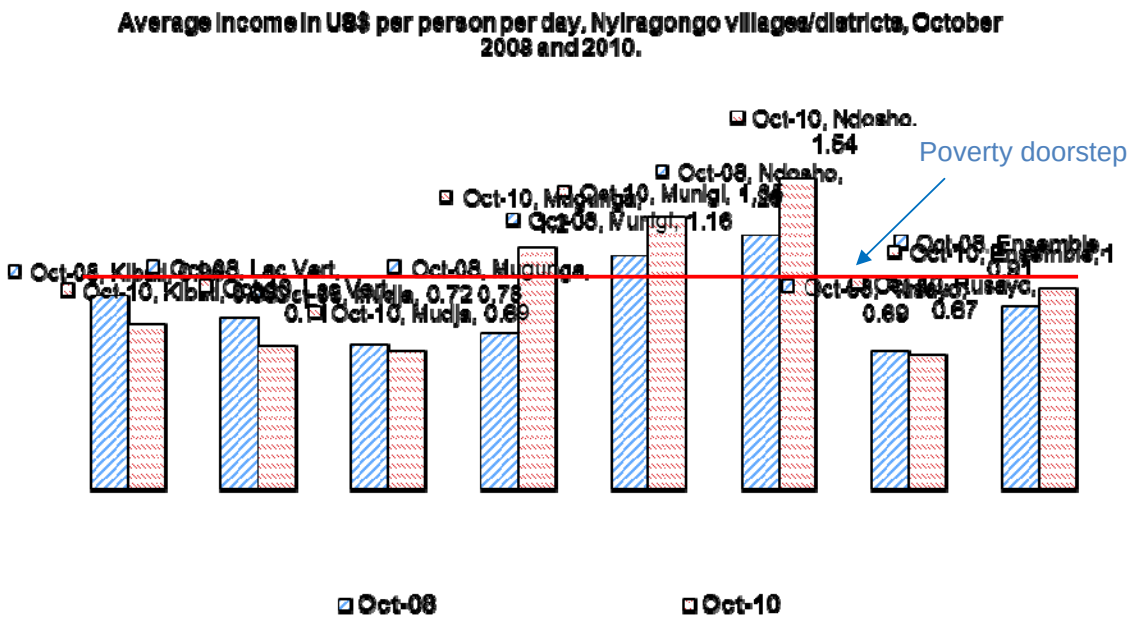


Figure 3. Average income in US$ per person per day, Nyiragongo villages/districts in 2008 and 2010

The average household has a monthly income of US$136.68 (US$0.68 per person per day, or US$244.80 per person per year). As in 2008, it was found that average income per person per day in Rusayo, Mudja, Lac Vert and Kibati was worryingly, still under US$1 per person per day.

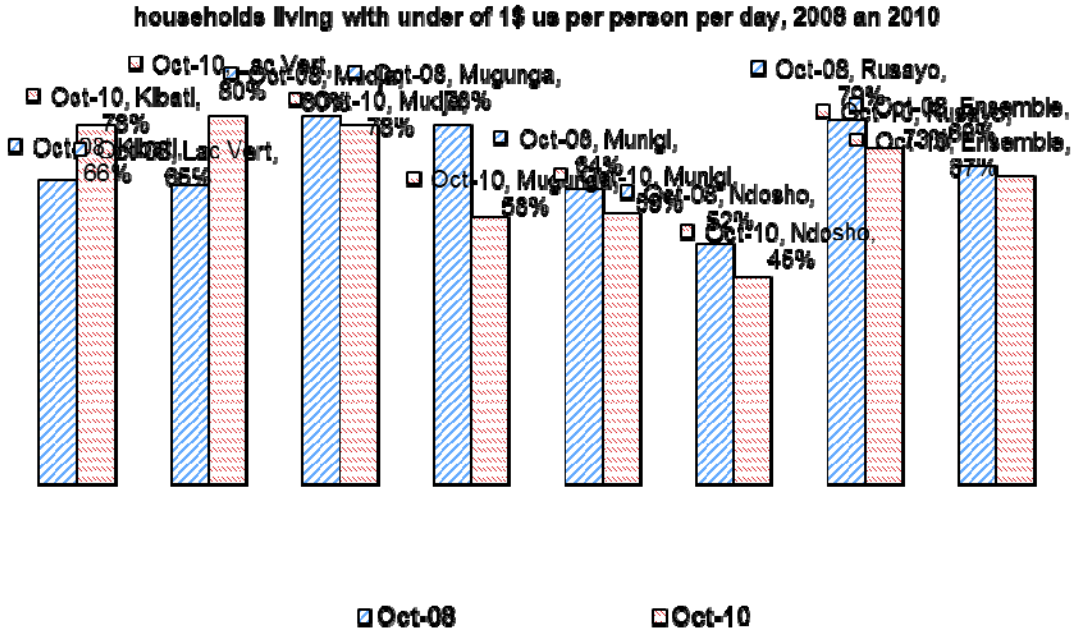


Figure 4. Percentage of households living on less than US$1 per person per day, 2008 and 2010

In 2010, 67% of all households surveyed were found to be living on less than US$1 per person per day, as opposed to 69% in the Nyiragongo villages/districts in 2008. With a confidence threshold of 95%, this was not found to be a significant difference. Poverty remains a major concern for these communities.

Goma villages/districts 2010

The monthly income of households in the Goma villages/territories was found to vary significantly between US$0 and US$21406.06. Average annual income per person was US$909.94. This varies significantly ($p<0.01$) from one quarter to the next. The average income per person per day was calculated at US$2.53, which is above the World Bank's 'dollar a day' poverty threshold.

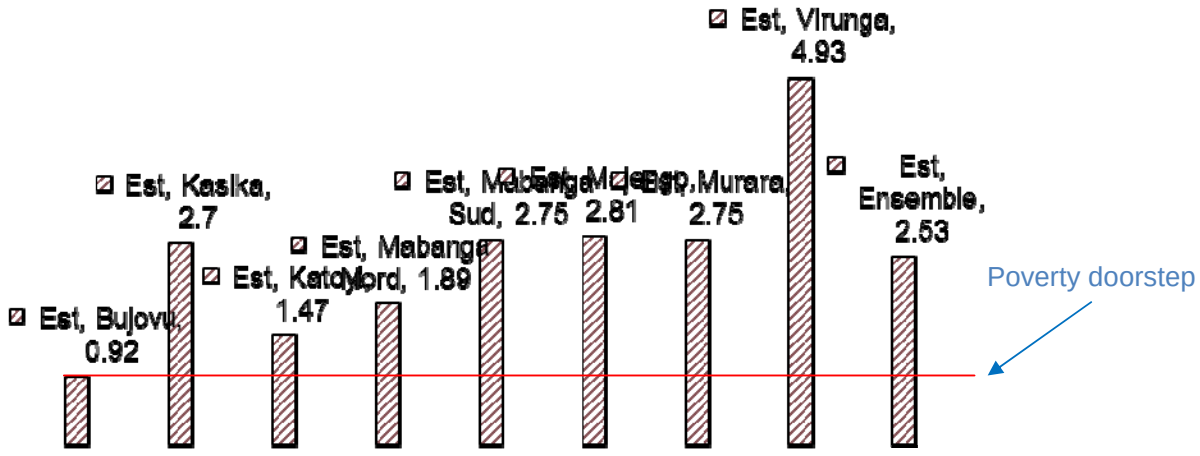


Figure 4. Average income in US$ per person per day, Goma villages/districts, 2010

A typical household in the Goma villages/districts was found to have an average monthly income of US$263.97, which amounts to US$1.50 per person per day, or US$ 540.68 per year. The worrying exception was the village of Budjovu, where the average income per person per day was found to be less than US$1 per day.

It should be noted that 'investment' expenses were found to feature heavily in the budgets of surveyed households. This is essentially because a significant number of households stated that they were in the process of having new property constructed. This necessarily affected the average income per person per day, particularly for households in the Virunga neighborhood (see Fig. 5).

2.2.3 Household Dietary Diversity Score

The Household Dietary Diversity Score (HDDS) was calculated as follows:

HDDS (0 – 12) =	Total number of food groups consumed by household members Values for A through L will be either « 0 » either « 1. » Sum (A+B+C+D+E+F+G+H+I+J+K+L)1

Equation 1. Household Dietary Diversity Score

Then the average HHDS was calculated for the sample population:

Average HDDS	$\frac{\text{Sum (HDDS)}}{\text{Total Number of households}}$

Equation 2. Average HDDS

According to FANTA's methodology, an increase in the average number of different food groups consumed provides a quantifiable measure of improved household food access. In general, any increase in household dietary diversity reflects an improvement in the household's diet. In order to use this indicator to assess improvements in food security in a performance reporting context, the changes in HHDS must be compared to some meaningful target level of diversity.

The dietary diversity patterns of wealthier households can be used as a target, under the assumption that poorer households will diversify their food expenditures as incomes rise, and thereby mirror the consumption patterns of wealthier households. Because projects using the HDDS indicator usually include interventions aimed at increasing household income, baseline surveys generally collect some income or economic status information, in addition to dietary data. If income data is available, the sample could be divided into three income groups (terciles of income), and the average dietary diversity calculated for the under poor.[2]

The average HDDS in the 33% least poor households in 2010 was roughly 4.21. 100% of the households surveyed in 2010 were found to have a higher HDDS than the target score of 3.81 which had been set in 2008.

Table 7. HDDS by income tercile, Nyiragongo villages/districts, October 2008 and 2010

Income Terciles	No. of households	HDDS (0-12)	HDDS average
2008: 33% very poor : less than US$78.43,	134	400	2.98

[1] See question 14 of the annex 3

[2] From A. Swindale and P. Bilinsky, *Score de Diversité alimentaire des Ménages (SDAM) pour la mesure de l'accès alimentaire des ménages : Guide d'indicateurs VERSION 2*, September 2006, Section V, http://www.fantaproject.org/downloads/pdfs/HDDS_v2_French.pdf

Income Terciles	No. of households	HDDS (0-12)	HDDS average
2010: 33% very poor: less than US$86.74	0	-	-
2008: 33% average: greater than or equal to US$78.43 but not exceeding US$137.32	134	437	3.26
2010: 33% average: greater than or equal to US$86.74 but not exceeding US$168.85	268	1129	4.21
2008: 33% least poor : greater than or equal to US$137.32	135	514	3.81 Target score
2010: 33% least poor : greater than or equal to US$168.85	142	713	5.02

Table 8. HDDS by income tercile, Goma villages/districts, October 2010.

Income Terciles	Number of households	HDDS (0-12)	HDDS average
33% very poor: less than US$198.6389	0	-	-
33% average : greater than or equal to US$198.6389 but not exceeding US$367.4074	320	1538	4,81
33% least poor : greater than US$367.4074	160	763	4, 77

The average HDDS for the least poor tercile in the Goma villages/districts was found to be 4,77. This figure will help to determine the appropriate target HDDS for subsequent performance evaluations.

2.2.4 Household consumption of foods rich in vitamin A

The proportion of households that consume fruit and vegetables rich in vitamin A is calculated as follows:

% of households which consume fruit and vegetables rich in vitamin A	$\frac{\text{No. of households with B, D or F = 1}}{\text{Total no. of households}} \times 100$

Equation 3. Proportion of households that consume fruit/vegetables rich in vitamin A

Table 9. Number of households where B, D or F = 1

Code	B	D	F	Number of households where B, D or F=1
	Nyiragongo villages/districts			
0	165	321	388	**386**
1	255	99	32	
	Goma villages/districts			
0	238	396	424	382
1	242	84	56	

Calculations:

Nyiragongo villages/districts

386 x 100 / 420 = 91.9%

In 2010, 91.9% of households in the Nyiragongo villages/districts were found to consume vitamin A rich foods, as opposed to just 67.7% in 2008: a very significant increase. (p<0,00000001)

Goma villages/districts

382 x 100 / 480 = 79.6%

79.6% of households in the Goma villages/districts were found to consume vitamin A rich foods.

2.2.5 Months of Adequate Household Food Provisioning (MAHFP)3

MAHFP was calculated as follows:

MAHFP (0 – 12)	12 months minus the total number of months (during the previous 12) during which the household was unable to meet its dietary needs Values for A to L are either 0 or 1 (12) – Sum (A+B+C+D+E+F+G+H+I+J+K+L)[4]

Equation 4. ***Months of Adequate Household Food Provisioning***

[3] Month of appropriate food supplying (MAHFP) for the measure of the food access of households**:** indicators guide; Paula Bilinsky, Anne Swindale ; June 2007

[4] See the 15th and 16th questions of annexe 3

The average MAHFP was calculated by taking into account the reported experience of all interviewed households.

Average MAHFP	$\frac{\text{Sum (MAHFP)}}{\text{Total no. of households}}$

Equation 5. Average MAHFP

According to FANTA, the average MAHFP score of the least poor households may be used effectively as a 'target' score for households in the lower terciles. MAHFP scores can contribute effectively to programs aimed at raising household income, which is in part why initial surveys generally seek to obtain information regarding the income and economic circumstances of the communities in question.[5]

The sample population was divided into three income groups, and the average MAHFP calculated for the upper tercile, or the least poor. This was found to be approximately 8.8, and therefore well above the target score of 7.8 established in 2008. An estimated 92% of households surveyed in 2010 met or exceeded the target score.

Table 10. MAHFP by income tercile, Nyiragongo villages/districts, 2008 and 2010.

Income tercile	No. of households	MAHFP (0-12)	Average MAHFP
2008: 33% very poor: less than US$78.44	134	959	7.16
2010: 33% very poor: less than US$86.74	35	273	7.78
2008: 33% average: greater than or equal to US$78.43 but not exceeding US$137.32	134	1008	7.52
2010: 33% average: greater than or equal to US$86.74 but not exceeding US$168.85	252	2223	**8.8**
2008: 33% least poor: greater than or equal to US$137.32	135	1055	7,82 Target Value
2010: 33% least poor: greater than or equal to US$168.85	133	1281	**9,6**

[5] From P. Bilinsky and A. Swindale, *Mois d'approvisionnement alimentaire adéquat (MAHFP) pour la mesure de l'accès alimentaire des ménages: Guide d'indicateurs*, June 2007 http://www.fantaproject.org/downloads/pdfs/MAHFP_Jun07_French.pdf

Table 11. MAHFP by income tercile, Goma villages/districts, October 2010.

Income tercile	No. of households	MAHFP (0-12)	Average MAHFP
33% very poor: less than US$198.64	6	48	7.89
33% averages: greater than or equal to US$198.64 but not exceeding US$367.41	315	3047	9.49
33% least poor: greater than or equal to US$367.41	159	1423	8.95

The average MAHFP for the least poor tercile in the Goma villages/districts was found to be 8.95. This figure will help to determine the appropriate target MAHFP for subsequent performance evaluations.

Water, Hygiene and Sanitation

2.2.6 Water Supply[6]

Access to water is a key aspect of disease prevention, and there are recommended limits for the minimum quantity and quality of water that individuals should have access to. These recommendations have emerged from agencies experiences of supplying water during emergency situations.

Water quantity

Access to water is an essential aspect of life; in communities with insufficient access to water, we see higher morbidity rates due to hygiene-related diseases, such as diarrhea. For each individual to be able to live a healthy life, the recommended minimum amount of water they should have access to has been identified as 20 liters per person per day. In certain circumstances, when constraints are unavoidable, the limit can be reduced by 5 liters, to 15 liters per person per day. However, this minimum standard should only be put in place in truly exceptional circumstances, wherein efforts are made to remove the constraints on water access so that the original minimum standard can be ensured.

Table 12. Proportion of households that have access to sufficient water, October 2010

Village/community	Number of households	Households that have access to sufficient water		
		% 2008	% 2010	p-value ; signification of test

[6] H.E.L.P. refers to the Public Health for the Management of Humanitarian Assistance, Dr Pierre Perrin ; P167.

Village/community	Number of households	Households that have access to sufficient water		
		% 2008	% 2010	p-value ; signification of test
Communities of Nyiragongo territory				
Kibati	60	7%	27%	0,0033 ; S[7]
Lac Vert	60	95%	82%	0,0229 ; S
Mudja	60	25%	27%	0,5001 ; NS[8]
Mugunga	60	77%	82%	0,8348 ; NS
Munigi	60	12%	18%	0,3065 ; NS
Ndosho	60	10%	70%	0,0000 ; S
Rusayo	60	3%	5%	0,6478 ; NS
Ensemble 1	420	33%	44%	0,0009 ; S
Additional Goma Communities				
Bujovu	60	-	10%	
Kasika	60	-	30%	
Katoyi	60	-	32%	
Mabanga Nord	60	-	33%	
Mabanga Sud	60	-	88%	
Majengo	60	-	22%	
Murara	60	-	83%	
Virunga	60	-	22%	
Together 2	480	-	40%	

In 2008, only a third of households in Nyiragongo territory reported being able to access the minimum quantity of water. This had gone up significantly by 2010, when 44% of those surveyed reported being able to access 20 liters per person per day. Clearly, since 2008, the water accessibility of most small communities in Nyiragongo has improved significantly. However, the communities of Mudja, Munigi and Rusayo are still in need of assistance in terms of access to sufficient clean water, as the improvements that have been seen there are not statistically significant. For those households that do not have access to a sufficient quantity of water (288 households), the following reasons have been proposed:

- Water is expensive to purchase and households lack the necessary funds (25%)
- Water sources are far away and often in Rwanda (Kibati), (22%)
- Households lack the necessary containers for storing and transporting water (7%)
- Ineffective government (3%)

According to the focus group discussions that we have conducted in these villages, the actions of Mercy Corps in terms of improving community access to water are have had a significant impact on the communities and are deeply appreciated.

In Kibati in 2008, when households were unable to access their water from the local area, certain households had to cross the border to Rwanda in order to access sufficient clean water. To improve this situation, Mercy Corps distributed sheeting so that these households would able to collect and store their own water. However, many of the beneficiaries report that not enough materials have been distributed and that, more often than not, neighbors have to share these

[7] S = The observed difference is significant statistically
[8] NS = The observed difference is not statistically significant

materials. They also report that soldiers in the local area help themselves to their stock of water, as they also lack access to clean water.

For most of the villages of Nyiragongo, each household should be able to store sufficient water from the rainy season to last them throughout the dry season, if they have access to the appropriate storage materials. However, for most households, their water is being shared among neighbors who have no water storage equipment of their own, and who have not been chosen as a beneficiary household by Mercy Corps. This means that most households do not have sufficient access to clean water.

Additionally, evidence from focus groups in communities in Goma, suggests that, in the dry season, many inhabitants of those communities have to buy water to fill their tanks. This water comes from RESIDESO, where vehicles deliver water to different areas in Goma for a price; for instance, at Katoyi, a can of 20 liters costs around 200 FC. The focus group members report feeling relieved during the rainy season, as they do not have to purchase water at that time.

Table 13. Average quantity of consumed water per day, per household, per person, Nyiragongo territory, October 2008 and 2010.

Village/ community	Number of households	% of those who travel more than 30km to reach a water source		Average quantity of water consumed per household per day in liters, 2008	Average quantity of water consumed per household per day in liters, 2010	Average quantity of water consumed per person per day in liters, 2008	Average quantity of water consumed per person per day in liters, 2010
		2008	2010				
Kibati	60	20%	17%	38,67	39,30	7,5	6,6
Lac Vert	60	65%	71%	51,33	44,67	8,6	6,6
Mudja	60	25%	10%	24,33	33,45	4,4	4,9
Mugunga	60	92%	100%	51,67	50,67	7,4	7,6
Munigi	60	37%	88%	32,00	38,33	6,0	5,9
Ndosho	60	33%	58%	54,33	59,67	9,1	8,1
Rusayo	60	12%	22%	39,33	31,33	6,8	5,5
Ensemble	**420**	**40%**	**53%**	**41,67**	**42,55**	**7,1**	**6,5**

We found no significant difference ($p<0,001$) between the quantity of water consumed by each community per day per household in 2008 and 2010. An average household of Kibati, for example, consumed 38.67 liters per day in 2008, whereas, in 2010, an average household consumed 39.30 liters.

However, when we took and average, we did observe a significant difference ($p<0,001$) between the average quantities of water consumed per day per person among the different villages/communities. We estimate that the daily average consumption per person is 6.5 liters compared to 7.1 liter in 2008. In 2010, as in 2008, these values are far below the minimum amount recommended by OMS of 20 liters per person per day. This brings with it significantly higher disease risk as a result of poor hygiene.

In Nyiragongo territory in 2010, the average quantity of drinking water that each household collected per day was 10.45 liters, which is down from 12.66 liters in 2008 (1.6 liters per person per day in 2010, down from 2.2 liters per person per day in 2008). The average quantity of water for domestic work that each household collected per day in 2010 was 33.46 liters in 2010, which is down from 33.75 in 2008 (see Table 34 in the appendix).

In terms of the geographic accessibility of water in 2010, the situation has improved significantly since 2008. More than half of those surveyed (53%) reported that they were less than30 minutes away from the nearest water source. Whereas in 2010, 60% of those surveyed had to travel more than 30 minutes to access clean water, in 2008, this figure had fallen to 47%. While geographic accessibility to water is improving, it remains a high priority; however, the focus now should be on improving the quality of water that communities are able to access.

Table 14. Average quantity of water consumed per day per household and per person, Additional Goma communities, October 2010

Village/ community	Number of households	Average number of people	% who must travel more than 30 minutes to reach a water source	Average quantity collected per household per day in liters	Average quantity of water consumed per person per day in liters
Bujovu	60	6,5	17%	50,0	7,7
Kasika	60	7,3	30%	81,6	11,2
Katoyi	60	7,0	25%	61,6	8,8
Mabanga Nord	60	6,3	30%	84,6	13,4
Mabanga Sud	60	7,0	88%	90,6	12,9
Majengo	60	6,8	50%	63,0	9,3
Murara	60	6,1	78%	97,4	16,0
Virunga	60	7,1	37%	82,4	11,6
Ensemble	**480**	6,8	**45%**	**76,4**	**11,2**

As in Nyiragongo territory, we observed a significant difference ($p<0,01$) between the quantity of water consumed per day per household. For example, an average household in Bujovu consumed an average of 50.0 liters per day in 2010. On average, households in these additional Goma communities were found to consume 1.79 times more water than households in Nyiragongo territory.

In addition, we observed a significant difference ($p<0,001$) between the average quantities of water consumed per day and per person within the different villages/communities. The estimated daily average consumption per person in these communities is 11.2 liters, which is under the value recommended minimum set by OMS of 20 liters per day. Therefore, these communities in Goma are at increased risk of hygiene-related diseases.

The average quantity of drinking water that each household fetches per day is 11.72 liters (1.7 liters per person per day). The average quantity of water for domestic work that each household fetches per day is 60.09 liters (see Table 35 in the appendix).

Only 44% of the population in these Goma communities can reach their nearest source of water in less than 30 minutes. This means that 56% of the population must walk more than 30 minutes to reach their nearest source of water.

The focus group participants in the villages of Rusayo and Mudja also report that the distance from the nearest source of drinking water is a problem. They report walking between 5 and 15 km to reach their nearest source of clean water.

For example, the inhabitants of Katoyi can access water at Lake Kivu (which is a 12 km round trip) or Nyabushongo (which is an 8 to 10 Km round trip).

At Bujovu, one participant of a focus group reported the following, which the other participants agreed with (with the exception of one) *"When we go to fetch water in Rwanda, the round trip is 4km. In Rwanda, we can collect a can of 20 liters for 100 FC. When we fetch water at the lake, we have to make a round trip of15 Km."*

All participants in our focus groups were clear about the fact that geographical accessibility to clean water was a problem for them during the dry season.

Provenance of drinking water

Table 15. Sources of drinking water, October 2010

Sources of Drinking Water	Nyiragongo Territory, n=420		Additional Goma Communities, n=480	
	Number of households	%	Number of households	%
Tap	240	57%	427	89%
Rain water	231	55%	9	2%
Lake	80	19%	47	10%
Tank	-	-	55	12%
Bicycle water vendors	-	-	5	1%

In Nyiragongo, 57% of households access their drinking water from taps; this is slightly higher than in 2008, when 56% of households accessed their drinking water from the tap, but the difference is not significant. As in 2008, tap water access is especially prevalent in Ndosho, Mugunga and at Lac Vert, where Mercy Corps had installed taps. The households of Rusayo also travel to Mugunga where there is a tap where people can access drinking water. .

In the Goma communities that were added to the study in 2010, 89% access their drinking water from taps and 22% access their drinking water either from the lake or from tanks.

55% of households in Nyiragongo use rain water as their drinking water; this is an increase from 2008, when, during the initial evaluation, 44% reported used rainwater as their main source of drinking water. Clearly, there has been a significant increase in respondents' use of rain water. At Kibati, Mudja and at Rusayo rain water is used almost exclusively for drinking as well as all

domestic work. In these villages, Mercy Corps should focus resources to reach the 70% target for reliance on rain water for drinking, as was suggested in the Indicator Performance Tracking Table (IPTT).

Figure 5. Percentage of households that own a rainwater container exclusively for storing drinking water 2008 and 2010

This figure shows the percentage of households that owned a container or can exclusively for water in Nyiragongo territory in the initial evaluation of 2008, and that percentage in 2010. The result of Mercy Corps' efforts at increasing reliance on rainwater for drinking are clear from the significant increase in the number of households that own a container for this purpose that has occurred since the initial evaluation (from 22% in 2008 to 48% in 2010). This is a significant improvement ($p < 0{,}00000001$, $x^2 = 63{,}32$), which testifies to the effort that has been made by Mercy Corps in this area. Mercy Corps intend to build on this foundation and intensify their efforts in this area to achieve the goal of every household having access to a rainwater container exclusively for drinking.

Additional Goma Communities

In these communities, 64% have access to a container exclusively for drinking water. As Figure 7 makes clear, further sensitization is still necessary at Bujovu, Mabanga Nord and Majengo.

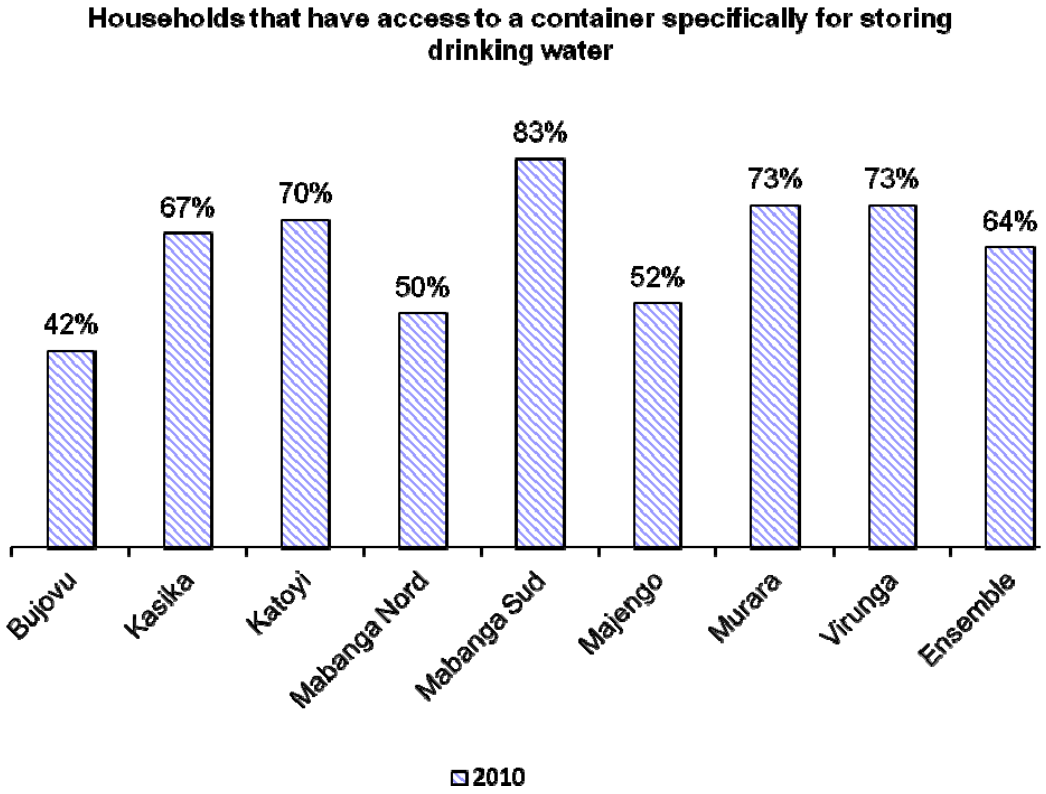


Figure 6. Percentage of households that own a rainwater container explicitly for drinking water use, 2010.

Of those households that own the 20 liter cans that are used for fetching the water used for domestic work, 65% report that these cans are not covered.

Number of access points to water by village/community

Table 16. Proportion of households according the number of water points they have access to, by village/quarter

Village/quarter	Proportion of household according the number of points of water by village/quarter				
	0	1	2	3	4+
Kibati	75%	12%	-	1%	12%
Lac Vert	5%	25%	25%	25%	20%
Mudja	86%	3%	5%	3%	2%
Mugunga	-	21%	12%	31%	36%
Munigi	28%	27%	8%	15%	21%
Ndosho	35%	54%	-	8%	3%
Rusayo	85%	13%	2%	-	-
Average	**46%**	**20%**	**8%**	**12%**	**14%**
Bujovu	93%	-	-	4%	4%
Kasika	78%	10%	10%	2%	-
Katoyi	30%	-	19%	24%	27%
Mabanga Nord	79%	19%	-	-	2%
Mabanga Sud	15%	30%	7%	10%	35%
Majengo	45%	3%	5%	22%	25%
Murara	20%	32%	10%	8%	30%
Virunga	80%	10%	-	2%	8%
Average	**56%**	**14%**	**6%**	**8%**	**16%**

In 2008, our initial survey found that there were no water access points at Mudja, Ndosho, or Rusayo, according to the respondents' reports. The results of the 2010 survey indicate that this has changed for the better in the last two years, and most households that were surveyed report that they have access to water sources in the local area. In the villages at Lac Vert and Mugunga in 2008, most households reported that they were able to access some water sources. The reports from 2010 show that the situation has improved and the population are more satisfied with their access to water At Kibati and Munigi, many residents now have access to reservoirs that they have built themselves, to store rain water. Many respondents report that the water points installed by Mercy Corps have made a significant difference to their ability to access water.

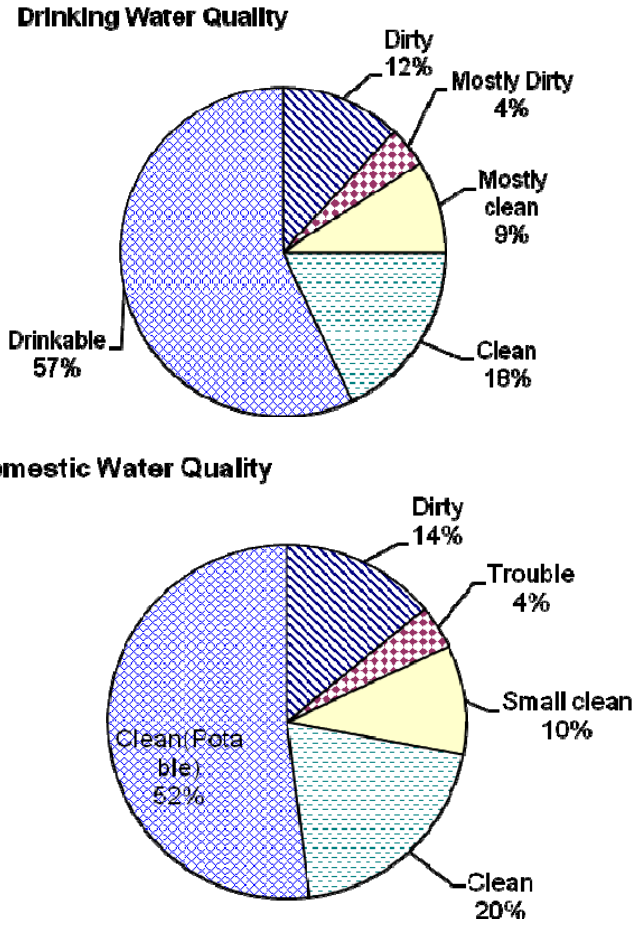
Aside from Mercy Corps, the other NGOs that have installed water points in the area are Oxfam GB, ASAF, Action Contre la Faim, CICR, EPR and the church. In some areas, we have been told that REGIDESO have also installed water points.

The quality of Water[9]

In terms of public health, it is crucial that people can access water of a good quality. Quality is assessed in terms of an absence of pathogens and germs. One of the indicators that water has been contaminated is the presence Escherichia Coli (E. coli), which signals a contamination of fecal origin. In emergency situations, we estimate that the number of colonies of E. coli, at 42°, can increase tenfold over a 24 hour period. This means that interventions must be implemented as a matter of urgency to make the water drinkable.

Figure 7. Proportion of households that have access to water of a sufficient quality

These figures represent averages of all the households in the survey (n=900)—both those in Nyiragongo territory and those in the additional Goma communities.



In 2010, as was the case in 2008, it has been difficult for us to confirm the level of E. coli in the drinking water of Nyiragongo territory and the additional Goma communities.

In terms of the quality of water in the region, the focus group participants from Kibati (specifically, Kisheke), Rusayo, Mudja, Munigi, and the Goma communities report *that they*

[9] H.E.L.P., Cours de santé publique pour la gestion de l'assistance humanitaire, Dr Pierre Perrin ; P167.

have no access to drinking water, as most of their drinking water is rain water and/ or lake that is treated with chlorine and purchased from sellers.

Aside from very little access to drinking water, the communities also report that they have problems with access to transport and do not have the means to conserve water. In fact, all villages/quarters surveyed reported a lack of appropriate water storage vessels, except those households who are beneficiaries of Mercy corps. Respondents told us that this inability to store water safely was due to a lack of appropriate containers and the poor condition of many of their houses.

Water treatment

Table 17. Proportion of households that treat water to drink, October 2010

Village/Quarter	Number of households	Households treating water to drink	
		% in 2008	% in 2010
Kibati	60	22%	52%
Lac Vert	60	97%	78%
Mudja	60	3%	57%
Mugunga	60	88%	80%
Munigi	60	60%	50%
Ndosho	60	50%	90%
Rusayo	60	35%	38%
Average	**420**	**51%**	**64%**
Bujovu	60	-	63%
Kasika	60	-	87%
Katoyi	60	-	83%
Mabanga Nord	60	-	90%
Mabanga Sud	60	-	72%
Majengo	60	-	65%
Murara	60	-	65%
Virunga	60	-	81%
Average	**480**	-	**75%**

64% of households report treating water to drink, which is an increase from 51% in 2008. That difference is significant ($p<0,001$ et $x^2 = 14,74$), and this testifies to the sensitization work undertaken by Mercy Corps. 75% of the Goma households report treating water to drink.

As Table 14 makes clear, of those households that do treat water to make it drinkable, 83% do this through chlorination (PURE), 14% through boiling water, and 3% by filtration.

Table 18. Water Treatment Methods, per household, October 2010

Village/Quarter	Number of households	Boil water		Filter water		Chlorination/PURE	
		Freq.	%	Freq.	%	Freq.	%
Kibati	31	17	55%	1	3%	13	42%
Lac Vert	47	4	8%	0	0%	43	92%
Mudja	33	8	24%	25	76%	0	0%
Mugunga	48	7	15%	0	0%	41	85%
Munigi	30	9	30%	0	0%	21	70%
Ndosho	54	2	4%	0	0%	52	96%
Rusayo	23	16	70%	1	4%	6	26%
Bujovu	33	6	18%	1	3%	26	79%
Kasika	52	0	0%	2	4%	50	96%
Katoyi	45	7	16%	0	0%	38	84%
Mabanga Nord	46	0	0%	5	11%	41	89%
Mabanga Sud	43	1	2%	1	2%	41	96%
Majengo	39	1	2%	1	2%	37	94%
Murara	39	6	15%	3	8%	30	77%
Virunga	48	3	6%	2	4%%	43	90%
Average	611	87	14%	42	7%	482	79%

Clearly, Mercy Corps' efforts to supply all the quarters of the study with the means to treat their own water have been successful, particularly in the villages of Kibati, Munigi, Mudja and Rusayo where households have built their own reservoirs with wood and sheeting and have reservoirs provided by Mercy Corps where water can be stored over a long period of time.

One inhabitant of Bujovu reported the following method for treating water: "*I take water from the lake and then boil it to make it clean; I then filter the water to make sure it is free of impurities"* The inhabitants of other villages/quarters report awareness of methods of treating water, particularly boiling. Unfortunately, boiling is rarely used because most households do not have access to sufficient wood. In almost all the villages of Nyiragongo territory, the population is aware that the water is not clean, but their poverty means that they are unable to implement treatment.

The task of bringing water from the source to the house is almost always undertaken by women. In fact, on average, our results show that, 78% of the time, mothers and young girls are responsible for transporting water, while men are only undertaking this job 22% of the time.

The task of water transportation has been found to significantly impair Africa's development prospects. Thus, to ensure that millennium development goals for DRC are met, improving communities' accessibility to water should be prioritized from now until 2015.

2.2.7 Personal Hygiene and Cleanliness of Communal Areas

Availability of latrines

Latrine availability is always an issue that concerns communities. Indeed, latrine supplying programs are always welcomed and will be necessary in many of the communities surveyed. In fact, in Nyiragongo territory, 30% of the visited households had a latrine that was in poor overall condition, which was an increase from 21% in 2008. 65% of visited households have either a hole or a designated area. For the 5% of households that do not have access to a latrine, almost all of these households use the latrines of their neighbors.

While there is a problem with latrine availability in all the villages/quarters, the problem has been somewhat alleviated by the building of community toilets in places such as schools and churches and in places where many vulnerable households live (see image in the appendix).

44% of those households that have a latrine assert that their latrine is only reserved for their household. Other latrines are shared by neighbors.

Table 19. Number of households that use neighbors' latrines

Number of households	Number	%
1	5	3%
2	61	31%
3	46	23%
4	22	11%
5	19	10%
6^{+}	44	22%
Total	**197**	**100%**

65% of households that have a latrine share it with their neighbors (either two, three, or four other households). This is down significantly from 2008, when 88% of latrine-owning households shared their latrine. However, in 2010, several additional Goma households were added to the study. In these households, 32% of latrine-owning households shared their latrine with their neighbors (usually between five or six households per latrine. In Nyiragongo territory in 2008, 8% shared their latrine with more than six households. In 2010, 3% of households with a latrine shared with only one other neighbor, versus 4% in 2008.

Cleanliness of latrines

Overall, as we can see from the figures below, around 34% of households only have access to a very dirty or dirty latrine, 36% have access to a latrine that is averagely clean, and 30% have access to a latrine that is clean or very clean.

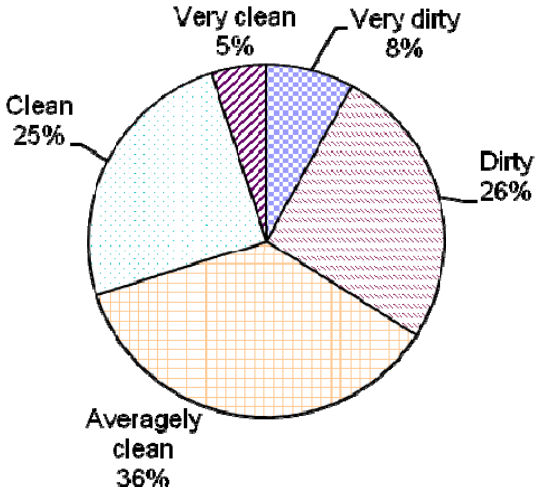


Figure 8. Number of households per latrine

Location of Diaper Disposal

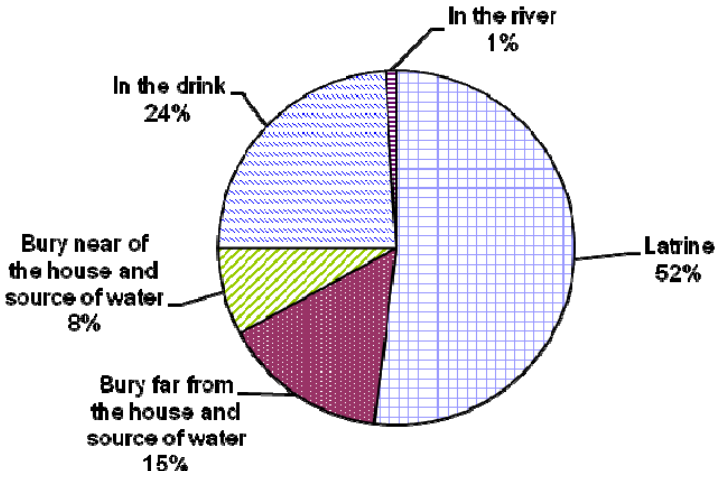


Figure 9. Location of diaper disposal, per household

As is clear from the table, according to the data from 2008, almost all households in Nyiragongo and in Goma bury the soiled diapers in a hole 10m below the ground. A more detailed breakdown of these results is presented below.

Table 20. Location of diaper disposal, per household, October 2010

Location of diaper disposal	Quarters of Nyiragongo **%, n =420**	Additional Goma Households % **n =480**
Latrine	19%	81%
Bury far from the house and source of water	26%	5%
Bury near the house and source of water	13%	4%

In the bush	39%	10%
In the river	3%	-
Total	100%	100%

Efforts should be focused on those quarters of Nyiragongo where children's diapers are disposed of in places that are close to the house and\or water sources. Indeed, this applies to more than half of those surveyed in Nyiragongo (55%)

Hand-washing

The responses to the question "When do you wash hands?" are given below:

Table 21. Responses to "When do you wash hands?" per household n = 900.

When do you wash hands?	Frequency	%
Before and after eating	614	68%
After using the toilet	417	46%
When hands are dirty	265	29%
Before cooking	115	13%
Before and after giving food to a child	96	11%
Never/Rarely due to lack of availability of washing facilities	41	5%

68% report of those surveyed report washing their hands before eating, less than half of (46%) report washing hand after using the toilet, 9% assert that they wash hands whenever they are dirty, and 13% wash their hands before cooking. The data is unclear in regard to the rate of hand washing after defecation. For users to be able to wash their hands effectively, they must have access to cleaning products such as soap or an alternative (ash, for example). An important MYAP project of Mercy Corps is to encourage hand washing after defecation with appropriate products and to ensure that there is access to a reliable source of water close to community toilets.

In Nyiragongo territory (n=420), of those who are responsible for the health of a child, 7% report washing their hands before and after giving food to the child; this is an increase on the rate of 3% in 2008. The difference observed is significant ($p<0,001$) and shows a positive increase of 133%.

In response to the question "With what do you wash hands?", 76% of those surveyed reported using soap, 6% use ash and 18% use only water. (See the appendix)

Rubbish storage location

Table 22. Rubbish storage location, by household, October 2010

Rubbish storage location	Quarters of Nyiragongo **%, n =420**	Quarters of the additional Goma households **%, n =480**
By the land around the house	58%	46%

Pit near the toilets	26%	49%
In the bush	16%	5%
Total	100 %	100 %

In Nyiragongo, 74% dispose of their household rubbish in the bushes surrounding the house—this is a reduction since 2008, when the rate was 79%. 26% of those surveyed disposed of their rubbish in specific pits; this is an increase from 2008, when only 21% of respondents used this method. This demonstrates increasing sensitivity in the community related to the importance of hygiene and cleaning.

For the Goma households of the study, 51% dispose of their rubbish in the land around their house in the bushes, and 49% dispose of their rubbish in prepared pits. The level of sensitization toward the importance of hygiene and cleaning will continue to be monitored.

Habitation Cleanliness

The community knows the importance of maintaining a clean habitation and the role this can play in maintaining health. Despite this, many reported in 2008 that they did not have the means to ensure that they could live in a clean and hygienic environment. This is still the case today. This has meant that Mercy Corps and other NGOs have been keen to promote the distribution of sheet metals, particularly at Kibati, Mudja and Rusayo, so that the population is able to build good houses which will allow communities to maintain a clean and hygienic living environment. This would also improve individuals' access to privacy and decrease diseases rates, as well as allowing inhabitants to catch and store rain water more effectively.

The population is aware of the danger of hygiene-related diseases. Many report instances of these diseases in the community, including diarrhea, malaria, bilharzia, scabies, and intestinal problems. While most people seem aware of the fact that lack of cleanliness and hygiene are linked to these diseases, they claim that their low socio-economic level does not permit them to implement the necessary preventative action.

2.2.8 Hygiene-related morbidity, by disease

Table 23. Hygiene-related morbidity, by disease, October 2010

Pathology by village/quarter	Simple diarrhea	Bloody Diarrhea	Cholera	Typhoid Fever	Acute Conjunctivitis	Scabies	Intestinal worms	Malaria
Kibati	45%	13%	3%	20%	7%	17%	33%	50%
Lac Vert	27%	5%	3%	22%	0%	8%	20%	47%
Mudja	30%	5%	3%	17%	2%	8%	28%	52%
Mugunga	33%	5%	0%	13%	8%	8%	25%	40%
Munigi	40%	8%	3%	20%	12%	12%	43%	57%
Ndosho	23%	3%	0%	8%	5%	8%	30%	40%
Rusayo	42%	10%	0%	15%	13%	13%	53%	43%
Average	**34%**	**7%**	**2%**	**16%**	**7%**	**11%**	**33%**	**47%**

Pathology by village/quarter	Simple diarrhea	Bloody Diarrhea	Cholera	Typhoid Fever	Acute Conjunctivitis	Scabies	Intestinal worms	Malaria
Bujovu	38%	8%	2%	10%	10%	15%	32%	50%
Kasika	30%	3%	0%	12%	3%	5%	15%	30%
Katoyi	23%	3%	3%	23%	5%	3%	5%	43%
Mabanga Nord	20%	5%	2%	13%	2%	2%	8%	37%
Mabanga Sud	12%	2%	0%	13%	7%	3%	10%	38%
Majengo	20%	0%	0%	13%	0%	5%	7%	38%
Murara	23%	0%	0%	18%	5%	0%	5%	15%
Virunga	23%	2%	0%	17%	2%	0%	13%	40%
Average	**24%**	**3%**	**1%**	**15%**	**4%**	**4%**	**12%**	**36%**

We assessed the incidences of malaria that had occurred in the community in the two weeks preceding the survey, and found that 47% of respondents reported an incidence of malaria; this was a significantly higher figure than the 21% reported in 2008. However, our evidence is clear that people do implement preventative action. Therefore, these figures may be more a reflection of the community's perception rather than the reality on the ground. Cholera was also reported, but not verified by health centers. In the additional Goma households, the same trend was found; 36% of households reported an incidence of malaria in the two weeks prior to the survey, which was then followed by simple diarrhea, typhoid fever, and intestinal worms.

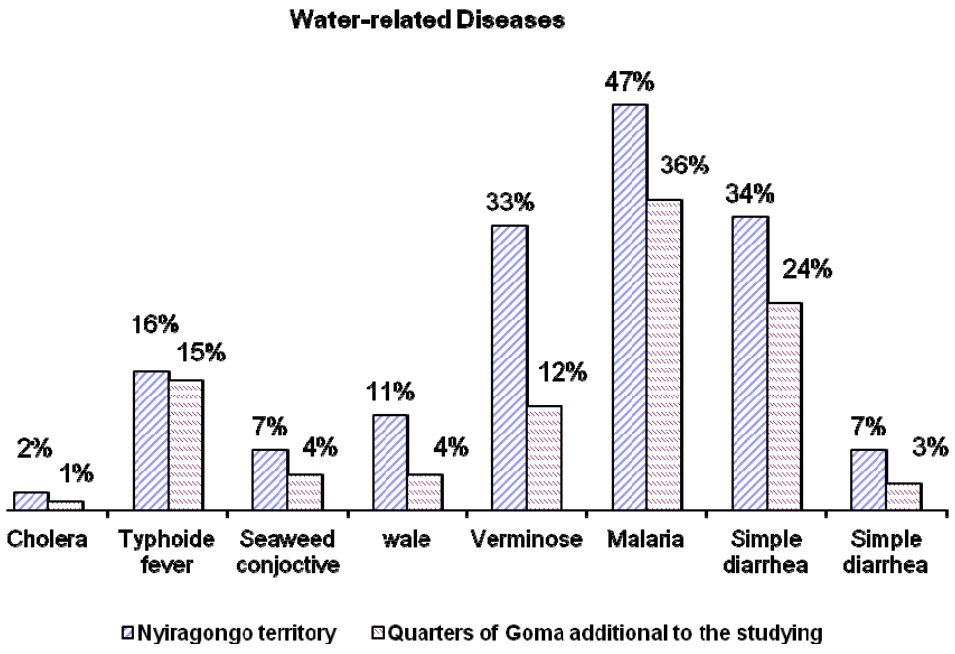


Figure 10. Prevalence of water-related diseases, per household, October 2010.

In 2010, as in 2008, malaria, simple diarrhea and intestinal worms remain the most frequently observed diseases in households. Moreover, Nyiragongo territory still has some way to go before the levels of hygiene and cleanliness are at the level that can be observed in Goma.

Table 24. No. of cases of water-related different diseases, by quarter

Village/ Quarter	# / %	Simple diarrhea	Bloody diarrhea	Cholera	Typhoid Fever	Conjunctivitis	Scabies	Intestinal worms	Malaria	Total	
										Freq	% total
Kibati	# cases	35	11	3	18	4	14	36	43	164	16%
	%	21%	7%	2%	11%	2%	9%	22%	26%	100%	
Lac Vert	# cases	18	4	4	21	0	7	24	42	120	12%
	%	15%	3%	3%	18%	0%	6%	20%	35%	100%	
Mudja	# cases	23	5	2	16	2	7	33	66	154	15%
	%	15%	3%	1%	10%	1%	5%	21%	43%	100%	
Mugunga	# cases	28	3	0	9	4	5	33	32	114	11%
	%	25%	3%	0%	8%	4%	4%	29%	28%	100%	
Munigi	# cases	28	5	3	13	12	13	57	70	201	20%
	%	14%	2%	1%	6%	6%	6%	28%	35%	100%	
Ndosho	# cases	17	2	0	6	3	6	34	30	98	9%
	%	17%	2%	0%	6%	3%	6%	35%	31%	100%	
Rusayo	# cases	34	7	0	13	8	9	56	43	170	17%
	%	20%	4%	0%	8%	5%	5%	33%	25%	100%	
Average		**183**	**37**	**12**	**96**	**33**	**61**	**273**	**326**	**1021**	**100%**
Bujovu	# cases	33	6	1	9	9	11	39	40	148	23%
	%	22%	4%	1%	6%	6%	7%	26%	27%	100%	
Kasika	# cases	28	2	0	7	3	3	14	23	80	12%
	%	35%	3%	0%	9%	4%	4%	18%	29%	100%	

Katoyi	# cases	18	2	5	15	3	5	7	48	103	16%
	%	17%	2%	5%	15%	3%	5%	7%	47%	100%	
Mabanga Nord	# cases	14	3	1	9	1	2	9	27	66	10%
	%	21%	5%	2%	14%	2%	3%	14%	41%	100%	
Mabanga Sud	# cases	9	1	0	9	6	2	6	26	59	9%
	%	15%	2%	0%	15%	10%	3%	10%	44%	100%	
Majengo	# cases	13	0	0	11	0	6	7	31	68	10%
	%	19%	0%	0%	16%	0%	9%	10%	46%	100%	
Murara	# cases	15	0	0	13	8	0	4	11	51	8%
	%	29%	0%	0%	25%	16%	0%	8%	22%	100%	
Virunga	# cases	18	1	0	15	1	0	9	38	82	12%
	%	22%	1%	0%	18%	1%	0%	11%	46%	100%	
Average		**148**	**15**	**7**	**87**	**31**	**29**	**95**	**244**	**656**	**100%**

There were a total of 1021 cases of water-related diseases. Most of these cases were in Munigi (20%), Rusayo (17%), Kibati (16%) and Mudja (15%). In 2008, 577 cases were observed; the significant increase is due to the additional Goma households, who accounted for 656 cases of the different diseases quoted. Most of these cases were seen in Bujovu (23%), Katoyi (16%), Kasika (12%) and at Virunga (12%).

The rates of malaria in 2008 in the Nyiragongo territory were as follows: Munigi: 30%, Lac Vert: 26%, Kibati: 18%, and Mugunga: 18%. The rates of malaria in 2010 were as follows: Munigi: 43%, Lac Vert: 35%, Munigi: 35%, Ndosho: 31% and Mugunga: 28. In the additional Goma household data, the malaria rates were as follows: Katoyi: 47%, Majengo: 46%, Virunga: 46%, Mabanga Sud: 44% and Mabanga Nord: 41%.

In 2008 in Nyiragongo territory, cases of intestinal worms were as follows: Mudja: 34%, Kibati: 32%, Mugunga: 31%, Rusayo: 29%. In 2010, the rates were higher in the following locations: Ndosho (35%), Rusayo (33%), Mugunga (29%), Munigi (28%) and Kibati (22%). According to the additional Goma household data, higher rates were also seen at Bujovu (26%), Kasika (18%), Mabanga Nord (14%), Virunga (11%) and Mabanga Sud with Majengo (10%).

The focus group discussions reveal that the population is generally aware of the transmission causes and vectors of diseases related to hygiene, but most state that they are unable to protect themselves from these causes.

- They understand that an unclean environment around the house and the presence of rubbish near the place of habitation places them at risk. They also understand the link between latrines in a bad condition and human waste not disposed of properly and disease.
- They understand that living in houses in a bad condition encourage multiplication of germs

The population is very conscious of these associations, but they are very poor, and are unable to implement the necessary measures to protect themselves from hygiene and related illnesses.

The Mercy Corps sensitization campaign has clearly work as all respondents showed a certain knowledge concerning the diseases related to water, cleanliness and hygiene. They know that even ensuring the highest levels of hygiene is the most effective way to prevent the transmission and multiplication of diseases such as diarrhea, malaria and schistosomiasis.

2.2.9 *Incidences of diarrhea in children under 5 years old in the two weeks prior to the survey*

This data is based on the average rate of children under 5 years old who had experienced an incidence of diarrhea in the two weeks prior to the survey. The total number of cases was 791 in 2010, an increase on the number in 2008 (668).

2.2.10 *Incidences of diarrhea in children under 5 years old in the two weeks prior to the survey*

$$\%\ \text{Ch. Dia} < 5\ \text{years} = \frac{}{\text{Children under 5 years in the households surveyed}} \times 100$$

2.2.11 *Equation 6. Percentages of diarrhea in children under 5 years old in the two weeks prior to the survey*

Calculation :

Nyiragongo Territory

$$\%\text{Ch. Dia} < 5\ \text{years} = \frac{24}{791} \times 100 = 3\%$$

Children under 5 years account for 23% of the population; of these, 3% experienced an incidence of diarrhea in the two weeks prior to the survey.

Additional Goma households

$$\%\ \text{Ch. Dia} < 5\ \text{years} = \frac{63}{603} \times 100 = 10\%$$

2.2.12 *Table 25. Incidences of diarrhea in children under 5 years old in the two weeks prior to the survey, by village/quarter, October 2010*

Village/Quarter	Children under 5 years	# incidences of diarrhea in children under 5 years old in the two weeks prior to survey	Percentage
Kibati	92	5	5%
Lac Vert	182	8	4%

Village/Quarter	Children under 5 years	# incidences of diarrhea in children under 5 years old in the two weeks prior to survey	Percentage
Mugunga	90	1	1%
Mudja	121	1	1%
Munigi	89	5	6%
Ndosho	112	1	1%
Rusayo	105	3	3%
Total	**791**	**24**	**3%**
Bujovu	76	11	14%
Kasika	90	9	10%
Katoyi	93	13	14%
Mabanga Nord	57	7	12%
Mabanga Sud	70	9	13%
Majengo	82	5	6%
Murara	54	3	6%
Virunga	81	6	7%
Total	**603**	**63**	**10%**

. Incidences of diarrhea in *children under 5 years* old in the two weeks prior to the survey decreased enormously between 2008 and 2010. The rate differed by 19%, which amounts to a real reduction of 86%.

This huge improvement is a result of Mercy Corps sensitization program, and should be extended to the Goma households so that the rates of childhood diarrhea can be reduced there too.

2.2.13 Household knowledge and practices on preventing water-related diseases

Attitudes of respondents regarding how best to prevent diarrhea

Table 26. Attitudes of respondents regarding how best to prevent diarrhea, October 2010.

How can diarrheas be prevented? (n=900)	#	%
Washing vegetables carefully and ensuring drinking water is clean	508	56%
Washing hands regularly	322	36%
Boiling water whose provenance is uncertain	133	15%
Not sure	136	15%

While we received many varied responses to the question,56% of the households in 2010 knew that Washing vegetables carefully and ensuring drinking water is clean; this was a significant improvement on the 40% level of awareness that was seen in 2008 in Nyiragongo territory. 15% were not sure about how best to prevent diarrhea.

How to prevent malaria

Table 27. Attitudes of respondents regarding how best to prevent malaria, October 2010.

Means of preventing malaria	Freq * (n=900)	%
Sleep under a mosquito net	326	36%
Drain all stagnant water in the area surrounding the house	220	24%
Sleep under a mosquito net treated by insecticide	176	20%
Cut down bushes around of house	168	19%
Take anti-malarial the tablets	109	12%
Use insecticide in the house	39	4%
It is impossible to prevent malaria	34	4%
Snake bites	23	3%
Put up wire mesh over all open spaces on the house	15	2%
Preventative and intermittent treatment of pregnant women	14	2%
Drink herbal tea	14	2%
Burn mosquito repelling material (such as citronella)	5	1%
Don't know	201	22%

*Many answers are possible. The list is not exhaustive.

While 36% of respondents know to sleep under a mosquito net, only 20 % know to sleep under a mosquito net treated by insecticide. It is also worth noting that incorrect practices exist alongside the true answers, and so further sensitization work must be done to ensure that people know how best to prevent malaria. 22% of correspondents do not know how to prevent malaria at all.

How to avoid intestinal worms?

Table 28. Attitudes of respondents regarding how best to prevent intestinal worms

Means of preventing malaria	Frequency (n=900)	%
Washing vegetables carefully and ensuring drinking water is clean	444	49%
Washing hands regularly	248	28%
Boiling water whose provenance is uncertain	146	16%
Not sure	158	18%

In 2008, in Nyiragongo territory, 56% did not know how best to avoid intestinal worms. This had fallen significantly by 2010 to only18%. Most of those who were aware of this, however, were from the additional Goma communities. Intestinal worms are the most common of all water-related diseases, apart from malaria; cases of intestinal worms are more frequent in Nyiragongo territory than in Goma communities. This is directly related to the distance between households and their nearest water source.

The relationship between the time to reach the nearest water source and the prevalence of intestinal worms

Nyiragongo territory

Table 29. The relationship between the time to reach the nearest water source and the prevalence of intestinal worms, October 2010.

Walking time	Absence of cases of intestinal worms		Cases of intestinal worms in the household		Total
< 10 minutes	95	69%	42	31%	137
10 - < 30 minutes	55	68%	26	32%	81
>=30	128	63%	74	37%	202
Total	**273**	**65%**	**142**	**35%**	**420**

70% of households that have members with intestinal worms are located more than 10 minutes from their nearest source of water; this is a reduction since 2008, when the rate was 79%. This reduction reflects the fact that fact that several new water points have been installed in Nyiragongo.

The presence of intestinal worms in household depends largely on how far they are from the nearest water source. (p<0,0001). This can be observed on a scale; the prevalence of intestinal worms increases as the distance from the nearest water source increases.

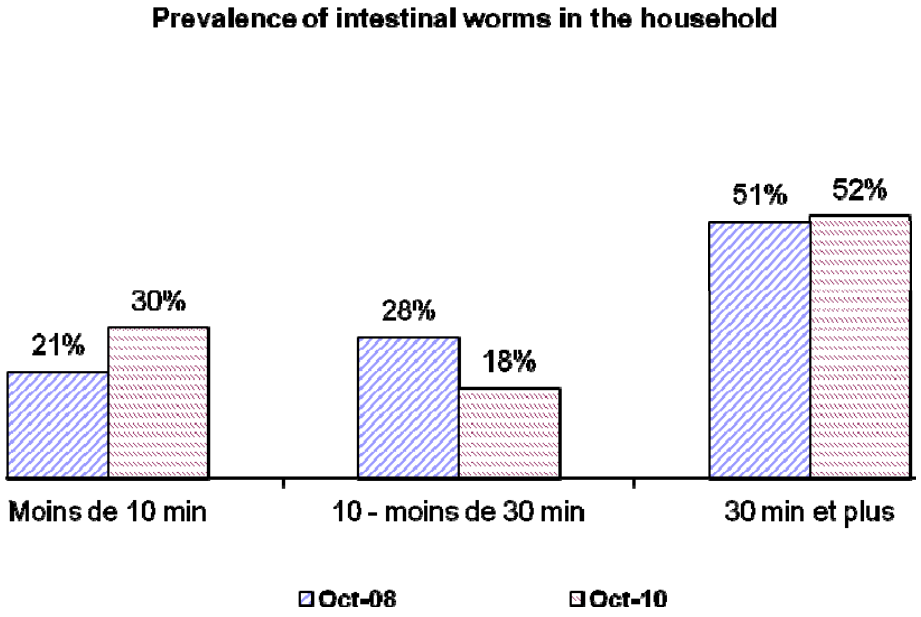


Figure 11. The time to reach the nearest water source and cases of intestinal worms 2008 and 2010, Nyiragongo territory

Additional Goma Households

Table 30. Relationship between the time to reach the nearest water source and the prevalence of intestinal worms

October 2010.

Time of walking	Absence of cases of intestinal worms		Cases of intestinal worms in the household		Total
< 10 minutes	118	93%	9	7%	127
10 - < 30 minutes	82	95%	4	5%	86
>=30	223	84%	44	6%	267
Total	**423**	**88%**	**57**	**12%**	**480**

In the additional Goma households, 77% of households with intestinal worms were located more than at 10 minutes from their nearest water source; this is higher than the rate in Nyiragongo, which is 70%.

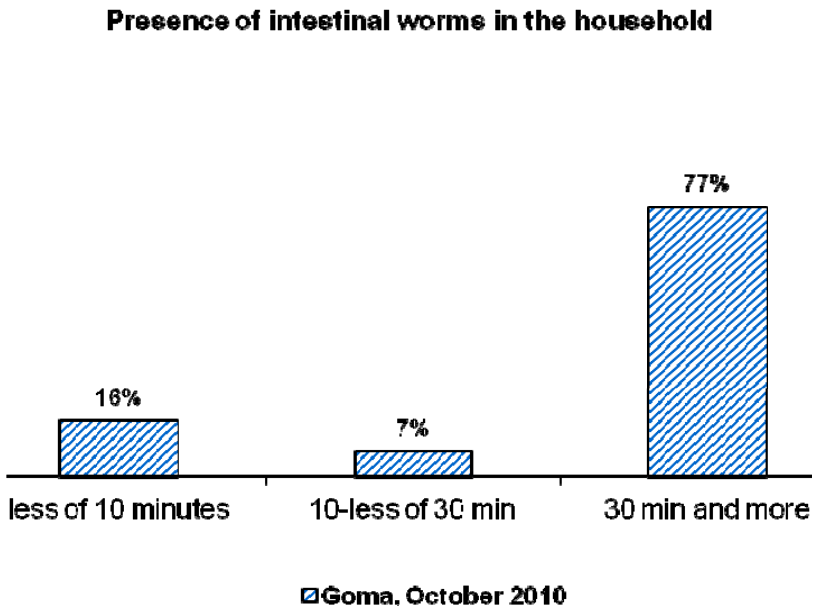


Figure 12. The time to reach the nearest water source and the prevalence of cases of intestinal worms, October 2010, Additional Goma households.

2.2.14 Problems related to lack of privacy

Other problems are related to a lack of privacy at both an individuals and environmental hygiene level—scabies, louse, ringworm, and jiggers are also present in the households.

We examined the different types of household that experienced these different infestations. The results are shown below:

Nyiragongo Territory

Table 31. Problems related to a lack of hygiene in households, n=420, October 2008 and 2010.

Problems related to a lack of privacy and hygiene	% of household presenting the problem	
	October 2008	October 2010
Insects	37%	33%
Cockroaches	29%	34%
Ringworm	22%	28%
Lice	17%	18%
Jiggers	17%	20%
Parasites of domestic animals	15%	7%

Despite an extensive sensitization campaign that has been successful in other areas, the number of households that are experiencing infestations has not decreased significantly—the 2008 rate of people reporting cockroaches in their house of 37% has dropped to 34% in 2010..

Quarters of Goma additional to the studying

Table 32. Problems related to a lack of hygiene in households, n=480, October 2010.

Problems related to a lack of privacy and hygiene	Number	% of households presenting the problem
Cockroaches	278	58%
Insects	150	31%
Ringworm	130	27%
Parasites of domestic animals	45	9%
Lice	18	4%
Jiggers	17	4%

We note that cockroaches are found in 58% of cases. 31% report that they have bugs in the house, and 27% of children present with ring worm.

The problems related to a lack of hygiene in households are presented below, per village/quarter.

Table 33. Problems related to a lack of hygiene, incidents per household

Village/Quarter	Ringworm	Jiggers	Lice	Bugs	Parasites of animals	Cockroaches
Kibati	17%	42%	35%	38%	12%	52%
Lac Vert	35%	8%	3%	17%	7%	30%
Mudja	15%	8%	5%	28%	7%	23%
Mugunga	32%	32%	37%	25%	3%	52%
Munigi	30%	13%	7%	52%	8%	40%
Ndosho	38%	2%	5%	25%	3%	20%
Rusayo	32%	38%	33%	48%	15%	20%
Average	**28%**	**20%**	**18%**	**33%**	**7%**	**34%**
Bujovu	32%	15%	5%	30%	5%	5%
Kasika	37%	0%	3%	35%	13%	13%
Katoyi	40%	3%	3%	47%	10%	10%
Mabanga Nord	22%	3%	3%	25%	12%	12%
Mabanga Sud	2%	0%	5%	38%	13%	13%
Majengo	30%	5%	8%	32%	5%	5%
Murara	23%	2%	0%	12%	7%	7%
Virunga	18%	0%	2%	32%	10%	10%
Average	**27%**	**4%**	**4%**	**31%**	**9%**	**58%**

The presence of lice, ringworm, jiggers, bugs, and cockroach etc. are symptomatic of a lack of hygiene.
In Nyiragongo, 18% of households declare that there are members of their household who have lice, versus 17% in 2008, 28% of households report ringworm, versus 22% in 2008. In Mugunga, Kibati and at Rusayo lice are reported at a rate of 37%, 35% and 33%, respectively. In 2010 at Mugunga, Kibati and at Rusayo 4% report that a members of their household suffers from lice and 27% for the ringworm. This suggests that, in these areas, 31% of households are infested with bugs and in 58% with cockroaches.

2.2.15 Health Sensitization

2.2.16 Participation at Health Sensitization Meetings

2.2.17 **Table 34. Participation at Health Sensitization Meetings, October 2010.**

Village/Quarter	Number of households	No. who have participated in the health Sensitization Meetings		Average number of times they have participated (ET)
		Number	%	
Kibati	60	44	73%	1,3(0,5)
Lac Vert	60	38	63%	1,4(0,5)

Mudja	60	47	78%	1,2(0,4)
Mugunga	60	48	80%	1,2(0,4)
Munigi	60	44	73%	1,3(0,4)
Ndosho	60	32	53%	1,5(0,5)
Rusayo	60	44	73%	1,2(0,4)
Total	**420**	**297**	**71%**	**1,3(0,5)**
Bujovu	60	31	52%	1,5(0,5)
Kasika	60	32	53%	1,5(0,5)
Katoyi	60	20	33%	1,7(0,5)
Mabanga Nord	60	19	32%	1,7(0,5)
Mabanga Sud	60	31	52%	1,5(0,5)
Majengo	60	33	55%	1,5(0,5)
Murara	60	19	32%	1,7(0,5)
Virunga	60	32	53%	1,5(0,5)
Total	**480**	**217**	**45%**	**1,6(0,5)**

71%° of households surveyed in Nyiragongo reported participating in health sensitization meetings; this is a significant increase on 24% in 2008. This rate does not vary significantly from area to area.

Overall, the average number of times that each person attended a meeting was 1.5 in contrast to the 2008, when the rate was 2,12; this gives a standard deviation of 1.27 which is not significant.

Of the additional Goma households, 45% of respondents had participated in a health sensitization meeting. at the average number of times that each person attended a meeting was 1.6 with a standard deviation of 0.5.

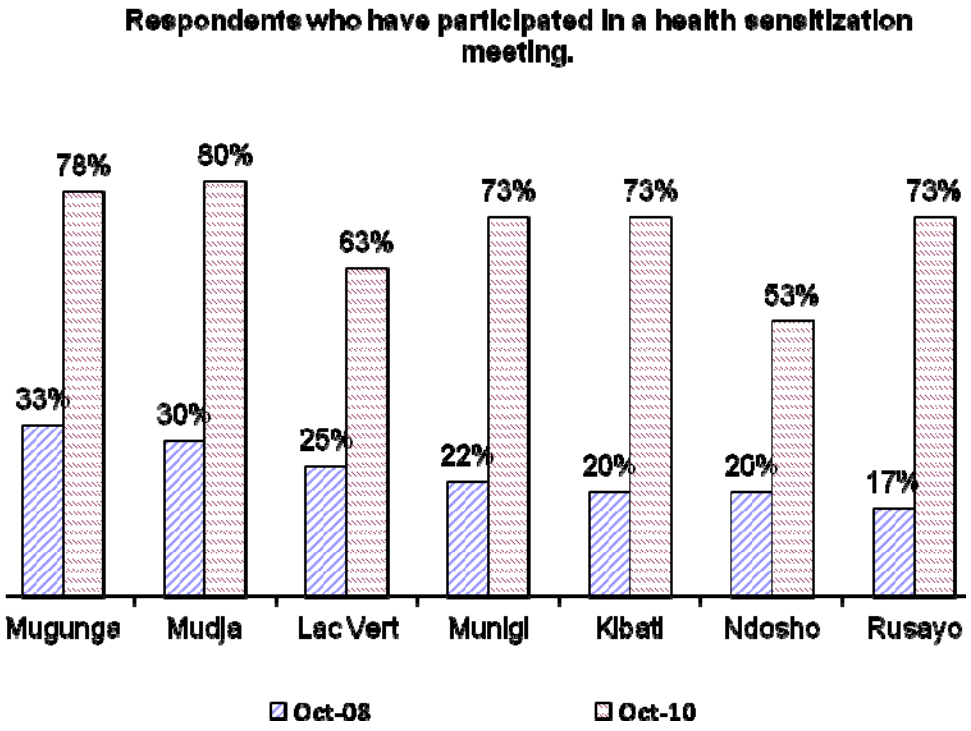


Figure 13 Respondents who have participated in a health sensitization meeting.

, Oct. 2008 and 2010.

The development of themes of the health sensitization meeting.

Table 35. Principal themes in the health sensitization meeting, October 2010.

Themes	Number, n=514	%
Hygiene and cleanliness	393	77%
Prevention of diseases	256	49%
Nutritional education	134	26%
Use of health services (CPS, CPS, curative activities, maternity hospital etc.)	51	10%

The themes that emerged most strongly from these meetings were focused on predominantly were hygiene and cleaning followed by the prevention of diseases, which were cited by 77% and 49% of the attendees.

Location of the health sensitization meetings

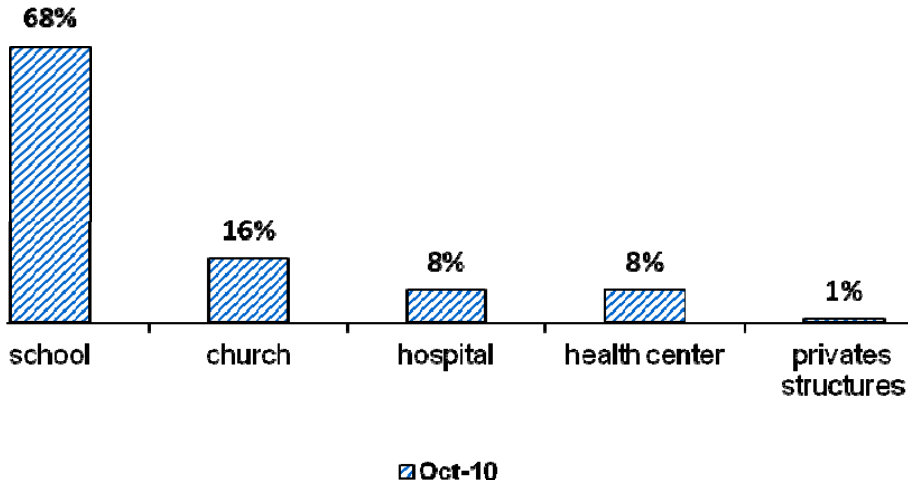


Figure 14. Location of the health sensitization meetings, October 2010.

84% of health sensitization meetings were held either in a school or a church. 16% were held in a hospital or health center. Only 1% were held in private structures.

In all the areas surveyed in the study, the focus group participants reported that they are more informed thorough Mercy Corps and their local partners in areas such as water, hygiene and maintaining a clean living environment, through the implementation of sensitization programs such as these. For example, one member of a focus group of Bujovu reported the following:

"Yes*, we are now much better informed because of Mercy Corps meetings that were held at the local school, where a local animator explained many things to us."*

3 CONCLUSIONS

The water, sanitation, and hygiene situation in Nyiragongo as surveyed from 28 September to 04 October 2010 makes it clear that the efforts of Mercy Corps over the last two years have made significant improvements in two objectives. First, to enhance the food security situation for 16,900 vulnerable households in 14 urban and peri-urban communities in North Kivu province, and, second, to decrease the rate of water-related diseases in children under five years old to 25% by improving access to drinking water and knowledge of hygiene in the communities in question.

To achieve these objectives, two intermediate results were necessary to assess how best to improve access to reliable sources of water and standards of cleaning and of hygiene.

In Nyiragongo, 47% of households rely on agriculture as their main income generator. This is a reduction from the 2008 rate of 56%. In the additional Goma households, 3% of households rely on agriculture.

The average income per person per year is 360 USD, which is a small increase on the 2008 rate of US$327.60. Households tended to use less water as in 2008. In 2008, in Nyiragongo, 60% of households were more than 30 minutes away from their nearest water source; this had dropped to 47% by 2010, demonstrating clearly that the situation regarding geographic accessibility to water has improved significantly.

While only 33% of households in 2008 had access to sufficient water, in 2010, this figure had risen to 44%. In the additional Goma households, 56% of households must travel more than 30 minutes to reach their nearest water source, and 40% of households have access to sufficient water. In general, the water that is used is not good quality; this is also the case in Nyiragongo.

Since 2008, when we began our sensitization program, there have been clear improvements in terms of people's awareness of means of disease prevention.

There are still many cases of malaria, intestinal worms and diarrhea in the region, as there were in 2008; in Nyiragongo territory, water-related diseases are more prevalent. This is also true in the data from the Goma households.

For children under 5 years old, the incidences of diarrhea have decreased. In fact, the number of cases has reduced by 22% since 2008.

The lack of hygiene in households is clear from the rise in the rate of infestations in many households: the proportion of Nyiragongo houses infested with lice is now 18%, versus 17% in 2008, households that report infestations of cockroaches are now 34% versus 29% in 2008, and bugs are found in 33% of households versus 37% in 2008. These rates are smaller for the Goma communities, at 4%, 58% and 31%, respectively. Almost of those households had access only to a latrine that was in poor condition.

Most households rely on fetching water from elsewhere rather than owning their own reservoir. The transportation of water results in a higher likelihood of that water becoming polluted. .

Most land plots are not kept clean and household rubbish is not disposed off in a clean and effective way. Following the sensitization campaigns of Mercy Corps, most of the population is aware of the link between a lack of hygiene and disease. Despite this, the population claims to find it difficult to put this knowledge into practice due to a lack of means. However, in places where Mercy Corps has had a visible impact, on the ground (building of community latrines as well as private latrines for vulnerable people, gutters and iron sheets, reservoirs in plastic) and where the sensitization campaign has been successful, significant improvements have been seen. Future work should focus on encouraging the community to apply their knowledge in practical ways.

Local collectivities must be involved at all levels of the management of water resources; of the participation of women in this area is women is particularly regarded as necessary, in light of the fact that they are the ones that are usually responsible for the daily supply, management, and use of water.

In 2008, to improve the quality of water, the levels of hygiene, and the accessibility of water in Nyiragongo territory in 2008, we outlined certain recommendations in terms of improving community awareness of these issues through workshops on the appropriated use of water, the link between water and health, the contamination and disinfection of water, the effective and clean ways to store water, the correct disposal of rubbish, the prevention of diseases of water-related diseases and transmissible diseases by the vectors related to water. The work of Mercy Corps since 2008 has significantly improved the lives of many beneficiaries in Nyiragongo and Goma through the implementation of its MYAP programs.

The following actions should continue to be implemented:

- Continue to develop and execute projects related to the prevention of diseases transmitted by vectors that live close to water, such as malaria, through the distribution of mosquito nets impregnated with insecticide,
- Continue to help educate the community in terms of preventing water-originating diseases, such as diarrhea, and promote widespread awareness of the precautions that can be taken to treat contaminated water.
- To encourage the implementation of water and sanitation projects through the construction of water access points and the installation of rainwater harvesting system.
- To reinforce the benefits of behavioral change in terms of improving standards of hygiene and cleanliness in living areas.
- To implement projects aimed at improving access to latrines, and proper waste management.

ANNEXES

Annex 1. Terms of Reference

Annex 2. Results tables

Table 36. Average quantity of water by household

Village/Quarter	Average number of persons	Average quantity of water by household			
		Drinking Water		Water for households works	
		Average	Standard deviation	Average	Standard deviation
Kibati	6,0	10,51	9,81	31,56	28,70
Lac Vert	6,8	9,46	5,98	32,63	28,06
Mudja	6,7	10,52	6,27	30,48	28,80
Mugunga	6,9	13,50	13,52	42,15	23,29
Munigi	6,5	9,24	7,69	30,67	17,17
Ndosho	7,4	13,83	12,26	45,73	26,96
Rusayo	5,7	6,02	7,42	20,67	13,13
Ensemble	**6,6**	**10,45**	**9,68**	**33,46**	**25,41**

Table 37. Average quantity of water by household: Drink and households works for quarters additional, October 2010

Quarter	Average number of persons	Average quantity of water by household			
		Water of drink		Water for households works	
		Average	Standard deviation	Standard deviation	Standard deviation
Bujovu	6,5	11,7	9,1	38,5	25,8
Kasika	7,3	12,1	9,6	68,0	39,6
Katoyi	7,0	11,5	10,6	48,6	33,3
Mabanga Nord	6,3	14,9	15,2	66,0	49,7
Mabanga Sud	7,0	10,9	7,2	68,4	31,9
Majengo	6,8	8,8	5,4	53,4	31,6
Murara	6,1	15,1	13,8	68,6	34,7
Virunga	7,1	8,7	5,7	69,3	40,1
Ensemble	6,8	11,7	10,3	60,1	37,8

Annex 3. List of survey staff

Coordinator of the studying

1. Jean Claude Balolebwami Amuli, CSF-RDC

Supervisor of the study

1. Jean Claude Balolebwami Amuli, CSF-RDC
2. Bahati Muhashirwa Chance, CSF-RDC
3. Roger Kasongo Ruciko, CSF-RDC

Translator of the document

1. Alphonse Sadiki Byabulire[10]

Table 38. Surveyors team

№	Names and post names	Sex
1	Fulbert Bandu	M
2	Charles Balolebwami Nfundiko	M
3	Damas Bigarura Shamamba	M
4	Roger Kasongo Ruciko	M
5	Mudosa Basima	M
6	Annie Belinda Amuli	F
7	Nathalie Lumba Bahati	F
8	Don Charles Mufungizi	M
9	Jean Pierre Mapendano Nyambwe	M
10	Christine Muhashirwa	F
11	Clovis Biringanine	M
12	Yvettes Ombeni Mufungizi	F
13	Valentin Muhindo Hamuli	M
14	Kawa Nyembo	M
15	Moïse Kambale Ndekeyonge	M

[10] Please note that Mercy Corps engaged volunteers to edit the translation, of which this document is the first draft.

Data entry team

1. Alphonse SADIKI BYABULIRE
2. Karlos Kasole Balole
3. Clovis Akonkwa Mugaruka
4. Fiston Malembe

Annex 4. Survey questionnaire

Mercy Corps Household WATER and SANITATION					
Name of the surveyor: _____	Date of the interview: Day: _____ Month: _____ 2010				
Quarter: _____; Locality: _____; District: _____; Commune or Territory: _____					nº _____
Name of the informant representing the household: _____	Circle:	Man	Woman	Head of HH	

	GENERAL INFORMATION				
1	How long have you lived in this dwelling?	0-12months *(1)* 13months-2years *(2)* 3-5years *(3)* 6-10years *(4)* 11+years *(5)*			
2	Type of population?	Resident *(1)* uncalled-fo (from where) (2) Returner *(3)*			*Welcome family* (4) Refugees (5)
3	Do you plan to stay here?	Yes No	If NO, why not?		
4	Do you:	Circle the response:	Own this dwelling	Rent	Other (provide details):
	NUMBER OF INDIVIDUALS THAT LIVE IN THE HOUSEHOLD	Male	Female	Total	*How*

5	Number of children under 6 months?				
6	Number of children between 6 months and less than 5 years?				
7	Number of children between 5 years and less than 13 years?				
8	Number of adolescents between 13 years and less than 18 years?				
9	Number of adults between 18 years and less than 30 years?				
10	Number of adults between 30 years and less than 45 years?				
11	Number of adults between 45 years and less than 60 years?				
12	Number of adults aged 60 and over?				
13	Number of individuals that live in this household?				

	Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access	**CODING CATEGORIES**
14	Now I would like to ask you about the types of foods that you or anyone else in your household ate yesterday during the day and at night.	**A** 1. Cassava bread 2. Maize bread 3. Rice 4. Biscuits 5. Sorgho 6. Rice 7. Groundnuts **B** 1. Potatoes 2. Yams 3. Cassava 4. Taro 5. Sweet potatoes, or any

	READ THE LIST OF FOODS, PLACE A *ONE* IN THE BOX IF ANYONE IN THE HOUSEHOLD ATE THE FOOD IN QUESTION, PLACE A ZERO IN THE BOX IF NO ONE IN THE HOUSEHOLD ATE THE FOOD.	other foods made from roots or tubers **C** 1. Vegetables 2.Cabbage 3. Cassava leaves 4. Sweet potatoes leaves 5. Beans leaves 6. Narrow leaves 7. Other to precise **D** 1. Bananas 2. Avocado 3. Plums 4. Mangoes 5. Maracudja 6. Pineapples 7. Pawpaw 8. Orange 9. strawberries **E** (All the organe of meat) 1. Ox 2. Sheep 3. Goat 4. Rabbit 5. Chicken 6. Duck 7. Other poultry..... **F** Eggs? **G** 1. Fresh fish 2. Salty fish 3. Smoked fish 4. Shellfish **H** (Foods which come from beans,hair, lentil) 1. Beans 2. Garden peas 3. Soja **I** 1. Cheese 2. Yoghourt 3. Milk 4. Other products milkman..... **J** Foods which are done with oil, Matter fatty or from butter? **K** 1. Sugar 2. Honey **L** 1. Coffee 2. Tea	
	Month of appropriate food supplying (MAHFP) for the measure of food access of households		**CODING CATEGORIES**
15	Now I would like to ask you about the types of foods that you or anyone else in your household during the different month of year. When you answer at these questions, could you think about ?. PUT 1 IN CODE IF THE RESPOND ANSWER YES AT THE FOLLOWING QUESTION, PUT 0 IN CODE IF THE ANSWER IS NO	During these last twelve months, is there the months during the one you didn't have food to satisfy the needs of your household? ..... 1. Yes 2. No In case of no, end herei.	

16	DON'T READ THE LIST OF MONTHS . IN GOING UP FROM ACTUAL MOTH, PUT 1 IN CODE IF THE RESPOND ACCEPT THIS MOTH QS A MOTH IN WHICH THE HOUSEHOLD HADN'T MUCH WATER	If yes, what were the months (of these 12 last months) during the one you didn't get food to satisfy the needs of your household ? …… **A** October 2008 **B** September 2008 **C** August 2008 **D** July 2008 **E** June2008 **F** May 2008 **G** April 2008 **H** Mars 2008 **I** February 2008 **J** January 2008 **K** December 2007 **L** November 2007	**A** ..... **B** ..... **C** ..... **D** ..... **E** ..... **F** ..... **G** ..... **H** ..... **I** ..... **J** ..... **K** ..... **L** .....
	HOUSEHOLDS INCOME		
17	What is the principle source of income of this household?	Farmer *(1)* Breeder *(2)* Artisan *(3)* Fisher *(4)* Trader *(5)* Employee *(6)* Other to (precize):	
18	VALUATION OF INCOME BY SPENDING MENTHLY IN LIQUID MONEY The calcul of spending can be calculated per week or per day (for the food), by term (schooling) or per year (cloths) and the surveyor multiply or divide to reach at the spending per month. The products coming from auto consumptions		

Food products	**Day**	**week**	**Month**	**Term**	**year**	**TOTAL MOTH** .....
Food of live base	.....	.....	.....	.....	.....	FC
Meat – fish – poultry – milk –eggs	.....	.....	.....	.....	.....	FC
Salt – suggar - chili - coffee – tea - fanta	.....	.....	.....	.....	.....	FC
Vegetables – fruits - oil	.....	.....	.....	.....	.....	FC

Other spending	**Day**	**week**	**Month**	**Term**	**year**	**TOTAL MOTH** .....
Beer – alcoholic drink – tobacco	.....	.....	.....	.....	.....	FC

	Charcoal/ petrol/ electricity .... …… ... FC school fees-put even uniforms .... FC Spending for other cloths .... FC Spending for the transport .... FC Fine – force contribution – tax - rob .... FC Tenth part of your haversting / offering /gift (month) .... FC Rent/ getting a small house (month) .... FC BanK/ cooperative (month) .... FC Mourning - marriage -reception-party (last month) .... FC Investment : bike – animals –ground – house - TV – radio (last year) .... FC Spending for health .... FC Other spending .... FC						
	WATER, HYGIENE AND CLEANING						
19	Have you access at sufficient quantity of water?	Yes *(1)* No *(0)*	If no, why?				
20	Where does your drinking water come from?	town (taps)	Spring	Uncovered well	Covered well	Lake	River
		Rain water	borehole / pump	Other (specify):			
21	Where does your household water come from?	Tap	Spring ce	Uncovered well	Covered well	Lake	River
		Rain water	borehole / pump	Other (specify):			

22	How many water sources are in your neighborhood/village?	0 1 2 3 4	Quelles sont les ONG qui les avaient installées?				
23	Using a scale from 1 to 5, how do you judge the quality of your water? (1=dirty, 2=cloudy, 3= some whater clear, 4=clear, 5=clean)	Drinking water 1 2 3 4 5	household water 1 2 3 4 5	Comments			
24	Do you treat your drinking water?	Yes *(1)* No *(0)*	If Yes, hoh?	Boil(1)	Filter (2)	Product (chlorine or PUR) (3)	Other (specify):
25	Who went to collect water yesterday?	Adult man(1)	Adult woman (2)	Boy (3)	Girl (4)	Other (specify):	
26	How long does it take to go to the water point? _____mn	Less of 10' (1) 10' à < 30' (2) 30' à 60' (3) more of 60' (4)					
27	Yesterday, how many cans of 20 litters have you fetched? # _____	How many are corved? #_____					
28	Do you have a separate reservoir for drinking water?	Yes *(1)* No *(0)*	Comments:				
29	What is the quantity of water that your household collects per day?	drinking water _____ _ liters	household water _____ liters	*Calculate the total quantity collected per day:* Total per day:_____liters			
30	Place of toilet for the household (**Observation**)	Latrine(1) hole(2) Designed corn(3) no designed corn4) Other (specify):……..					
31	If it is (1) to the question 30,now ask the following question: is it reserved for your household?	Yes *(1)* No*(0)*	If no, how many households use it?			Number #	

32	How do you judge the state of the latrine? (1=very dirty, 2=dirty, (**Observation**) 5=very clean)	Cleanliness: 1 2 3 4 5	*Comments:*
33	Place where the household dispose the saddles of children ?	Latrine (1) Bury far from the house and source of water (2) bury near the house and source of water(3) In the bush (4) In the river (5)	
34	When do you wash hands?	Never /Rarely(1) After toilet(2) Before cooking (3) Before eating (4) Before giving baby food (5) When hands are dirty (6)	
35	Do you wash hands with what?	Water only (1) water + soap (2) water + ash (3) Other to specify : ……	
36	Place to store household rubbishes ? (**Observation**)	Pit to the rubbishes (1) on the land around the house (2) in the bush (3)	
	HEALTH :The morbidity closed at the water and to miss hygiene		
37	Do you have a health structure in your quarter?	Yes *(1)* No *(0)*	Comments:
38	Two last weeks (15 days) is it the case of diseases in your households ? (Propose the the list of deseases progressively)	a. simple diarrhea O/N …… how many cases …… b. Sanglante diarrea O/N …… how many case …… c. Cholera O/N …… how many case …… d. Typhoide Fever O/N …… how many case …… e. Sharp Conjonctivity O/N …… how many case …… f. scabies O/N …… how many case …… g. Verminose O/N …… how many case …… h. Normal malaria O/N …… how many case ……	

39	Among diarrhea cases, how many are children under 36 months? Under 59 months?	Number of case under 36 months	Number of case under 59 months
40	How can we avoid diarrhea ? (many possible answers)	a. In boiling water that we aren't sure b. In washing hands c. In observing hygiene of foods and of drinking water d. I don't know e. Other answers	
41	How can we avoid verminoses ? (many possible answers)	a. In boiling water that we aren't sure b. In washing hands c. In observing hygiene of foods and of drinking water d. I don't know e. Other answers ……	

42	According to you, how can you prevent malaria? (so many answers are possible)	a. It's impossible to prevent malaria de prévenir le paludisme b. Avoid the bad minds c. Cut the bush around of house d. Drain all stagnante water in parcel/ arounds e. Sleep under a mosquitonet f. Sleep under a mosquito treated of insecticide g. Pulverize the insecticide in house h. Take the herb tea i. Take the tablets anti malaria j. Presumptive treatment and intermittent to fansidar for pregnant woman. (2 times per pregnant) k. I putting the wire fencing at all the house l. corver the skin, wear long cloths m. Use products which scatter odor that can dismiss mosquitos n. Burn snakes o. Isn't it p. Other to precise ……
43	Have you gotten the occasion to assist at the meeting of sensibilisation on the health ? O/N……..(If no go to 47)	Yesi (1) No (2)
44	If yes, how many times ……	
45	C'était où (Plusieurs réponses possibles) : a. CS b. Hôpital c. Structures privées d. Eglise e. Ecole Autre lieu à préciser ……	

46	Quels étaient les thèmes ? (Plusieurs réponses possibles) a. Prevention des maladies b. Hygiène et Assainissement c. Utilisation des services de santé (CPN, CPS, activités curatives, maternité etc.) d. Education nutitionnelle e. Autres thèmes ……	
47	Dans votre ménage y a-t-il des cas de problèmes suivants? a. La teigne tondante b. Chiques c. Poux d. Punaises de lits e. Verminosis des animaux domestiques. f. Blattes (« mende en swahili »)	

Annex 5. Program Photos, Mercy Corps 2010


Mercy Corps


TOURISTIQUES


CLOVIS
JEAN-PIERRE