Impact study summary
Cambodia 2012

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1. Executive Summary

1.1. Project summary

1001 fontaines pour demain is a non profit organisation (created in 2004) contributing to the global effort of international solidarity and, more specifically, improving access to safe drinking water. This initiative is specifically orientated towards small rural communities, which generally fall outside of the remit of water access projects. It aims at improving the health of these populations by allowing them to meet their needs for safe drinking water in a sustainable manner and without any specific infrastructure or expertise.

The major objective of this study is to measure to what extent the health of the beneficiaries of 1001 fontaines services may be improved by such services.

More specifically, two populations have been observed:

- Children under 5, within their families (Cohort study), for whom diarrheal diseases occurences have been reported and correlated to the water source used by the family,
- Children between 6 and 12, where attendance at school has been measured.

These groups have been observed during a 6 month period, during which each family of the cohort study has been visited twice a month in order to record potential diarrheal diseases.

For the schools study, attendance rates have been extracted from the attendance reports of each school.

1.2. Schools study findings

The comparison of attendance statistics between two groups of schools, one where safe water was made available, every schoolday, to the children, while the children of the other group used their usual water sources, has shown that the absenteeism, during the dry season, was reduced by 55 to 75% for the children of the first group. Although we do not suggest that a similar reduction factor might be automatically expected on the water-borne diseases preventing them to attend the school, we believe that this suggests that this provision of safe water sufficiently improves the child's general wellbeing as well as the learning and experience of the school day as he/she is better hydrated. Consequently they are more likely to attend school the following day.

1.3. Cohort study findings

The study clearly shows that, as an alternative to piped systems which appear as the safest water source but obviously cannot be deployed, for investment cost reasons, widely in rural areas, two water sources (rain harvesting and *1001 fontaines* supply) can be associated with reduced childhood diarrhea while other alternatives can hardly be.

Other water sources (groundwater as well as surface water) show a probability of getting ill 30 to 60% higher than these two water sources, result which may surely be associated to the conditions of transportation or storage of such water (promoting its contamination before its consumption) as well as to some poor practices in the hygiene area.

2. 1001 Fontaines initiative

2.1. Description

1001 fontaines pour demain is a non profit organisation (created in 2004) contributing to the global effort of international solidarity and, more specifically, improving access to safe drinking water. This initiative is specifically orientated towards small rural communities, which generally fall outside of the remit of water access projects. It aims at improving the health of these populations by allowing them to meet their needs for safe drinking water in a sustainable manner and without any specific infrastructure or expertise.

As you will see by visiting our website www.1001fontaines.com or by watching a short video (link at the end of this section), 1001 fontaines has implemented several pilot projects in Cambodia between 2005 and 2013, enabling today roughly 180,000 people in more than 100 villages to drink safe water.

We started similar projects in Madagascar in 2008 (10 operating sites running at present and 16 more being launched in 2014 and 2015), and a first experimental project is currently undertaken in India (West Bengal).

Furthermore a specific Sponsorship Programme was started in 2008, by which safe water is provided to 58,000 children in the primary schools of villages, where 1001 fontaines has activities. We recognise that children are the most vulnerable to water-borne diseases, and we are convinced that targeting children is an effective means of raising not only their own, but also their parents,' awareness of Water and Sanitation for Health (WASH) issues.

This initiative has received a number of awards, notably the « *2006 Award for International Solidarity* », an annual award granted by the French « High Council for International Cooperation » (a service of the office of the Prime Minister), and has been awarded in 2011 by the Schwab Foundation, through his Cambodian cofounder M.Chay Lo, the title of "**Asian Social Entrepreneur of the year**".

1001 fontaines' funding comes mainly from private donors (private companies, foundations), although it has also received financial support from the French Embassies in Cambodia and Madagascar.

1001 fontaines' long-term strategy is to provide totally safe water to millions of villagers in many countries:

- at an affordable price – currently less then 0,01 € per litre,
- in a sustainable manner; our economic model relies on social enterprise principles with each operating site, as well as the supporting infrastructure, being self-financing through water sales,
- for a very low one-time investment cost – currently US $ 6 per beneficiary.

The following link will help you rapidly to understand the core principles guiding our actions, as well as the positive impact on health that they generate.

***1001 fontaines* video (6 minutes)**: http://fr.youtube.com/watch?v=8bykbVECVrE

2.2. Operating principles

Over the last six years (2005-2011), the work of "*1001 fontaines*" has focused on three major issues:

- Water quality: The water sold in each village by local "*1001 fontaines*" entrepreneurs is produced and distributed in 20-litre bottles according to a process which was designed with the help of two world-wide leaders in drinking water distribution, namely Veolia and Danone. Quality

requirements correspond to the highest World Health Organisation (WHO) standards and water quality is controlled on a frequent basis according to procedures designed for us by the Fondation Mérieux (France).

- Accessibility: This starts with offering safe drinking water at an affordable price for poor people (i.e. *ability to pay*). We meet this condition with a selling price of US $ 0.01 per litre.

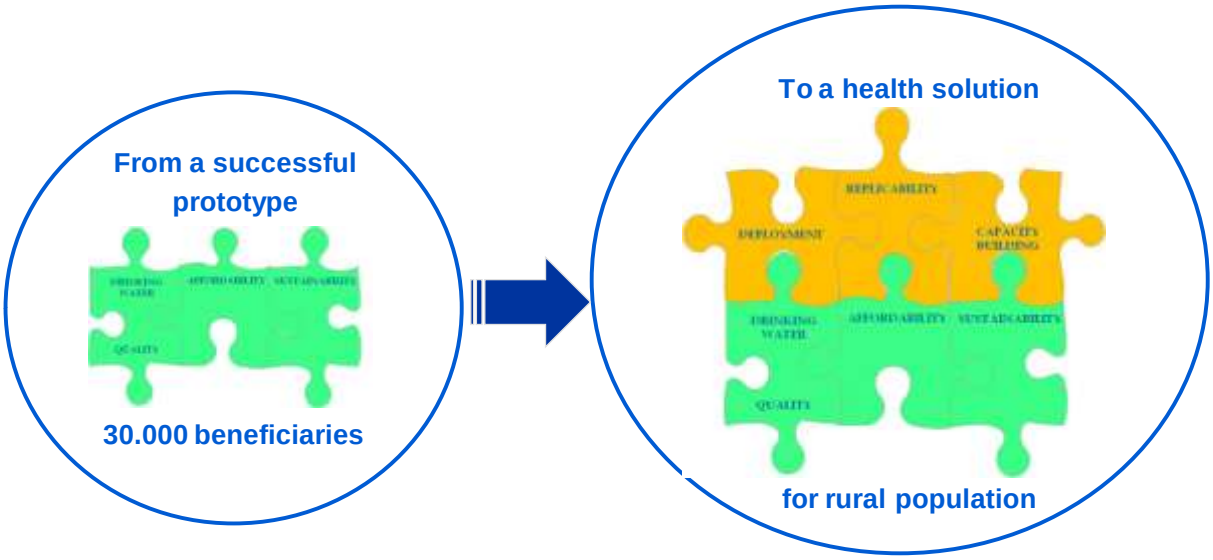
  Accessibility also requires undertaking significant training and social marketing steps, in order to foster changes in behavior related to hygiene and safe water consumption (i.e. *willingness to pay*). Over a 6 to 8 year period our objective for each production site (in each village) is to convert at least 40% of the population from drinking contaminated water to drinking safe water everyday.

- Sustainability: After a one-year apprenticeship period, each production site becomes financially self-sustainable, i.e. the operator generates enough turnover to make a living and finance all operating and maintenance expenses, as well as growth investments.

  Operational sustainability is also guaranteed by a technical support platform, i.e. a team of skilled technicians supervising 50 to 60 operating sites. The platform gives technical assistance to operators and carries out quality control tasks. In exchange for these services the platform receives monthly assistance fees from each site according to a micro-franchise operating model.

  Thus, water sales enable the achievement of financial sustainability for both the support platform and the operating sites, despite a very low selling price.

Now that the viability of its safe water provision model has been demonstrated, *1001 fontaines* intends to pursue two new constituents of its vision, namely scalability and replicability.



- Scalability: By mid-2012, 58 operating sites will be running in northwest Cambodia, serving up to 100,000 contributing beneficiaries on a regular basis.

  The next step, which has the operational support of the Cambodian Ministry of Rural Development, is to scale up the model by opening 3 new support platforms throughout Cambodia and creating 200 new operating sites connected to these platforms between 2012 and 2016. This ambition requires the funding of a US $ 4 million capital cost, for the 250 production sites to be launched by 2016 (including already existing sites) ultimately to serve 1 million customers. (Today

7 million Cambodian people living in rural areas do not have any access to safe drinking water). Approximately 1,000 income-generating full-time jobs will be created by this programme.

- Replicability: Given its successful achievements in Cambodia, *1001 fontaines* intends to replicate it in other countries, where the demand for safe water needs to be fulfilled. To prepare for this, pilot projects have been underway in Madagascar since 2008, and new initiatives in other countries are being pursued.

  We are also currently evaluating opportunities for a similar initiative in India, through a partnership with one of the largest Indian NGO, **Sulabh**, which employs 60,000 persons in the sanitation area throughout India.

2.3. Achievements

As of October 2012, *1001 fontaines* safe water production units serve mote than 110,000 beneficiaries in Cambodia, 68,000 being villagers paying US $ 0.01 per liter of safe water, and 44,000 being children under 12 who takes advantage of a daily free delivery of safe water in their schools.

Our key activity indicators are shown hereunder.

Operating Sites (31/12/2013)

	Cambodia	Madagascar
Initiated	105	10
In operation	88	9
New launches planned within next 12 months	30	10

Beneficiaries* (actual)

	Cambodge	Madagascar
2008	3.178	0
2009	18.375	1.423
2010	40.407	1.897
2011	45.018	2.838
2012	75.582	4.000
2013	118.687	12.187

*Excluding Sponsorship Program

Note : for each site, the « break-even » corresponds to approx. 1,000 beneficiaries, and the average objective is to serve 3,000 customers after 5 years of operation.

Sponsorship (30/09/2013)

	Cambodia	Madagascar
Number of children	55.386	4.428

Comment : Sponsored primary schools receive, everyday, free of charge, safe water for their children

Jobs created (31/03/2013)

	France	Cambodia	Madagascar
Employed by 1001 fontaines	5	45	4
Local operators	NA	164*	20

*incl. 24 X women

2.4. School program

In conjunction with the launch of production sites for safe drinking water in the largest possible number of villages, the charity “1001 fontaines pour demain” initiated a programme in early 2008 named “*Water in school !*”, aimed at providing a supply of clean drinking water to the most vulnerable people, especially children.

This programme finances the daily supply of safe drinking water to the primary schools, children’s homes and health care centres in the villages, where we operate. This supply is provided by social enterprises launched by “1001 fountains” in the respective villages. If the volumes required justify it, a water purification unit may actually be installed on the premises.

To date, one hundred and eighteen sponsorship programmes have been established in Cambodia:

- 114 «*Water in school !*» programmes, providing the daily supply of drinking water for the primary schools of the villages concerned, whereby a quantity of 20 litre-containers of safe water (one for each classroom) is delivered every morning,

- 4 «*Fontaine sponsoring*» programmes, which consist of the installation on site of the complete water production unit enabling the school or care center to satisfy, by themselves, the needs for drinking water of all the children whom they support. This solution is preferred to the «*Water in school !*» programme, where there is a large number of children in attendance each day at the site.

As *1001 fontaines* continues to deploy its solution to additional villages during 2013-2014, the objective is to expand the sponsorship programme to provide clean drinking water to **60,000 children**, with an annual budget of US $ 100,000.

2 dollars supplies safe drinking water for 1 child at school for 1 year.

In addition to the direct impact on the health of the children, who benefit from safe drinking water, the provision of this water is an opportunity for educating the children on the importance of safe drinking water and improved hygiene.

The children in the sponsorship programme are then very effective in educating other members of their families and motivating them to adopt new hygiene habits to the benefit of the whole family.

3. Impact study description

3.1. Objectives

The major objective of this study is to measure to what extent the health of the beneficiaries of *1001 fontaines* services may be improved by such services.

More specifically, two populations have been observed:

- Children under 5, within their families (Cohort study), for whom diarrheal diseases occurences have been reported and correlated to the water source used by the family,
- Children between 6 and 12 (Schools study), where attendance at school has been measured.

These groups have been observed during a 6 month period, during which each family of the cohort study has been visited twice a month in order to record potential diarrheal diseases.

For the schools study, attendance rates have been extracted from the attendance reports of each school.

Observation period was Dec 1st 2011 to May 31st 2012. Most of this period corresponds to the "dry season" (Dec 1st to mid April), rain having started to fall by mid-April 2012.

3.2. Cohort study

This study has focused on children under 5, within their families, and has tried to correlate their diarrheal diseases incidences with the drinking water sources they used to consume.

The following chart shows the key figures regarding the cohort study participants.

Basic demographics

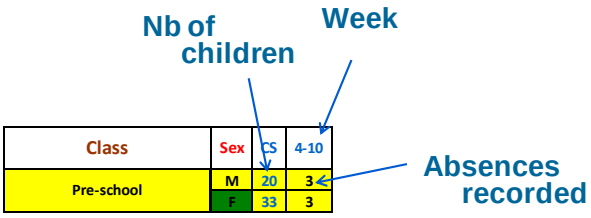
- 4275 completed follow-up visits on
- 376 participants
- 310 homes
- 15 villages
- 340 participants were interviewed on all 12 occasions
- 48.4% Male and 51.6% Female

3.3. Schools study

The schools study has been conducted in the primary schools of 8 different villages :

- 4 villages where a *1001 fontaines* safe water production facility had been established (for at least 2 years) and where the local *1001 fontaines* producer delivers, every schoolday, free of charge, a 20 Litre bottle of safe water in each classroom (under the 1001 fontaines "Water in School" program). 1,986 children composed this "Intervention Group",
- 4 villages where no *1001 fontaines* project has ever been conducted, and where children, at school, have to rely on the usual sources of water they bring from home or find in the neighbourhood of their school. 1,534 children composed this "Control Group".

The next chart explains what was measured, week after week, over this 6 months period.



Potential schooldays = Nb of children x 5 days/week

$$\text{Absenteism} = \frac{\text{Nb of absences}}{\text{Potential schooldays}}$$

3.4. Budget / Duration

This study has been conducted between January 1st, 2011 and October 31st, 2012. Its cost amounts to 160.00 € (US $ 208,000).

Many actors have contributed to ensure that the study was conducted according to the best practices of epidemiology.

A Scientific Committee has guided the study, including the following persons:

- Professor Paul Hunter (University of East Anglia)
- Professor Philippe Hartemann (Faculté de Médecine de Nancy)
- Doctor Christophe Longuet (Fondation Mérieux)
- Doctor Hassan (WHO Cambodia).

The research protocol has been established by Professor's Hunter department in University of East Anglia. All data collection has been subcontracted to an independant institute, Indochina Research Ltd, based in Cambodia.

The study has been conducted according to the following study:

- Jan 1st – March 31st , 2011 : Preparation of the research protocol
- April 1st – November 30th, 2011 : Recruitment of the families (Cohort Study) and selection of the schools (Schools study)
- December 1st, 2011 – May 31st, 2012 : Field data collection
- June 1st – October 31st, 2012 : Data Analysis.

This study has been made financially possible thanks to the following contributors:

- Fondation Ensemble,
- Fondation Avenir Finance,
- Danone Group,
- AFD (Agence Française de Développement),
- Fondation Mérieux.

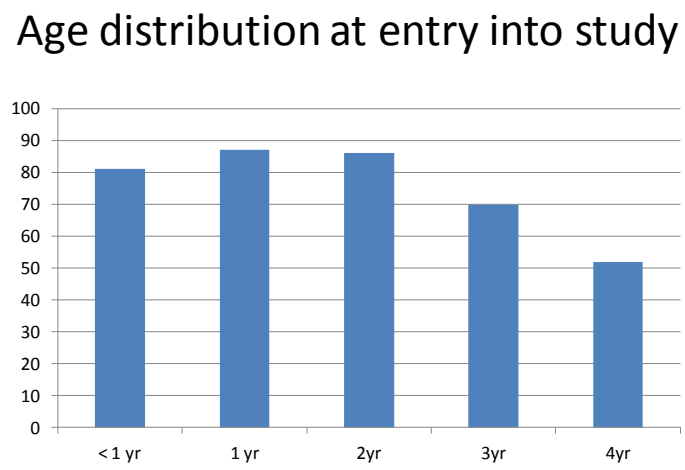
4. Cohort study findings

4.1. Population surveyed

As explained earlier, the study has focused on children under 5, within their families, and has tried to correlate their diarrheal diseases incidences with the drinking water sources they used to consume.

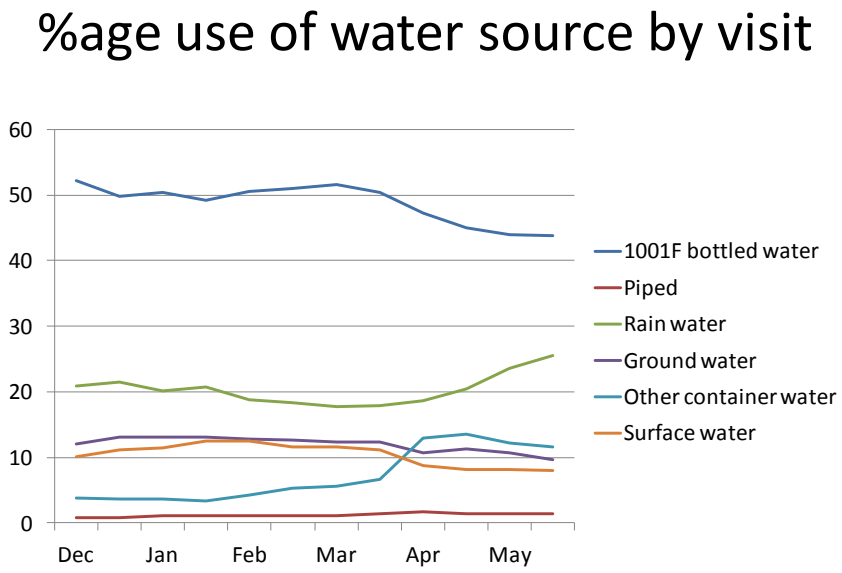
340 of such children have been interviewed (through their parents) every 15 days, over a 6 months period, out of an initial count of 376. Most of the 36 cases having been dropped during the study result from the move of their family to another place, although a few of them were dropped because they unfortunately died during the study.

The distribution of these children on December 1st, 2011 is shown hereunder.



4.2. Water sources

The following chart indicates the water sources that each respondent claimed to have primarily used during the two weeks preceding each interview.



Since the study was centered on the impact of *1001 fontaines* projects, the surveyed population contains approximately 50% of *1001 fontaines* consumers, the other half using other sources such as rain water (generally collected during the rainy season then stored at homes in large 1,000 litre jars), surface water, or groundwater (protected or unprotected wells).

Some water source changes may have been recorded from a period to another during each interview, most of these changes occuring in April, when rain started to fall again in Cambodia.

4.3. Illness

The side chart describes the criteria retained for identifying illness occurrence.

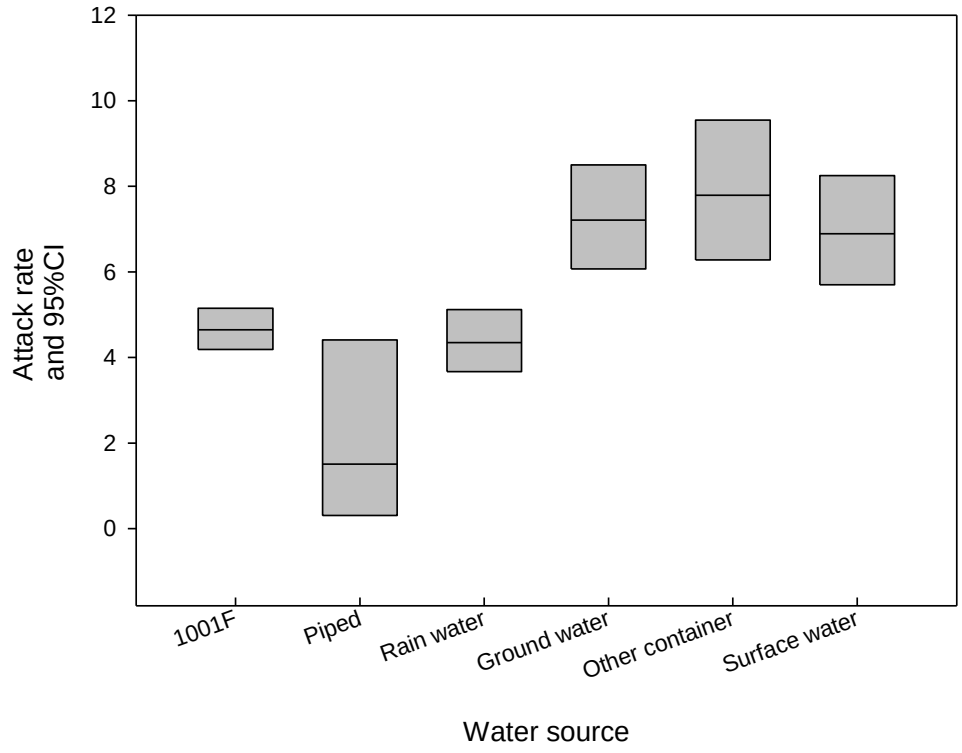
Diarrhoea

- Case definition: Three or more episodes of diarrhoea in a 24 period or any number plus vomiting.
- Overall reporting rate 20.4% of visits
- Incidence rate estimate = 5.32 episodes per child per year (95% confidence interval = 4.97 to 5.69).

4.4. Major findings

The most valuable information resulting from this cohort study is shown hereafter (Illness Incidence reported by water source).

Crude annual attack rates by water source



Water Source	Incidence Relative Ratio	Confidence Interval L95%CI	U95%CI
Piped water	0,284	0,101	0,800
Rain Water	0,998	0,754	1,320
1001 fontaines	1		
Unprotected Groundwater	1,041	0,489	2,216
Surface water	1,326	0,988	1,778
Other container	1,569	1,149	2,141
Protected Groundwater	1,619	1,192	2,199

This table clearly shows that, as an alternative to piped systems which appear as the safest water source but obviously cannot be deployed, for investment cost reasons, widely in rural areas, two water sources (Rain Harvesting and *1001 fontaines* supply) can be associated with reduced childhood diarrhea while other alternatives can hardly be.

Other water sources show a probability of getting ill 30 to 60% higher than these two water sources, data which may surely be associated to the conditions of transportation or storage of such water (promoting its contamination before its consumption) as well as to some bad practices in the hygiene area.

Surface water slightly better score than groundwater may be related to some practice of boiling, which are somewhat usual for surface water consumers but not for groundwater consumers.

Other containerized water suppliers does not seem to be as much concerned by water quality as *1001 fontaines*.

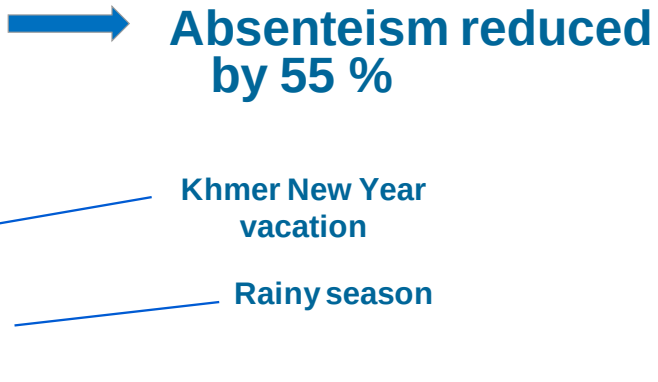
The poor score of protected groundwater is to be underlined since most of the investments made by governments or international donors are dedicated to such facilities. This study shows that, with regard to the pure health impact, this approach, by itself, can hardly be recognized as an access to “improved water”. As well, the current classification of the WHO / UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation, which does not recognize bottled water as “improved water”, might be challenged, this study confirming that position for other container suppliers, but being challengeable when considering suppliers committed to water quality as *1001 fontaines*.

5. Schools study findings

5.1. Major findings

The comparison of the absenteism rates between the primary schools of the Intervention and Control groups are shown hereunder.

Week			Contr.	Interv.
Children			1534	1986
Dec	4		4,8%	1,0%
	11		4,5%	1,1%
	18		4,4%	1,3%
	25		4,6%	1,1%
Jan	1		4,8%	2,6%
	8		4,1%	2,5%
	15		4,1%	2,7%
	22		3,6%	3,0%
	29		4,1%	1,3%
Feb	5		3,5%	1,2%
	12		3,8%	1,3%
	19		3,7%	1,3%
	26		3,8%	2,3%
Mar	4		4,2%	1,9%
	11		4,3%	3,0%
	18		4,1%	3,0%
	25		4,6%	3,5%
Apr	1		12,2%	10,5%
	8		0,0%	0,0%
	15		0,0%	0,0%
	22		20,9%	17,9%
	29		10,5%	10,8%
May	6		14,0%	13,9%
	13		10,7%	7,6%
	20		12,1%	12,7%
	27		7,1%	6,8%
Total			6,7%	4,8%



<u>This table shows a reduction of 55% of absenteism between these two groups, during the dry season,</u> reduction amazingly consistant when examining the detailed results, school by school and grade by grade.

Results shown during the rainy season can hardly be interpreted since other factors may significantly contribute to raising this absenteism:

- Rainfall, in rural areas, have a significant impact on the roads and may prevent a significant number of families to send their children to school,
- Ricefields culture, which is the major economic activity of these families, restarts with the rainy season (only one harvest per year in Cambodia), which may lead some families to retain children at home in order to compensate their presence in the ricefields.

5.2. Additional findings

When reviewing the detailed absenteeism numbers, school by school, a significant consistency appeared, week after week, school by school and grade by grade, except for one school belonging to the Intervention Group (as shown hereunder).

After a field investigation, it appeared that the *1001 fontaines* entrepreneur, in charge of supplying the Hun Sen Svay Leu Primary School with safe water every morning, did not actually serve that school as planned. Short of enough containers (20-litre bottles) to satisfy both the villagers demand and the school demand, he had preferred to serve first his paying customers (the villagers), the quantity of water delivered to the primary school being then limited to the remaining available containers.

Therefore, the level of service for the school has been minimized, especially in January and March.

However, the next chart, putting in perspective the actual service level of water supply and the absenteeism rates per week, shows that, even a partial delivery of water generates a partial benefit as far as absenteeism is concerned.

Hun Sen Svay Leu Primary School	Siem Reap Province																
Date	December-11				January-12				February-12				March-12				
	4-10	11-17	18-24	25-31	1-7	8-14	15-21	22-28	29-4	5-11	12-18	19-25	26-3	4-10	11-17	18-24	25-31
Expected delivery*	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138
Actual delivery*	29	41	17	33	20	32	31	10	29	33	17	16	12	26	9	19	4
% delivery	21%	30%	12%	24%	14%	23%	22%	7%	21%	24%	12%	12%	9%	19%	7%	14%	3%
% absence	1,1%	1,2%	1,4%	1,2%	4,3%	4,1%	4,5%	5,0%	1,5%	1,6%	1,4%	1,6%	3,4%	2,6%	5,0%	5,0%	5,3%
* Number of 20L-jugs per week																	

This phenomenon can be interpreted as something, very much appreciated by most epidemiologists, called the “Dose–response relationship”. The dose–response relationship, or exposure–response relationship, describes the change in effect on an organism caused by differing levels of exposure to a stressor after a certain exposure time.

Studying dose response, and developing dose response models, is central to determining "safe" and "hazardous" levels and dosages for drugs, potential pollutants, and other substances to which humans or other organisms are exposed. These conclusions are often the basis for public policy.

In our case, this “dose-response relationship” has been made visible despite we did not searched this evidence, but the fact it appeared is likely to reinforce the validity of our conclusions.

5.3. Interpretation

The magnitude of the reduction of the absenteeism observed during the dry season between the Intervention and the Control groups, its consistency over weeks and in detail between the various schools and grades within the schools may lead us to conclude that **the consumption, everyday at school, of a fully safe drinking water has a significant impact on the ability and/or willingness for these children, aged between 6 and 12, to actually be present**.

This magnitude is emphasized in the following chart (where the Hun Sen Svay Leu primary school has been excluded from the Intervention Group), the reduction of absenteeism then topping, consistently during the dry season, 75%.

		Control Group			Interv. Group		
Week		Total	M	F	Total	M	F
Ib of children		**1534**	**761**	**773**	**1032**	**539**	**493**
Dec	4	**4,8%**	6,6%	3,0%	**1,0%**	1%	0,6%
	11	**4,5%**	6,1%	2,9%	**1,1%**	1%	1,1%
	18	**4,4%**	5,8%	3,1%	**1,3%**	2%	1,0%
	25	**4,6%**	6,1%	3,0%	**1,0%**	1%	0,9%
Jan	1	**4,8%**	5,8%	3,8%	**1,1%**	1%	0,9%
	8	**4,1%**	4,8%	3,5%	**1,1%**	1,6%	0,5%
	15	**4,1%**	5,7%	2,5%	**1,0%**	1%	1,0%
	22	**3,6%**	4,7%	2,5%	**1,0%**	0,8%	1,3%
	29	**4,1%**	4,4%	3,7%	**1,2%**	1,1%	1,3%
Feb	5	**3,5%**	3,9%	3,1%	**0,8%**	0,7%	1,0%
	12	**3,8%**	3,8%	3,8%	**1,2%**	1,4%	0,9%
	19	**3,7%**	3,6%	3,8%	**1,0%**	0,7%	1,3%
	26	**3,8%**	3,9%	3,6%	**1,3%**	1,3%	1,3%
Mar	4	**4,2%**	4,4%	4,1%	**1,3%**	1,4%	1,1%
	11	**4,3%**	4,2%	4,5%	**1,1%**	0,9%	1,3%
	18	**4,1%**	4,1%	4,0%	**1,1%**	1,3%	0,9%
	25	**4,6%**	4,7%	4,5%	**1,7%**	1,9%	1,5%
Total		**4,2%**	4,9%	3,5%	**1,1%**	1,2%	1,0%

A subsequent question is then to know to what extent this impact on absenteeism can be extended to an impact on these children health.

First of all, the observation of the absenteeism rates in the Control Group schools clearly shows the importance, for these poor rural families, to see their children attend school. For most of these families, they understand and believe that the major chance, for their children, to have a future life better than theirs is to go to school. The low value of the average absenteeism rate, shown by this study (between 4 and 5%), confirms this importance.

Besides health issues or lack of interest, the major causes for not attending school are generally financial reasons, a difficulty to physically access school or the obligation to devote time to income-generating activities rather than to school.

Regarding the first item (cost factor), it is likely that the financial issue did not interfere with the study, one reason being that, in Cambodia, education is a free public service, and the second reason being that the selected villages, through the used selection technique (Propensity Score Matching) are very similar with regard to the average income level.

Regarding the access difficulty, this surely interfere with absenteeism during the rainy season, but very likely not during the dry season.

Similarly, the priority potentially given to income-generating activities, while very likely during the rainy season, is surely minimal during the dry season, most of the economic activity of these villages consisting in rice production, activity performed (unfortunately for these population) only during the rainy season.

Therefore, it is assumable that the major reasons for absenteeism, during dry season, lie with health trouble, with a clear focus, for this age group, on diarrheal diseases, and/or with unwillingness to attend school.

The demonstrated reduction of absenteeism, brought by this simple consumption of safe water at school, has already its own value with regard to the children education and therefore to their future.

However, this leaves the question of what is the mechanism between water supply provision and absenteeism. In this study we were not able to collect any data on the reasons for the absenteeism. Given the fact that the association was between absenteeism rates and water delivery in the same week and not the previous week, we are not suggesting that this association was primarily due to a reduction in waterborne infectious disease. Another likely explanation may be that by providing readily available palatable and safe water in the classroom, children are more likely to drink during the school day and so not become dehydrated. Even mild dehydration in vulnerable groups such as young children has been suggested as being associated with various adverse health effects.

But what this study suggests is that provision of supplementary water sufficiently improves the child's general wellbeing as well as the learning and experience of the school day as he/she is better hydrated. Consequently they are more likely to attend school the following day.

5.4. Perspective

This study suggests that, just by providing safe water at school to these children, but providing it regularly (each school day) and with a guarantee of quality of this water, a very significant impact on their general wellbeing and their willingness to attend school, for this class of age, can be achieved.

Furthermore, the 1001 fontaines experience shows that this can be made possible for a cost not exceeding US $ 2 per child and per year.

Obviously, this formulation is restrictive, since, by construction, this study has been made in villages offering to the families (through the existence of a 1001 fontaines safe water producer) the ability to consume also at home (at night and over the week-ends) a totally safe water. Similarly, the fact that this facility exists and the education programs which have been led along with its establishment may have contributed to improve the hygiene practices of these families regardless from their actual consumption of safe water or not.

However, the ending result seems significant enough to encourage, on a wide scale, such safe water delivery at school programs.

6. Additional remarks

Based on this study, some other institutions or field organizations may wish to reproduce a similar analysis on other projects. The following remarks aim to, based on our experience, draw their attention on the most important success factors for such study.

6.1. Water quality

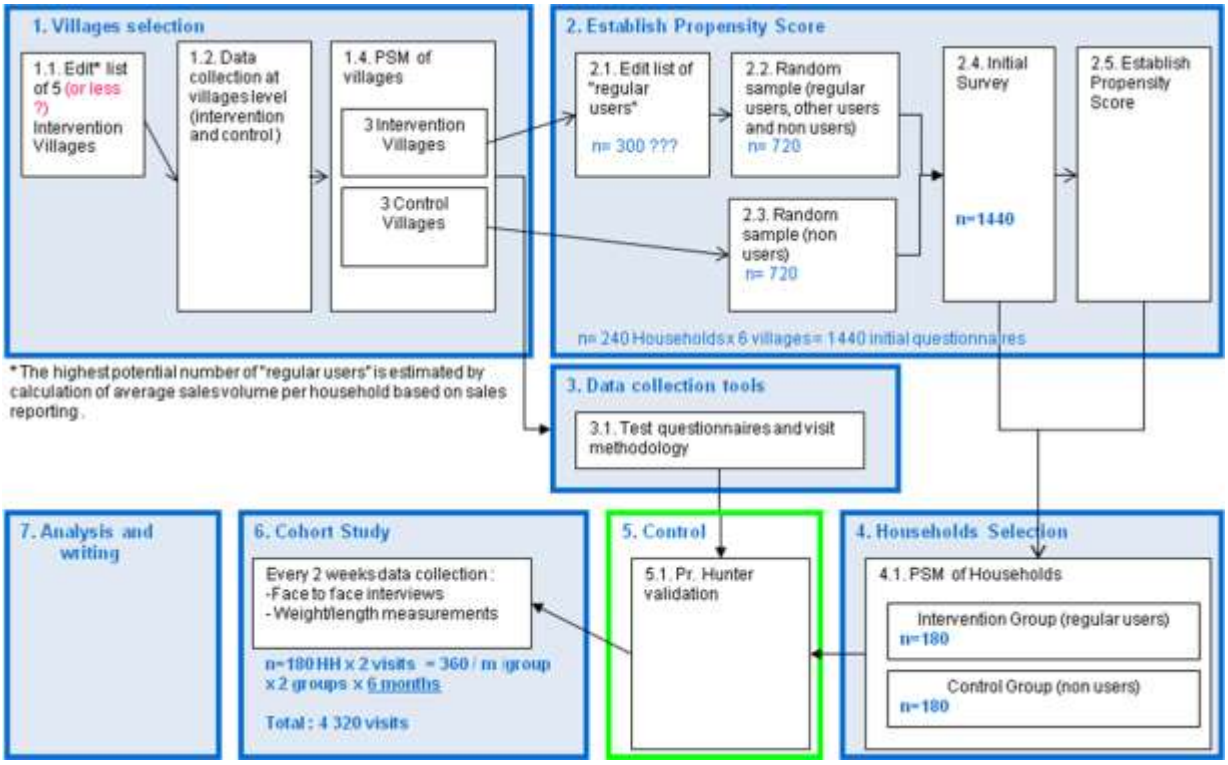
Especially for the schools study, none of our conclusions would be valid if we were not able to guarantee the quality of the water supplied to these children.

The 1001 fontaines process is monitored, on a quality standpoint, to ensure the consumers of the safety of the drinking water when they consume it. Its delivery process, in 20-litres bottle, disinfected, filled and sealed by our professional operators, equipped with a tap, is design to prevent any recontamination before its consumption.

6.2. Propensity Score Matching

Trying to isolate water quality impact on people general health is very difficult because of the multi-factor nature of health. Many different variables may interfere with the relationship between water quality and diarrheal diseases, and can therefore create bias invalidating any result.

One of the most time-consuming parts of the study was the selection of the 360 households to be included in the Cohort study. The process is sketched hereunder.



The technique used for this selection is named Propensity Score Matching, which is described by Wikipedia as follows : "*In the statistical analysis of observational data, propensity score matching (PSM) is one of a family of statistical techniques that attempts to estimate the effect of a treatment, policy, or other intervention by accounting for the covariates that predict receiving the treatment. PSM attempts to reduce the bias due to confounding that could be found in an estimate of the treatment effect obtained from simply comparing outcomes among units that received the treatment versus to those that did not*."

PSM has been used at two levels: first at the village level to identify quasi-similar villages, then at the household level to identify comparable households.

The following chart shows that this effort has been fruitful, since the intervention and final groups seems to be comparable enough to give a significant credibility to the conclusions of the study.

Are the intervention and control groups similar?

Variable	Intervention	N	Mean	Std Dev	P
Propensity score	N	165	0.46	0.21	0.707
	Y	211	0.47	0.27	
Number of adults in home	N	165	2.70	1.16	0.653
	Y	211	2.76	1.20	
Number of children in home	N	165	2.37	1.33	0.177
	Y	211	2.76	1.14	
Age at recruitment	N	165	2.18	1.31	0.785
	Y	211	2.21	1.29	
Monthly income					0.225
Mothers education					0.966

