

# Mission Impossible: Clean Water in Bihar, India



In Bihar, the lack of proper hygiene practices, toilets, plumbing, nonexistent waste collection, undesignated areas for livestock, and incessant flooding causes severe water contamination. Viruses and bacteria are found in the surface water. The alternative water source that is uncontaminated by viruses and bacteria, referred to as ground water, has high arsenic content. This leads to Bihar residents either walking long distances for pure water or drinking consistently contaminated water, many times with fatal consequences. Previous filter implementations have failed due to Bihar residents not feeling personally responsible for the solution or not being educated on the reasoning for the solution.



## Operation W.A.T.E.R.S.

### Women

The solution especially targets women that are pregnant, as they risk contaminating their children before they are even born. **Women are also responsible for gathering water and cooking the family's food with it.**

### Aid

Our solution is different because we will be **prescribing the filter as a medical treatment** to pregnant women, and for any illness or arsenic poisoning symptoms. This will overcome cultural or religious aspects.

### Treatment

To treat the water we designed a filter that is able to **filter out viruses, bacteria, and high arsenic content**, as well as one easy to use in daily life.

### Education

It is a necessity for Bihar residents to understand the exact use of the filter, why they need to change it, when they need to change it, and what the medical benefits are.

### Responsibility

The people of Bihar must take **ownership of and pride in the filter**. Therefore, the implementation of the filter into the community is run by members of the village as a business.

### Sustainability

Ultimately the entire system including production, distribution, and education of the filter is **self-sustaining**. The lack of outside involvement will create a lasting solution.

## Tools for Success

### The Filter

With vast technologies readily available, the critical revisions we made when developing and considering the components of our unique filter were tailored to fit the needs of rural residents in Bihar. This filter, while **taking into account the budget of Bihar residents, will remove waterborne illnesses, arsenic compounds, along with bacterial contagions**. We chose three main components: sand, activated carbon pellets, and a polyester felt filter media sheet. The sand filters out particulates. Activated carbon pellets are highly porous and absorb heavy metals, odors, colourants, vital organic compounds, and pollutants. Last of all, the polyester felt media sheet surrounding the sand and carbon pellets filters the water and catches larger particles.



### Cost

$$\$1.20 + \$0.04 + \$0.47 + \$0.15 = \$1.86$$

The price of raw materials before considering price variability due to supply and demand, government assistance, and other factors. The lowest income bracket has a **monthly income of approximately 30 USD a month**. The filter would use about **5% of their monthly income**, not taking the expected government subsidies into account. We hope with government subsidies that this will **decrease to approximately 1-3%**.

## Covert Integration

1 Village doctors and village leaders are contacted and educated on why the filter is needed, how it should be used, how it can be made, and the plan to implement it into the community.

2 Money for the initial filters is raised through fundraising and charity.

3 Village leaders choose a respected vendor of the filters. The village doctor then educates the vendor on the filter, its need, and especially how to make it.

## Education/Training of People, Vendor, and Doctors

The most integral part of our solution is the implementation of our filter into the individual communities. The responsibility of Water Works is the training of key people in the community, such as village doctors and the elected vendor. The education of actual Bihar residents will be done through the village doctor, vendor, and word-of-mouth. Village doctors in Bihar often do not have updated knowledge on the symptoms of arsenic poisoning or why bacterial infections occur. We will **train the village doctors on the current state of their water, symptoms of diseases and poisoning, plus how the filter will solve these medical problems**. The doctors will be able to pass this information onto the Bihar residents when they have medical complaints. Since the village doctor is so trusted in the community and we are providing a medical solution instead of a product, we bypass cultural and religious hurdles of Bihar culture. The vendor will learn the same information as the doctor, along with the logistical knowledge of the system. He will be able to advertise via word-of-mouth since the communities are small. The **solution will be accepted as a medical prescription** and begin to spread based on success of preventing and treating disease and poisoning.



4 The vendor is given the money raised to buy the materials for the filter and transport them to the village.



5 The vendor hires locals to make the filter and trains them on the process, creating jobs.



6 The completed filters are given to the village doctors.



7 Expectant mothers, patients with arsenic poisoning, diarrhea, and other bacterial or viral ailments are prescribed the filter by the doctor. We recommend: The first filter is free.

We recommend: An incentive for expectant mothers. This could take the form of 6 free filters during pregnancy and 6 filters after the birth of the child.

Side note: As the community gains interest, the village doctor could hold seminars on the issue of clean water and how the filter solves this problem.

8 After the first free filter, the additional filters must be paid for. The cost of the filter is subsidized by the government.



11 Self-sustaining Loop: The community is provided continuous clean, safe, and accessible water whilst creating jobs for the community and ensuring future generations' health.

10 The old filters and the money from filter sales get returned to the vendor.

The old filter components are reused or disposed of, as appropriate. The money is used to buy more materials, provide the vendor with a profit, and pay the workers.



9 As the community sees the filter keeping people free from ailments to those that use it, filter use will spread to the rest of the village.

We recommend: If the residents bring in the filters 30 days after receiving it (plus a 5-day grace period), they will get an extra discount on the next filter. In general, the old filter must be brought in to receive a new subsidized one.

