

Feasibility study of Domestic Water Purifier for Rural Areas

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ABSTRACT: Rural areas suffer every year with water borne diseases like Diarrhoea, Cholera. The major reason of these diseases is the infection caused due to impure quality of water. This water is either taken from the wells or nearby lakes without any process of purification. The illiteracy is also one of the components which contribute to lack of knowledge in the region. Due to this there are lot of health issues especially in the age group of 1 to 5 years children. These children come in contact of non – potable water which they drink and lead to diarrhoea or sometimes cholera too. This study focuses on feasibility of water purifiers for the rural areas which will protect children and other members of the family from water borne diseases. The water filter used in this study is designed by Bhabha Atomic Research Centre (BARC) along with the design inputs from IIT Bombay. The unique thing that makes this filter different from others is the use of Nano membrane technology in purification. This membrane filter makes it useful for long term use and economical. This study is done in four villages of remote and tribal areas of Gadchiroli where the problem of water borne diseases is in major amount.

1. INTRODUCTION

Rain, surface water and groundwater are the different natural sources of water. These water resources are open to various environmental agents, sewage, industrial discharges and agricultural runoffs, making them heavily polluted. This contaminated water if consumed directly with-out treatment may prove harmful to the health of humans.

In urban areas, the municipal authorities treat the water by filtration methods before supplying for consumption. Also, most of the urban houses use simple filters or water purifier devices. But in rural-remote areas, there is no municipality water supply, people are dependent on the natural water sources for drinking as well as other activities.

India has 67% population living in rural areas and 7% is living without access to clean water. Understanding the current needs of providing safe drinking water, a de-sign intervention in water purifiers for rural areas to improve human hygiene has become a necessity.

The objective of the project is to design a domestic water purifier for remote/rural areas using 'Nanocomposite Ultrafiltration Membrane' technology of Bhabha Atomic Research Centre (B.A.R.C.) This is very simple, well-engineered, single, reliable and cost effective removal of microbial contaminations through chemical addition without the need of any electricity and overhead water tank, and hence most suitable for remote/rural areas.

This project will be worked under the guidance of Prof. B.J Godbole (GHRCE) and O.N Mukherjee (Director, ONM Consultants).

2. Objective –

- To understand the current needs of providing safe drinking water
- To check the feasibility of a domestic water purifier for the remote rural areas
- To use of simple, reliable, and cost effective technology
- To check the effect of behavioral changes to prevent water borne diseases
- To prevent water borne diseases in rural areas

3. Methodology –

- Design of Product – The Product design will be the utmost important factor in this project. The product should be designed according to rural feasibility, technical grievances and solutions, space, affordability, usage protocol
- Pilot study – The Pilot study is very significant to work on this study. In primary phase this product is planned to pilot in regions of Aarey Colony, Mumbai and Kanholi Bara in Nagpur in 10 households respectively
- Selection of Control and Intervention areas – The control and intervention areas will be decided according to quality of water, population of area, funding. Primarily it is planned in Aarey colony in 10 houses for control and 10 houses for intervention. In Nagpur region it is planned in Kanholi where 10 households in control and 10 households in intervention are planned.
- Post Installation feedback survey – A detailed questionnaire is proposed for these 40 families. In this questionnaire the socio economic data will be recorded
- Analysis of health conditions after 3 months of use of water purifier – The observations in control and intervention area are recorded in this phase. It includes health parameters like fever, vomiting and diarrhea.

4. Advantages of NFT –

- Works on lower pressure than RO and so requires much less energy
- Recovery in NF water purifiers is more than RO and so NF does not waste as much water as an RO
- Ideal for drinking water purification of any water source with TDS less than a 1000ppm
- Softens hard water
- Removes toxic Heavy metals from water
- Removes toxic and other organic compounds from water and thus removes bad odors and taste from water

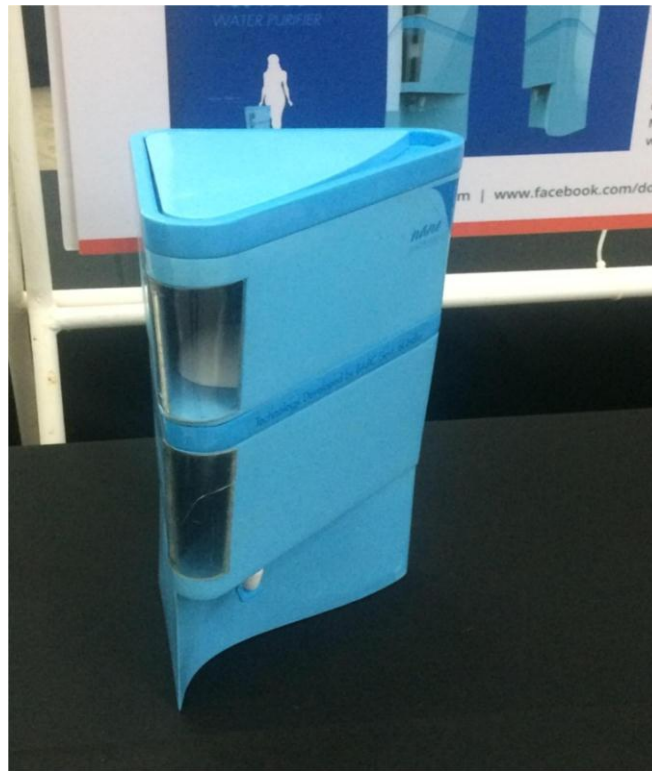
5. What will be achieved?

- Simple, well-engineered, single, reliable and cost effective removal of microbial contaminations through chemical addition without the need of any electricity and overhead water tank, and hence most suitable for remote/rural areas.

6. Limitations –

- Based on the size of colloidal particles and membrane pores, colloidal fouling might occur due to the accumulation of particles on the membrane surface forming cake layer or it penetrates the membrane pores.
- For solutions containing organic compounds where only few suspended solids available, can cause adsorption of organic compounds on the membrane surface.
- Presence of salt and high pH may result in increased permeability

7. Product Prototype -



8. References

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