

Market Based Solutions to Safe Drinking Water: Approaches and Constraints

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Abstract

Universal access to safe drinking water still remains a goal to be achieved in India. In spite of huge spending on development of water infrastructure, we have not been able to arrest the spread of water borne diseases. The constraints faced by the state Governments in supplying safe drinking water to their citizens and ever increasing demand for drinking water is paving the way for private players. Rural India with the concentration of a large percentage of population and limited infrastructure faces serious problems in terms of availability of safe drinking water.

In this scenario, low cost water purifiers produced by companies are making their inroads into villages either through regular channels or through non-government organisations. Further, some companies are setting up their own foundations, which propagate business models, selling safe drinking water profitably. This article looks into such market based solutions and analyses their strengths and weaknesses. It elaborates on the challenges faced by marketers, while selling water purifiers or safe water to large number of rural consumers. Finally, it suggests that marketers need to sell the concept of safe water, change the behaviour of consumers, and focus on products or services which are acceptable, affordable, and available continuously.

1. Introduction

Water is intricately connected with the cultural fabric of India having both economic and social connotations (UNICEF¹, 2013). Indian Government has been stepping up measures to provide potable drinking water to its

citizens. In line with this, census 2001 and 2011 data (see Table 1) suggests that people are shifting away from contamination prone open source of water such as well, to safer means such as tap, hand pump, or tube well. This may help in achieving water safety for the larger population. Similarly, data reveals (see Table 2) that 2.6 percent of the rural households travel longer distances to access water, whereas for the rest, the source of water has shifted to their premises (Census, 2011). The 69th round of survey conducted by the National Sample Survey Organisation (NSSO) highlights that, households in rural areas spend 35 minutes compared to 31 minutes spent by urban households in collecting and fetching water (NSSO, 2013:16-17).

Though the household level statistics present a good picture about the availability of drinking water, still there are some limitations. Government determines the coverage from the point of view of physical availability and access to water. The national or state level data may not provide a clear understanding of who is accessing and who is denied access to the drinking water. For instance, in rural areas, physical location of the house, religion, caste, other social and economic differences play a major role in determining access to the source of drinking water (UNICEF, FAO² and SaciWATERS³, 2013). Currently, 30 percent of the rural population lacks access to drinking water. Only seven out of 29 states in India have ensured full water availability in rural areas (Sevea, 2013). According to a report by Ernest and Young (2011), in India, about 89 percent of available water is used for irrigation, 6 percent for industrial consumption, and 5 percent for domestic purposes.

1. UNICEF – The United Nations Children’s Fund

2. FAO – Food and Agriculture Organisation of the United Nations

3. SaciWATERS – The South Asia Consortium for Interdisciplinary Water Resources Studies

According to the report, demand-supply mismatch in water between years 2007 and 2030 will increase from 27 billion liters a day in 2007 to 94 billion liters a day in 2030. This staggering mismatch in demand and supply of water creates opportunities for private players, specifically in case of drinking water.

2. Need for Clean Drinking Water

About 87.7 percent households in rural areas perceive^[1] their drinking water to be of good quality. So the percentage of rural households treating their drinking water is only 32.3 percent, including those perceiving their water to be of good quality. This is due to the difference between the perceived quality and the objective measure of water quality across households and regions (NSSO, 2013:18-19). Further, the percentage of rural households using some method of water purification is only 27.3 percent (see Table 3). Of the 27.3 percent people doing water treatment in rural areas, 15.4 percent strain the water through cloth, which does not purify water except for removing solid suspended particles. About 7.7 percent boil the water, 2.4 percent add bleach / chlorine, 3.3 percent use ceramic/sand or other water filter and only 0.1 percent use electronic water filter to purify water (MoSPI, 2011:139).

Moreover, cleanliness of the surroundings of water source is important to prevent fluoride, arsenic, iron, nitrate, heavy metals, salinity, persistent organic pollutants, and pesticides from polluting water. Religious practices promoting dumping of offerings in water source degrade water quality. Defecation on boundaries of water bodies due to lack of safe latrines results in bacteriological contamination of water, rendering drinking water interventions ineffective. In addition to clean surroundings, hygiene behaviour in ways and means of water collection is important (Khurana and Sen, 2008). Lack of clean water source or hygiene behaviour in collection and storage may lead to communicable diseases such as diarrhoea. Adi Media report (2012) quoting the World Bank estimates, suggests that 80 percent of communicable diseases in India are water related. About 10 million illnesses and 0.7 million deaths in India could be attributed to diarrhoea. Of these deaths, 0.4 million are children aged less than five years, making diarrhoea number one disease causing children's

death (Adi Media, 2012). Sanitation and safe drinking water are interrelated and can save lives of children and reduce the number of days lost due to ill health among adults.

Although it is Government's responsibility to ensure continuous supply of drinking water, limitations in its mechanisms prompt market based solutions. Private companies and non-government organisations (NGO) are coming up with ways and means to provide adequate and safe drinking water. This article looks at challenges faced by companies and NGOs in marketing drinking water to rural households and suggests measures to address the same.

3. Private Sector Efforts in Providing Clean Drinking Water

Companies are moving aggressively to tap the existing need for clean drinking water in rural markets. However, the existing need for drinking water should be converted to demand for ensuring profitability of such ventures. Poor economic conditions of rural households and ingrained belief that, water is ubiquitous (so must be available for free), may constrain the success of drinking water marketing. Majorly, two options are available for drinking water marketing; one, the indirect way of marketing water purifiers and the other, selling safe drinking water in various quantities as per the customer's requirement. However, for both options marketing strategy should focus on acceptability, affordability, availability, and awareness (Sheth and Sisodia, 2012).

3.1 Water Purifiers Market

3.1.1 Product: In India demand for water purifiers has been growing at an average rate of 15.49 percent in last 14 years (see Table 4). Domestic and institutional water purifier segments occupy 70 percent and 30 percent of the market respectively. Geographically, north, west, east, and southern regions in India account for 25 percent, 40 percent, 25 percent and 10 percent market share respectively⁴. Companies are constantly innovating and introducing purifiers to serve the demand for water purification. Ultra violet (UV), reverse osmosis (RO), ultra filter (UF), total dissolved solids (TDS), and silver

⁴ Market forecast of drinks and beverages in India (2010-2020) <http://www.indiastat.com/table/marketforecast/10143/marketforecastofdrinksandbeveragesinindia20102020/10411/10415/data.aspx>, accessed as on June 30, 2014

nano are some of the technologies used in the water purifiers. Table 5 presents details of nine major players in water purifier market. A total of 85 models are available, of which 12 are storage type and 73 are online type water purifiers^[2]. The prices of purifiers available in the market range from INR 999 to INR 54,000. GfK (2014) statistics suggest an increase in demand for both top end and bottom end water purifiers. Lower pricing is the driving force behind the increase in demand for storage type purifiers. Additional benefits over storage type purifiers are leading demand of online purifiers.

3.1.2 Price: Estimates of the Ministry of Statistics and Programme Implementation (MoSPI) suggest that, the average monthly expenditure per person in rural India is INR 763 of which INR 395 (51.77 percent) was spent on food alone (MoSPI, 2011:156). So annually INR 4416 is available with an average rural person (INR 22080 if we consider a family of five) for expenses after spending on food^[3]. Moreover, many rural households do not have access to running water and uninterrupted power supply, making storage type water purifier a suitable choice. Storage type water purifiers are available in the range INR 999 to INR 3800 (see Table 6). Under the aforementioned constraints, low cost product such as Tata Swach, which is priced^[4] at INR 999 seems a suitable option for price sensitive consumers. However, average monthly expenditure figures^[5] given by MoSPI are misleading and estimation of real demand is possible if we have disaggregated data on income or expenditure of various rural consumer segments.

3.1.3 Place: Companies are shifting from direct sales to traditional channels such as distributor and dealer / retailer to meet the demand for water purifiers. Leading manufacturers are also supporting their sales through service outlets (GfK, 2012:36). Lowest priced Tata Swach is sold through network of retailers. Companies such as Hindustan Unilever Limited (HUL) and Eureka Forbes Limited (EFL) collaborated with Spandana and ACCESS, which are microfinance institutions (MFIs) to sell their purifiers (on pilot^[6] basis) to rural and peri-urban consumers. Spandana and ACCESS played the crucial role of consumer education, demand aggregation, extension of credit, and retailing of cartridges. Spandana helped sales of HUL's Pureit in Madhya Pradesh and

Tamil Nadu, whereas Pragathi Seva Samithi a second-tier MFI under umbrella of ACCESS sold EFL's Aquasure in Andhra Pradesh. HUL and EFL subsidised price of purifiers, collected the money in instalments, and provided after sales service to consumers during the pilot sales (Dargan and Elliott, 2012).

3.1.4 Promotion: As on 31st March 2012, out of the estimated 148 million households with television (TV), an estimated 94 million are cable TV subscribers and 46.25 million are direct to home (DTH) subscribers registered with private service providers. In terms of radio listenership for the year 2010-11, Vivid Bharati has 40.7 percent listenership, regional stations and local radio stations had 49 percent listenership, FM rainbow had 37.7 percent listenership and FM gold had 18.9 percent listenership⁵. Considering the scale of viewership and listenership it is possible for a marketer to advertise their purifiers in the suitable media. Most of the advertisements on TV are for online purifiers, HUL's Pureit being an exception. In general advertisements on benefits of water purification are issued in public interest by the Government of India and the state governments.

3.2 Business Model to Market Drinking Water: Sarvajal

Waterhealth, Waterlife, Sarvajal, and Nandi foundation are some of the organisations marketing safe drinking water to rural households in India. Sarvajal's franchise business model established by Piramal foundation, for marketing safe drinking water is discussed in this paper. It is because franchise model helps in rapidly expanding Sarvajal concept of universal access to safe drinking water with investments coming from interested parties. As in franchising, Piramal foundation can control the business to ensure smooth functioning of franchisees. More importantly, the uniqueness of this model lies in staying away from the Government subsidies and managing to keep the water price low (Economist, 2013).

Sarvajal initiative began in 2008 and evolved over six years of existence with 154 franchisees catering to more

5. Percentage of Listenership of Various Channels of All India Radio (AIR) in India (2009-2010 to 2011-2012) <http://www.indiastat.com/table/media/21/airradio19912013/450129/714551/data.aspx>, and Overall Status of Broadcasting and Cable TV Services in India, <http://www.indiastat.com/table/media/21/television/276/767805/data.aspx>, accessed as on June 30, 2014

than one lakh persons in six states of India (Jewell, 2013). Sarvajal establishes cloud-based remote monitoring systems at each franchise with best-in-class reverse osmosis and ultrafiltration units. These units provide real-time intelligence, quality management, and help reduce operational costs. Customized enterprise resource planning (ERP) is provided to franchises for managing its processes. The ERP integrates Soochak (meter), water automated teller machine (ATM), supply chain operations, service and maintenance⁶.

3.2.1 Product: Sarvajal targets villages with more than 1000 households and where water suffers mineral contamination. Ground water is extracted from the bore well owned by the franchisee, purified to 50-150 TDS (a World Health Organisation standard) and sold to customers. Dispensers stop automatically if the water is not of approved quality (Sevea, 2013).

3.2.2 Price: Franchises sell 20 litres of water at six rupees (30 paisa) and if the water is sold through ATM, it would cost 36 paisa per litre. For 20 litres, an optional delivery charge of four rupees for normal water and nine rupees for chilled water is collected. This additional delivery and chilling fee is kept by the franchisee (Sevea, 2013).

3.2.3 Place: Sarvajal model believes in establishing localised processing and distribution of safe water, compared to the centralised distribution of water through pipes, which is costly thus making it infeasible to achieve universal supply of water in rural areas (Sevea, 2013). Customers can come with the containers and pre-paid cards provided by Sarvajal to fill water at their nearest ATMs. One litre, five litre, and 10 litre purchase options are available at each ATM. After inserting the card, required quantity of water can be collected by pressing the respective switch designated for the aforementioned quantities of water. Strategic locations are chosen to place the ATMs so as to provide uninterrupted services to people of all communities (Paliwal, 2013).

3.2.4 Promotion: In the first three months of franchisee establishment in a new village, Sarvajal conducts awareness and advertisement campaigns. The campaign fee is collected from the franchisee. In low performing

villages one day campaigning is taken up mostly through role plays and games for kids. Value proposition of Sarvajal is "Clean water is accessible right in the beneficiaries' village and clean water is vital to health". Free container cleaning services are provided to all customers once in a month. To encourage existing franchisees, Sarvajal offers incentives on volumes sold and rewards on new franchisee referrals. Toll free landline was also established for receiving client feedback (Sevea, 2013).

3.2.5 Investment and Revenue Sharing: A franchisee incurs capital expenditure of about INR 8,40,000 towards setting up the water treatment plant and four solar powered water ATMs, and little more than INR 17,400 for meeting the monthly operational costs⁷. In the first month, 100 percent revenues are kept by franchisee and second month onwards 20 percent of sales revenues are shared with Sarvajal. Further, three paisa per litre is shared from water sales through ATM. The RO units of franchisees operate currently at 40 percent efficiency, but they are trying to improve the capacity utilisation. The franchisees target only 60 percent of the total drinking water market in the concerned village/s and achieve 50 percent penetration. Expected revenues from the business are INR 54,000 per month with 50 to 65 percent profit. Franchisee typically reaches break-even in 20 to 30 months' time (Sevea, 2013).

3.2.6 Services Received by Franchisee: Sarvajal provides technology, training, monitoring, maintenance, and community awareness services to franchisees (Piramal, 2014).

4. Constraints in Marketing Drinking Water

Drinking water being a public good, marketing it for profit, especially in rural areas has some constraints. This section describes constraints faced by organisations involved in marketing purifiers and safe drinking water to rural households.

4.1 Marketing Purifiers

Felt need to purify water, male member's awareness about benefits of water purification, and provision of microfinance from organisations such as Spandana and ACCESS to purchase purifiers led to sales of low-end storage type water purifiers. However, inability of

6. Sarvajal.com, Products, <http://www.sarvajal.com/#products>, accessed as on June 30, 2014

consumers to purchase cartridge for the second time due to financial constraints, lack of after sales service for supporting cartridge replacement, dissonance stemming from purifier's inability to reduce brackishness, inconvenience in refilling the purifier by the household, difficulty in finding a suitable safe place for purifier at home, perception that storage type purifiers are delicate, aspirational need for status overtaking real need to purify water, subsidy in price seen as an opportunity to make money through resale, and younger women with children having no decision making power in purchase are found to be some reasons constraining the purifier sales (Ganesan, 2011; Ganesan and Bastian, 2012).

4.2 Marketing Safe Drinking Water

Though Sarvajal was able to emerge as one of the solutions for universal water accessibility, there are some challenges hindering its scale-up. They are (a) constraints faced by franchisees in obtaining cheaper loans for establishing and expanding the business, (b) regulatory risk as Sarvajal sells loose water through ATMs unlike the regulated bottled water industry, (c) waste water management by franchisees to justify ground water sourcing, (d) people's willingness to pay for water, which is a public good, and (e) opposition from existing businesses selling purified water at higher prices in highly polluted areas e.g. industrialized South Gujarat, may constrain the expansion of Sarvajal's business (Kaul, 2010; Sevea, 2013). To set up another plant, a franchisee needs new property and capital, and the new plant location may or may not fall in the franchisee's range of influence. These issues may confine a franchisee to one location and limit his/her income and growth opportunities. Though on the face, it may appear that the Sarvajal business model helps more people becoming entrepreneurs and earning better income, it also poses challenges to Sarvajal as an organisation. Finding people willing to take up an entrepreneurial venture is the major challenge. Even if Sarvajal finds a new franchisee, he / she may be competing with existing franchisee for same customers unless the markets are clearly demarcated. A significant dilemma faced by the business model is, whether Sarvajal should encourage existing franchisees with entrepreneurial spirit to expand

operations or should it encourage new franchisees to create income generating opportunities.

5. Discussion

It is understood that there are constraints in marketing purifiers as well as marketing safe drinking water to rural households. If we delve deeper, adoption of water purifiers by large number of rural households is influenced by existing beliefs, attitudes and established behavioural patterns. Advertising campaigns both by Government and private companies share important benefits of safe drinking water and hygienic behaviour to adopt while collecting, storing and consuming water. However, it may not be safe to assume that people will change their unhygienic practices after knowing how the diseases spread through unsafe water (Wijk and Murre, 1995). This is because people make sense of new information in light of their own perceptions, meanings, and cultural backgrounds. So informing people about the steps to remain healthy may not solve the problem. People need to get an opportunity to think, discuss and relate the new practice with their life. In absence of which they may not remember the information, let alone apply such information (Rivers and Aggleton, 1993). So to promote adoption of new behaviours, it is necessary for marketers to provide consumers with opportunities of relating the hygiene practices of water collection and storage to their family health.

The case in point is water purifier, which can be categorised as resistant innovation, which have clear competitive advantages over the existing products. However, such products either conflict with the consumer belief structures or require large behavioural changes from existing status quo in which consumer finds satisfaction (Ram and Sheth, 1989). While adopting products of resistant innovation, consumers have to incur psychological and economic switching costs as they have to learn new routines and habits or embrace new traditions and values (Garcia, Bardhi and Friedrich, 2007). In case of water purifiers, consumers must learn new routines and habits i.e. filling purifier regularly, storing it in safe place, and changing its cartridge regularly. In this process, not only the consumers incur psychological switching costs of accepting that the

purifier will help improve overall health of the family, but also economic switching costs of spending money on purchase of purifier and regular replacement of cartridges. It is due to these significant costs consumers may resist adopting water purifiers. Likewise, the newness of the product in consumer's life and consumer inertia to adopt new behaviour may hinder the process of purchase and continuous usage of water purifiers.

Ganesan and Bastian (2012) observed reselling of HUL's Aquasure by rural households, which was sold to them at subsidised prices through Spandana. Further, they also highlighted that lack of distribution and after sales service led to discontinuity even by interested households. These findings suggest that companies need to focus on the acceptability aspects than simply emphasising on affordability as in the case of HUL's Aquasure. Most important is the establishment of local eco-system, where the consumer who is made aware of the benefits of safe drinking water, gets positive reinforcement from regular service extended by well entrenched distribution channels. In absence of such eco-system it is difficult to ensure continuous usage of water purifiers by large number of rural households.

Furthermore, Sarvajal's business model of marketing safe drinking water to rural households seems to address constraints faced by marketers of water purifiers. This is because Sarvajal's service is a receptive innovation from consumer's point of view. Receptive innovation does not require consumers to alter their existing belief structures, attitudes, traditions or entrenched routines significantly (Ram and Sheth, 1989). Because of this, consumers need not move far from their established comfort zones while adopting products categorised under receptive innovation (Garcia, Bardhi and Friedrich, 2007). Rural households are used to collecting water from various sources e.g. wells, bore wells, ponds where purity is not ascertained. Sarvajal's business model simply altered the mode of collection, from freely available water with questionable purity to purchase of purified water. Henceforth, consumers need not move far from their established water collection behaviour, but need to pay for water collected from a Sarvajal franchisee or ATMs. Apart from creating a business opportunity for franchisees, the model addresses the

consumer affordability issue to a large extent by supplying water at lowest price possible and continuously innovating to improve its services. However, Sarvajal needs to address the dichotomies in terms of promoting few entrepreneurs, increasing their sales / profits versus more entrepreneurs earning their living by marketing safe water to rural households.

The belief, attitude, subjective norm, and enabling factors model of Hubley (1993) suggests that individuals adopt a new practice (e.g. using water purifier or purchasing safe drinking water from ATM), when they believe that such practice has net health or other benefits and consider those benefits important. Individuals will then develop positive attitude towards their own behaviour. Whether an individual (rural or urban), subscribes to the idea of water purification or not depends on his or her positive or negative views (i.e. subjective norms) which he or she receives from others in his or her immediate environment i.e. community, hamlet, or village. Enabling factors such as (1) skills required for maintaining the purifier or collecting water at ATM, (2) time needed to adopt the new behaviour, and (3) means available to change the existing entrenched behaviour i.e. availability of affordable purifier with good after sales service or availability of water ATMs will determine adoption and continuation of new practices. Companies have to take steps to ensure that customers are convinced of the health benefits emanating out of drinking safe water and the means of getting that safe water fits their ideas of hygiene and health at large.

5.1 Behaviour Change Programmes in Practice

Lifebuoy and Shell oil are the two examples discussed in this sub-section to highlight the efforts taken by multinational companies (MNCs) in creating awareness and promoting their products. Essentially, these two campaigns aimed at changing the existing behaviour of the population towards a desirable behaviour. Both campaigns are focussed on improving the health of population through change of attitude and behaviour of people. Lifebuoy focussed on inculcating hand washing habits essential to prevent dominant communicable diseases such as diarrhoea and Shell focussed on simple measures to be adopted for reducing the ill effects of indoor air pollution.

5.1.1 Lifebuoy: Lifebuoy's behavioural change programme was one example of efforts taken by Unilever to change the consumer behaviour. The programme had three significant activities (a) hand washing behaviour change programmes, (b) skill development and partnerships, and (c) advocacy. Hand washing behaviour change programme was designed as a four step model with (i) creating awareness as to why the habit is important, (ii) obtaining commitment from people in a public forum through pledge to ensure practice of the new behaviour, (iii) reinforcing the behaviour by ensuring that consumers continue to practice hand washing for 21 to 50 days, and finally (iv) rewarding the consumers through social recognition for sticking to the healthy behaviour. 'Mothers programme' was also organised to drive the commitment to behaviour change by involving doctors, medical staff, mothers and children. Mass media was used to drive home the message about benefits of hand washing. Digital media was also used wherever appropriate to promote the campaign. Visual glow germ demonstration was used to show that soap and water are necessary to wash away invisible germs. This was helpful in communicating the message that 'visibly clean is not necessarily clean from germs' (Unilever, 2012). School children were targeted through 'The School of 5' campaign where children were assisted by five different cartoon characters who each represent and promote a different soap use occasion (Gopal, 2011). The behavioural change programme aims to change behaviour of one billion people around the world. Till now Unilever was able to change the behaviour of 130 million consumers around the globe (Unilever, 2014).

5.1.2 Shell Oil: Shell oil launched a campaign since 2008 against indoor air pollution to promote simple measures of reducing smoke while cooking in the kitchen. The campaign named 'My kitchen, My pride' was launched in the state of Karnataka covering 112 villages with population between 5000 and 20,000. The promotional campaign included wall posters, wall paintings, mobile van campaigns, flipchart stories, interactive games and street plays to increase awareness about indoor air pollution and its harmful effects. Shell foundation also launched sale of improved cooking stoves in partnerships with local NGOs to address the indoor air pollution

(Kashyap, 2012). KhidkiAmmal^[8], an old woman's character was created around which stories were woven to be shared with women and children. Local opinion leaders in the villages were contacted to promote the idea of kitchen with big windows. With the active support from school principal, children were taught the dangers of smoke in the kitchen. Door to door campaigns were also conducted for interacting with women to spread the message of indoor air pollution (Shell Foundation, 2009).

Campaigns of Unilever and Shell have demonstrated that it is possible to change the behaviour of people either by engaging with them directly or through local NGOs. Manufacturers of water purifiers as well as companies selling safe water can adopt some of these promotional elements to engage with their consumers to create the desired behaviour. However, multiplicity of languages with their dialects, variations in penetration of mass media pose challenges for large scale mass communication in rural India. Considering this, companies must design innovative below the line (BTL) promotional campaigns including street plays, puppet shows, demonstrations in local fairs, wall paintings, door-to-door campaigns, etc. to engage and educate the consumers about the processes of protecting the sources of water, handling and storing of water, purification, and hygiene behaviour while drinking water. Involving Government agencies established for the purpose of water hygiene and sanitation may bring synergy into the campaign.

6. Conclusion

It is important for businesses to innovate and produce products or services, which are affordable and help in delivering safe drinking water to people. However, such product or service innovation should be backed by creation of local eco-system which ensures (1) product or service fit with the cultural aspects of concerned consumers, thereby increasing its acceptability, (2) regular supply of spare parts and after sales service i.e. improving its availability, and finally (3) well-crafted awareness campaigns promoting suitable behaviour among consumers, so that they can realise the benefits of safe drinking water.

Notes

1. Perception of households with respect to quality of drinking water is measured by asking respondents if the water was bad in taste, bad in smell, bad in taste and smell, bad due to other reasons or had no defect. The perception in rural areas of only 7 states and 2 union territories is lower than national average (87.7 percent).
2. An online water purifier is attached to a running water pipeline and requires electricity to operate.
3. Total monthly expenditure is INR 763 out of which INR 395 is spent on food alone leaving INR 368 with an individual in a family. So annually, INR 4416 is remaining to be spent on other items of need by the concerned individual.
4. Tata Swach initial price is INR 999 and for every 3000 liters of water processed, cartridge needs to be changed. If we consider minimum 2 liters of water consumption per person in a family of five, then total 3650 liters of water will be consumed by the family in a year. This means at least once a year, the cartridge costing INR 500 needs to be purchased by the household.
5. Data provided by Ministry of Statistics and Programme Implementation only gives highest and lowest expenditure segments of rural population. Only 9.2 percent population live in the highest monthly per capita expenditure class of INR 890 and more. About 3.4 percent lives with monthly per capita expenditure of INR 0 to 235. These figures do not include, expenses incurred on purchasing water or water purifier per se, which is needed for better understanding.
6. Sale of purifiers on pilot basis was carried out between December 2010 and June 2011 in Andhra Pradesh, between February 2010 and September 2010 in Madhya Pradesh and between August 2009 and May 2010 in Tamil Nadu.
7. Operational cost includes electricity, diesel, human resources, tax, loan instalments, and marketing.
8. Khidki means window and amma means mother/aunt. In India in almost all villages there are women who are named after their special traits or appearance. As the name KhidkiAmma suggests, the woman is a gossip monger who peeps in peoples' homes through their windows and spreads village gossip. KhidkiAmma urges people to have bigger windows, i.e. acknowledge and act on indoor air pollution problem in kitchen. As such characters are culturally rooted they help in spreading the message.

Tables

Table 1: Sources of Drinking Water in Rural India (2001-2011)

Source	2001	2011	Change
Tap	24.3	30.8	6.5
Well	22.2	13.3	(8.9)
Hand pump/Tube well	48.9	51.9	3
Others	4.5	4.0	(0.5)

Note: Figures are given in percentages; Figures in brackets indicate reduction in households having access to that source.

Source: Census 2011, Main source of drinking water 2001-2011, http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Drinking_Water.pdf, accessed as on June 20, 2014.

Table 2: Availability of Drinking Water in Rural India (2001-2011)

Distance from source	2001	2011	Change
Within Premises	28.7	35.0	6.3
Near Premises	51.8	42.9	8.9
Away from premises	19.5	22.1	(2.6)

Note: Figures are given in percentages; Figure in brackets indicate worsening situation.

Source: Census 2011, Main source of drinking water 2001-2011, http://www.censusindia.gov.in/2011census/hlo/Data_sheet/India/Drinking_Water.pdf, accessed as on June 20, 2014.

Table 3: Methods of Treatment Used Prior to Drinking Water in Rural Areas

Treatment Used	Percentage
Strain through cloth	15.4
Boil	7.7
Ceramic, sand or other water filter	3.3
Electronic purifier	0.1
Alum	0.9
Add bleach/chlorine	2.4
Allowing water to stand and settle	0.5
Other	0.3
No treatment	72.7

Note : Total percentages may add to more than 100.

Source: National Family Health Survey III: 2005-06 and Selected Socio-Economic Statistics India, 2011, Ministry of Statistics and Programme Implementation, Government of India, pg.139. http://mospi.nic.in/mospi_new/upload/sel_socio_eco_stats_ind_2001_28oct11.pdf, accessed as on June 19, 2014.

Table 4: Demand for Water Purifiers

Year	INR (Billion)	Percentage change	Year	INR (Billion)	Percentage change
2001-02	6.90	—	2008-09	19.12	16.51
2002-03	7.95	15.22	2009-10	22.33	16.79
2003-04	9.14	14.97	2010-11	26.17	17.20
2004-05	10.54	15.32	2011-12	30.75	17.50
2005-06	12.18	15.56	2012-13	34.86	13.37
2006-07	14.12	15.93	2013-14	39.53	13.40
2007-08	16.41	16.22	2014-15	44.82	13.38

Source: Demand for purifiers: Past and future, <http://www.indiastat.com/table/marketforecast/10143/marketforecastofdrinksandbeveragesinindia20102020/10411/10415/data.aspx>, accessed as on June 30, 2014.

Table 5: Major Players in Indian Water Purifier Market

Company	Brands	Technology	Product Design	Price Range (INR)
Eureka Forbes	Aquaguard (13) AquaSure (14)	UV, RO, UF technology	Online and storage filters	1,999-27,999
Hindustan Unilever	Pureit (9)	UV, RO, 4 stage germ kill	Online and storage filters	1,200-16,000
Ion Exchange	Zero B (9)	Ion exchange technology	Online and storage filters	7,490-33,000
Kent Ro Systems	Kent (10)	UV, RO, UF, TDS control	Online filters	14,500-54,000
Whirlpool	Classic (1), Purafresh(2) UTS (1)	RO technology	Online filters	15,500-17,500
Tata	Swach (2)	Silver Nano technology	Storage filters	999-2,050
Luminous	Biocare(1) Envy(2), Touch(2), Magna (1)	UV, RO, UF technology	Online filters	9,990-18,900
Hi-tech	V top, D top, K top etc. (10)	UV, RO	Online filters	7,000-21,000
Nasaka	Essel Nasaka (8)	UV, RO, UF, 6-12 stage filtration	Online and storage filters	2,900-18,900

Note: Figures in brackets indicate number of models available in each brand; UV – Ultra violet, RO – Reverse osmosis, UF – Ultra filter, & TDS – Total dissolved solids.

Source: Compiled from Sulekha.com website, http://homeappliances.sulekha.com/water-purifier/water-purifier_products-models-with-prices, accessed as on July 1, 2014.

Table 6: Water Purifiers with Storage Type Design

S. No	Brands with storage type design	Price (INR)
1	Tata Swach Smart Water Purifier (Silver Nano Technology)	999
2	Intella Water Purifier (4 Stage-Germ Kill)	1200
3	Pureit Classic Water Purifier (4 Stage-Germ Kill)	1550
4	AquaSure Xtra Tuff Water Purifier (Germ Kill)	1999
5	Tata Swach La Vita Water Purifier (Silver Nano Technology)	2050
6	AquaSure Galaxy Water Purifier (Germ Kill)	2199
7	AquaSure Amrit With Kitanu Magnet Water Purifier (Germ Kill)	2499
8	Pureit Classic 23 L Water Purifier (4 Stage- Germ Kill)	2600
9	Essel Nasaka Xtra Pure Water Purifier (6 Stage Filtration)	2900
10	Essel Nasaka Xtra Sure Water Purifier (6 Stage Filtration)	2950
11	Puteit Advanced Water Purifier (4 Stage-Germ Kill)	3100
12	AutoFill Water Purifier (4 Stage- Germ Kill)	3800

Note: Brands of nine companies have been considered.

Source: Compiled from http://homeappliances.sulekha.com/water-purifier/water-purifier_products-models-with-prices, accessed as on July 1, 2014.

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