Water and Sanitation

The Problem

Diarrheal disease caused nearly 1.7 million deaths globally in 2016. Nearly 0.8 million of these deaths occurred in India of which 90% were due to unsafe drinking water, sanitation and hygiene according to estimates by the Global Burden of Disease 2016 (GBD 2016). In Rajasthan over 47 thousand deaths were caused by diarrheal disease and intestinal infections (mainly typhoid and paratyphoid) in 2016, constituting 8.7% of all deaths in the state according to GBD 2016, thus remaining a major cause of concern in relation to drinking water and sanitation.

To address these issues 4 interventions are analyzed for the state of Rajasthan. Benefits and costs are presented as a ratio of annualized benefits and annualized costs (benefit-cost ratios (BCRs) over the expected useful life of each intervention.

Solutions

Interventions	BCR	Benefits (INR crores)	Annualized costs (INR crores)
Improved drinking water supply - urban	5.5	265	48.6
- rural	4.5	2,097.7	464.5
Behavioral change campaign for household point-of-use treatment of drinking water	4.0	1,470.7	363.8
Improved sanitation - urban	4.8	2,651.8	555.2
- rural	6.6	23,960.7	3623.4
Behavioral change campaign for use of existing sanitation facilities	1.9	231.5	125.1

Total costs annualized and total benefits discounted at 5%

The full paper by economist **Bjorn Larsen** is available on www.rajasthanpriorities.com/water-and-sanitation.

Improved Drinking Water Source

The Problem

Over 85% of households in Rajasthan had access to an improved drinking water source in 2015-16, up from 82% in 2005-06 according to the National Family Health Survey (NFHS) IV (IIPS, 2017).

Only 6% of households practiced point-of-use (POU) treatment of their drinking water in 2005-06, mainly by filtering, according to the NFHS III (IIPS, 2008). Moreover, as much as a quarter of the rural population in Rajasthan has more than 30 minutes round-trip to their drinking water source, particularly affecting women and children who often perform the task of fetching drinking water.

The Solution

The most common type of improved drinking water source is piped water to dwelling in urban areas and tube well/borehole/hand pump in rural areas (NSS 71, 2014).

The intervention is Piped water to dwelling for urban households without an improved drinking water source and Tube well/borehole for rural households without an improved drinking water source or that have more than 30 minutes round-trip to their drinking water source.

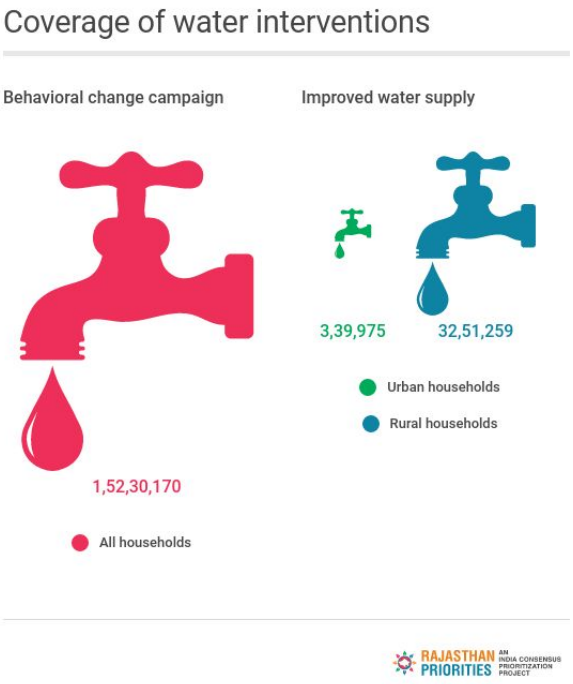
Costs

About 3.6 million households are expected to benefit from this intervention. Annualized cost per household is estimated at Rs. 1,429. Total

annualized cost of Rs. 513.1 crores. (Urban Areas Rs. 48.6 crores per year and Rural areas Rs. 464.5 crores per year).

Benefits

The quantified benefits of the intervention are the value of health improvements and productivity benefits. The largest benefits are avoided mortality and productivity benefits in terms of time savings from water source closer to dwelling. It is estimated that nearly 1,100 deaths and 2.2 million cases of diarrheal illness will be averted per year due to this intervention. Total annual benefits for urban areas are estimated at Rs. 265 crores and Rs. 2,097.72 crores for rural areas.



Household point of use treatment of drinking water

The Problem

Only a little over 6% of households in Rajasthan practiced appropriate methods of point-of-use (POU) treatment of drinking water a decade ago, compared to over 20% nationwide in India according to the NFHS 3 (2005-06). POU treatment by appropriate methods is likely to have increased somewhat, postulated at 10% currently

The Solution

Given that water filter was the most common method in Rajasthan, the intervention assessed is a behavioral change campaign (BCC) that promotes household POU treatment of drinking water with water filter.

Costs

The main household costs of POU treatment of drinking water is the water filter (Rs. 2,000), parts replacement (Rs. 500 per year), and cost of time spent on filtering water (Rs. 440 per year). For scenarios that make 1.5-3.0 million households start POU treatment by filtering of drinking water, the total annualized cost is Rs. 318 crores.

Additionally, mid-intensity BCC program is estimated to cost Rs. 45.7 crores annualized, depending on intensity or level of effort, prompting 1.5-3.0 million households to start POU treatment. Thus, total annualized cost is estimated at Rs. 363 crores.

Benefits

It is estimated that about 1,900-3,900 deaths and 3.9-7.9 million cases of diarrheal illness averted per year due to this intervention. The total value of the health and productivity benefits of the intervention is estimated at Rs. 1470.7 crores per year.

Improved Sanitation

The Problem

About 52% of households in Rajasthan had a sanitary toilet facility in 2015 according to the Swachhta Status Report 2016 (MSPI/GOI, 2017). Moreover, 45% of households had access to an improved non-shared sanitation facility in 2015-16 according to the NFHS IV. Thus about 7% of households shared a sanitation facility with other households in 2015.

The Swachhta Status Report 2016 also reveals that 4.5% of persons with a sanitary toilet facility continued to practice open defecation (OD). Additionally, 48% of households had no sanitation facility and practiced OD in 2015 (MSPI/GOV, 2017).

The government has been/is undertaking a substantial drive for household sanitation and eradication of open defecation (OD) with a subsidy of up to Rs 12,000 to eligible households.

The Solution

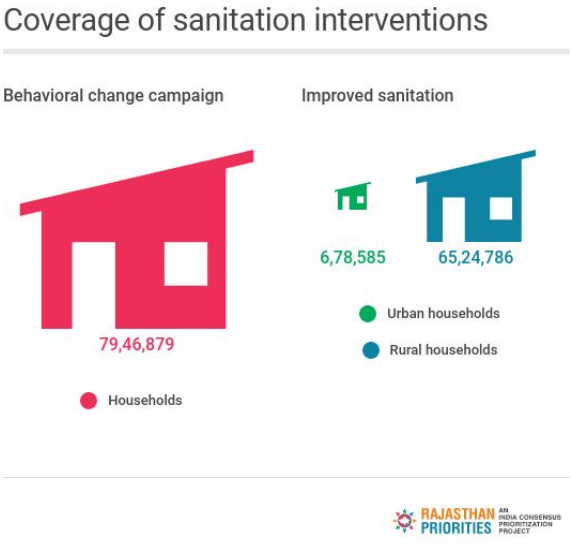
Most households opt for a flush/pour-flush system with a single- or twin-pit. This is intervention assessed. A target of 95% household coverage with improved, non-shared sanitation is applied.

Costs

Annualized average rural and urban cost per household is estimated at roughly Rs. 5,550 – 8,200. Total intervention beneficiaries for this intervention are estimated to be 7.2 million households. Total annualized cost of intervention is estimated at Rs. 555.2 crores for urban areas and Rs. 3,623.4 crores for rural areas. Thus, total annualized cost is estimated at Rs. 4,178.6 crores.

Benefits

The estimated cases of 13,600 deaths and 28 million cases of diarrheal illness averted per year due to this intervention. The total value of the health and productivity benefits of the intervention is estimated at Rs. 2,651.8 crores per year for urban areas and Rs. 23,960.7 crores for rural areas.



Promotion of use of Sanitation Facilities

The Problem

The Swachhta Status Report 2016 found that 4.5% of household members continue to practice OD after construction of sanitation facility.

The Solution

Faced with a situation of OD among households with sanitation facility, the intervention is a behavioral change campaign (BCC) that promotes the consistent use of existing sanitation facilities

Costs

Total annualized mid intensity BCC program promotion cost is estimated at Rs. 39 crores.

The two most important reasons in Rajasthan some household do not use their sanitation facility and continue to practice OD were personal preferences (36%) and lack of cleanliness/insufficient water (17%) NSS 69 (2012). Factoring these two additional costs to the intervention it is estimated that Rs. 86.1 crores would be total annual cost. The total annualized cost (both BCC program and additional cost) of this intervention is Rs. 125.1 crores.

Benefits

It is estimated cases of 41-81 deaths and about 83-167 thousand cases of diarrheal illness averted per year due to this intervention. The total value of the health and productivity benefits of the intervention is estimated at Rs. 231.5 crores.