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India, Water scarcity

India: Water Scarcity, Sanitation, and Implications for Public Health

Water scarcity, the lack of freshwater resources to meet demand, is one of the fastest growing public health concerns today. As a country with one of the world's largest populations, India is a prominent example of how disproportionate allocation of, and dependency on neighboring countries for water exacerbates water scarcity. Water scarcity affects all aspects of public health including physical health, sanitation, and quality of life. There have been initiatives in the past run by independent NGOs, such as The Water Project, that have aimed to solve this issue with volunteers from around the world. However, these are only temporary solutions to a much bigger problem that requires collaborative efforts from the Indian government and population. For a more sustainable and prosperous future, India needs to implement water conservation methods in agriculture as well as invest in infrastructure pertaining to public health initiatives and education.

India is reliant on an agricultural economy, meaning most of the population works in agriculture and most government resources are allocated towards it (World Bank, 2012). A majority of India, approximately 195 mega hectares, is occupied by cultivated land. Forest land occupies another 65 mega hectares (World Bank, 2012). The staple crops of India are wheat, rice, and cotton (World Bank, 2012). The heavy rainfall, which is a product of the tropical climate, contributes to the large agriculture economy (Working Abroad, 2019). Being situated in South Asia, India has a diverse climate and geography. India has a tropical climate and also goes through rainy and dry seasons. Inconsistent precipitation patterns contribute to water scarcity, because if improperly managed it can decrease reliable water availability.

A large population also increases the risk of water scarcity, and with a population of over 1.2 billion people, India is one of the leading countries with this problem. Since the majority of India's water supply is reserved for agricultural use, India looks to neighboring countries for 30% of its water needs (Prabah, 2020). Of the population, 68.84% live in rural areas, whereas the other 31.16% live in urban areas (India Census, 2011). The average size of a rural household is 5.5 people; urban households are similar, with an average of 5.2 people (Haub, 2008). Combined, both rural and urban, 52% of Indians live under the poverty line (Snyder, 2007). Although this is the case, there has been a steady decline in poverty rates in rural areas going from 40% of the population to 30% in the last decade (World Bank, 2012). The average monthly per capita expenditure for a rural family is approximately 695 rupees or 14 USD. The MPCE for an urban household is 1,312 rupees or 27 USD (Haub, 2008). The most common vehicle of transport are motorcycles and mopeds. It is somewhat rare to see a single household with a car (Haub, 2008). In rural areas, 72% of households have mud floors, and in urban areas it is only 18% (Haub, 2008). Although

India is somewhat industrialized, household appliances are mostly found in urban areas; but this differs depending on the appliance/product (Haub, 2008). Most families continue to use wood fires to cook their food (Haub, 2008). The average living conditions of Indian households coupled with an increasing population stresses the need for better allocation of water.

The water scarcity in India is driven by a disproportionate use of available water between agriculture and the general population, and contamination. India is strained by the growing population and urbanization, but the lack of water is affecting public health (Snyder, 2012). India has allocated a majority of its water supply towards its large agricultural economy (World Bank, 2012). While this is pertinent to maintaining the major industry, it has come at the expense of citizens. This issue has different effects on the varying demographics. The scarcity of water contributes to the issues of sanitation and public health because there isn't enough water to provide sewage and plumbing systems. 78% of Indian households do not have toilets and even less have water closets or flush toilets (Haub, 2008). The lack of investment in sewage and sanitation systems has led to public defecation which contaminates groundwater making it unusable. Public defecation can directly affect children through direct contact and contamination of local water sources (Unicef India, 2016). Less than 50% of schools have no appropriate access to clean water sources or to bathrooms (Unicef India, 2016). This is a major problem in contracting all types of water/contact borne illnesses.

A large portion of the population only has access to contaminated drinking water; causing 22% of ailments in India to be traced back to the poor quality and or lack of water (Snyder, 2012). For pregnant women, poor sanitation and contaminated water can also cause neonatal and infant death. The current infant mortality rate is 24 out of 1000 infants born (Sofi, 2020). Without proper sewage and access to bathrooms, disease has a higher probability to spread. Sepsis, a potentially fatal condition brought on by the body’s extreme reaction to infection, can be developed from consuming pathogens in contaminated water (CDC, 2021). This condition is easily spread through hospitals and extremely dangerous to patients, especially pregnant women (Sofi, 2020). Sepsis is responsible for 15% of infants, and 11% of maternal deaths (Sofi, 2020). Disease is not the only contributor to the high infant mortality rate, postnatal care plays an important role. Without access to clean drinking water and sanitation, postnatal recovery leaves many women vulnerable to illness, further endangering themselves and their children. The lack of access to proper bathrooms, and clean water is directly related to the governments disproportionate focus on water usage.

There needs to be conscious effort in reducing the use of water for agriculture in order to allocate a larger portion of the country's available water towards domestic use. By teaching and integrating conservative usage of water to farmers, India can leave room for domestic usage. There are many methods that if implemented would be advantageous to the population and to agriculture. Drip irrigation is one strategy that can deliver water straight to the roots of the plant without leaving any excess. This method is cost effective, easy to set up, and can be made using tubing and ties. A standard drip irrigation system costs 45 USD per hectare or 3,416 rupees per hectare (Smith, 2002). Funding for this intervention can come from the relocation of the money India uses to import water from neighboring countries. Although it still may be a pricey investment, drip irrigation has a high conservation rate. Drip irrigation can be about 90% more effective than sprinkler systems, can save up to 50% more water, and can increase crop yields by 40%

(Smith, 2002). This may be extremely beneficial for the agricultural economy and would allocate more water for the population. Along with drip irrigation, India can take advantage of its tropical climate and utilize water storage during the rainy season combining these two methods.

Investing in public health measures, India can improve the quality of life and health of its citizens. This is a much broader recommendation but it can be rolled out in the span of several years. By partnering with Unicef's program 'WASH' dedicated to improving sanitation for children, India can create a sustainable sanitation infrastructure. Implementing chosen representatives from rural and urban areas, India can survey the nation and get an understanding of the full scope of the issue. This would also allow them to take into account the unique constraints of each area. After compiling a conclusive report, India can hire people in specific areas to oversee the implementation of things such as wells, toilets, sewage systems, and plumbing. This can help India educate their population on public health and build generational knowledge. While this is a great concept, it would be extremely expensive to give every area of India sewage, plumbing, and proper bathrooms. Coupling with Unicef could help a nationwide restructuring but it has a hefty price.

Urbanization, and fast population growth are some of India's greatest obstacles. This along with disproportionate use of available water and lack of investment in public health causes water scarcity and sanitation issues for its citizens. By using methods of agricultural water conservation, investing in public health infrastructure, and implementing education initiatives such as 'WASH', India can keep up with their growing population and improve the health and quality of life for the nation. India can continue to expand its collaboration with global organizations like The Water Project, however ,it is important to acknowledge that outside initiatives can restrict India's autonomy. India can improve these existing relationships by using these outside resources to teach locals about sanitation and rooting its public health initiatives in the local communities. Water scarcity and contamination affects over half of the global population (The Water Project, 2007). Mobilizing one of the biggest populations to achieve one goal can be a powerful example for other countries struggling with the same issue. With the implementation of public health infrastructure and education coupled with water conservation, India has the potential to be a trailblazer in the fight for water and sanitation security.

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