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India, Factor 9: Water & Sanitation

There are four major geographical features of India: the Deccan Plateau in the south, Himalayas in the north, flat plains along the Ganges in the east, and desert in the west. India is the second most populous country in the world with more than a billion people calling the geographically diverse sub-continent home. And just as the land, India's people are culturally diverse, with nearly every state having a language different from the other; as well as religiously diverse. While sustaining a massive and diverse population, India faces a host of struggles in achieving a secure life for its people. With the rate of malnutrition totaling 45%, India has the second highest rate of malnutrition in the world and a population expected to reach 1.69 billion in 2050, India's issues need to be resolved quickly (Goswami, 2013; World Bank, 2013). Yet such tragedy is but a microcosm of India's woes and does not depict a complete backdrop of India's struggle with public health. One of the most basic and vital elements of the human health, water, can be characterized as insecure in India. 89% of Indian water sources in rural areas are unimproved, 25% of Indians must leave home to retrieve water, 67% of which is untreated, and over a quarter billion people defecate publicly further compromising an already corrupt water system. (UNICEF). India's struggle with access to clean water and sanitation underscores many of other sectors complicated problems such as malnutrition, disease, and agriculture.

Most families take part in India's agriculture sector with half of India's workforce being employed through agriculture, two-thirds of which are rural families (CIA, 2016; Rural Poverty). The typical Indian family is a rural family as more than two-thirds live in rural settings (CIA, 2016). Households are typically nuclear families of four or less (Shrinivasan, 2012; Niranjana, S, Nair, S, Roy, T.K., 2005). However, in wealthier families with more land, there is a strong association with families being of the joint type in which patrilineally related generations live together (Niranjana, S, Nair, S, Roy, T.K., 2005). As a patriarchal society, many of the households are headed by middle-aged men (Niranjana, S, Nair, S, Roy, T.K., 2005). Unfortunately, many households are finding life hard following India's farmer suicide epidemic; women are finding themselves thrust into such responsibilities as farm management and marketing that their focus on labor has not prepared them for (Umar, 2015)

Despite consuming well below 2,400 kcal every day, the Indian diet is varied consisting of dried fruits, nuts, milk, and pickled vegetables (Rukimini, 2014; Sarkar) Since Muslim doctrine prohibits pork, similarly as Hindu doctrine restricts beef, respectively, vegetables are the backbone of the Indian diet; lentil and dal are substituted for protein (Sarkar; Saglimbene 2014). Furthermore, chicken and mutton (goat) is a popular alternative to beef and pork. Among coastal states fish is commonplace in the diet of rural families. In the northwestern regions, families often enjoy breads such as roti and naan (Sarkar). Spices are very common among Indian cuisine. Yet, many farming families do not experience complete sustenance because over half are undernourished (UNICEF).

Children in India are also hard hit. Nearly half of children in India under age five are underweight (CIA, 2016). Also, children have the opportunity to receive a meal from schools when they attend. Despite the incentive of meals, most children in rural areas do not attend school regularly. Children often start their education at age six and continue until seventeen, the conclusion of their secondary education; young women often drop out of school early, most likely to work in their family farm (CIA, 2016). Because of the fees for education, families under economic stress will often opt to send sons to school and not their daughters. Young women are also burdened with the cost of sanitary napkins, something women in very

strenuous situations substitute with unsanitary cloth, ash, or even sand for; this lack of access to women hygiene products places a great deal of stress on school aged women and their health (Sinha, 2011).

The public health of rural India is, quite frankly, dismal. The government owns much of the healthcare system in India, the system itself being comprised of primary healthcare centers (PHC), single physician clinic, and community healthcare centers (CHC) (Panagariya, 2008). Most families, however, do not have health insurance, and most funding for health care expenditures are paid for by families, who pay for such costs with loans (Healthcare in India). Government sponsored health insurance is available to nearly 30% of Indians living below poverty lines; however, much of the Indian healthcare system is urban centric (Health Care in India). The vast majority of Indian hospitals are in urban areas (Patil, A. V., Somasundaram, K. V., & Goyal, R. C.). With that said, this means, there are more doctors, hospital beds, and an increased access to healthcare compared to that of rural families (Patil, A. V., Somasundaram, K. V., & Goyal, R. C.). The inequality in health care breeds a sentiment of distrust among rural people towards doctors and healthcare providers. Some rural families even practice undocumented methods of naturopathy, homeopathy, and folk medicine. Many of those working in healthcare lack formal qualifications to maintain the positions they are staffed in (Panagariya, 2008). The issue may stem from the fact that there are .7 doctors for every thousand patients coupled with the issue of only a portion of qualified medical doctors being located in rural areas (CIA, 2016). Such statistics point to a crucial need for more doctors, staffing PHCs with untrained physicians is one of the ways in which the Indian healthcare system attempts to satisfy this need. The solvency issues in health care among rural India allow diseases such as bacterial diarrhea, one of the more common diseases of India, hepatitis A, hepatitis E, along with typhoid fever to dominate the morbidity pattern of public health in India (CIA, 2016). A very popular mode of transportation for such diseases is water. Open defecation in India is a serious problem, but, due to water going untreated diarrhea has become a serious issue in India (UNICEF).

Open defecation near water sources in rural communities allows feces to contaminate crops and creates problems for farms and their crop yields. Crop yields are also harmed by water-logging, which, without proper drainage, causes exponentially higher amounts of salinity levels in soil. Besides causing a great deal of degradation of soil, water tables also suffer because of water saturating practices. Furthermore, such water tables are shrinking as aquifers are being polluted as well as depleted. Farmers count on ground- and rain-water for irrigation, but this has proven to be an unreliable source of irrigation, with India's largest use of water being agricultural, only 37% of farms are properly irrigated (World Bank, 2012). While facing a myriad of challenges, Indian farmers remain unmoved and prove to be a powerhouse, as India is the second largest producer of rice, wheat, cotton, sugarcane, fish, sheep, fruit, vegetables, and tea (World Bank, 2012). Grains such as rice, maize, cotton, and jute are grown during a growing season referred to as Kharif season in which seeds are sown in early summer and harvested in the fall. The Rabi farming season is for wheat, barley, peas, and mustard. The Rabi sowing season starts in early winter and harvest is in early spring. Finally, the Zaid farming season includes crops from both the Kharif and Rabi seasons and utilizes artificial irrigation for cultivation. Indian farms are also major producers of oilseed, jute, potatoes and poultry and also rear cattle such as cows, buffalo, and yaks (CIA, 2016). Small farmers are the real heroes, producing more than 50% of agricultural output while two-thirds of land holdings are smaller than 1 ha (Ayyappan, S. & NASC, D. 2014).

In further analyzing farming practices, several become problematic. First, the practice of farm shifting that very poor farmers practice is an issue. Farm shifting is an agricultural practice in which farmer's clear plots of land using crude slash and burn methods (Mondal). After the clearing is complete and the soil is ready for use, the farmer follows up with exhaustive cultivation that strips soil of its nutrients (Mondal). Once soil is completely or near exhaustion, apparent in the low crop yields, farmers find new plots to

move to an abandon the land (Mondal). This practice is harmful, primitive, and accelerates soil degradation. However, shifting is not completely ignorant of the environment. When farmers shift to another plot of land, land plots will lay fallow allowing the soil to recuperate (Mondal). Shifting is cyclic and involves many plots of land of which a farmer periodically moves between (Mondal). Mismanagement also poses a threat to production. Fertilizer is used inefficiently as rates of efficient use of iron, copper, zinc, and sulfur are all below 15% (Ayyappan, S., & NASC, D. 2014). Problems such as inefficient use of fertilizer are most likely connect to the issue of mechanization. It is not uncommon for farmers to use draft animal power on their farm.

While draft animal power drives many farms, farmers themselves are struggling to maintain their operations and look for non-agriculture work in addition to farming (Shrinivasan, 2014). Economic instability within rural families is the result of poor farming conditions. Land plots in rural communities are small and do not allow enough land necessary to leverage the successful farming operation that so many farmers need (Ayyappan, S. & NASC, D., 2014). Food crops are the predominant crop of choice due to the majority of being subsistence farms. Mass food crop cultivation leaves the large payout of plantation and commercial crops out of the hands of rural families. Farmers are too poor to afford quality inputs for their crops; fertilizer, second to labor, is the biggest cost to rural families (Shrinivasan, 2014).

Poor nutrition is commonplace among rural families. Major issues in the farm diet result in vitamin A and iodine deficiency, anemia, and protein energy malnutrition or PEM (Patil, A. V., Somasundaram, K. V., & Goyal, R. C.). Despite having a varied diet, farm families struggle with chronic hunger. Such hunger is exacerbated by illnesses that farm families experience. Poor rural families do, nevertheless, have access to limited amount of food provide by the government through ration cards.

Infrastructure in rural communities is a very present issue. With only about a third of farms in India being irrigated and farmers counting on rain water and monsoon, shocks such as erratic rain patterns threaten the production and security of farms in India (World Bank, 2012).Public sanitation is another problem in that not every Indian has access to a toilet. Only 30% of rural India has toilets (Hedge, 2012). In communities without toilets, people usually evacuate their bowels near water sources, water sources that are connected to the source of irrigation. This in turn, negatively affect the yield of farms across rural communities. The majority of diseases in the morbidity pattern of India are waterborne – as much as 80% according to a University of Pennsylvania report (Patil, A. V., Somasundaram, K. V., & Goyal, R. C.). Furthermore, whatever farm families manage to obtain is likely to be full of fluorides, nitrates, and toxic metals (Hedge, 2012).

According to recent reports from UNICEF, there are around a quarter of a billion people in India practicing open defecation (UNICEF). Nearly 4,000 villages are now considered open defecation free (ODF) (Express News Service, 2016). This a big jump from last year where about only 400 were considered ODF (Express News Service, 2016). This can be attributed to the work of the Swachh Bharat Grameen mission's programme Swachhata Shilpis (Express News Service). As well as a recent pledge of USD\$1.5 billion to support the programme (World Bank, 2016). This news could not come any sooner as families are having problems with the virtual non-existence of sanitation infrastructure in India. Despite a 2013 ban on the job itself, there are some who, for money, grain, or scraps of food, transport feces (Dhawan, 2016). A Times of India article suggests that there are nearly 2 million people who transport feces, or work as “manual scavengers” most of whom are women (Dhawan, 2016).

With regard to new trends, infrastructure is on the rise as more canals are being built to better support agriculture (Hedge, 2012). However, the issue remains, how does India plan to solve for a growing

population? With the population expected to grow more than 350 million, water and infrastructure stress will greatly increase (Goswami, 2013). Water stress is expected to grow as many farms shift to water intensive cash crops and vegetables, industrialization occurs, and the need for food increases (Hedge, 2012). Yet, this increase in water stress will not only increase the groundwater pumping and the over-exploitation of water, but will also put farms in tough situations in which they lack something that they seriously need. Waterborne diseases will also intensify with population growth.

Improving water and sanitation in rural India could greatly change the agriculture production. Small-farm holders would see an increase in yields, and, thus, have more money available to them to better finance their farm and healthcare. Improving the quality of water would reduce disease owing to the fact that most of the communicable diseases in India are waterborne. With issues in healthcare decreasing, considering the expected increase in population, the Indian government would have more funds to invest in subsidies and infrastructure development. Better infrastructure translates into more profits for farmers getting their products to urban markets, which rarely happens.

“Ways to radically enhance the productivity of irrigation (“more crop per drop”) need to be found. Piped conveyance, better on-farm management of water, use of more efficient delivery mechanisms such as drip irrigation are among the actions that could be taken. The[re] is also a need to manage as opposed to exploit the use of groundwater. ...Incentives to pump less water such as levying electricity.” (World Bank, 2012). The World Bank outlines several realistic solutions to issues with water and sanitation in rural India. Also, projects such as watershed management where communities work alongside NGOs and government agencies to engage in research, manage groundwater, and fund large community projects such as improved rain catchment systems; less than 18% of rainwater is used efficiently (Hedge, 2012). Irrigation management would result in increases in crop yields as well. Infrastructure for irrigation needs expansion to support agriculture as the demand for food multiplies with a growing population. Improving use of rainwater is beneficial to the environment in that it has more rainwater is properly navigated to crops, the water table is raised (Hedge, 2012). The government should also take an active role in developing farm policies that place rural families at the epicenter such as relaxing constraints on marketing, transport, export, and processing (World Bank, 2012). Policies that are rural centric should be developed that are “bottom up” and place more resources in farms. Policies should not be developed as catch all policies and should focus on each type of farm in that farms, source labor differently, have access to mechanized equipment, and market access. Farming schemes that are successful and sustainable, crop rotation that does not involve slash and burn methods for example, should be promoted and shared with other farmers.

Co-operations should also be formed for the benefit of entire communities of farms. NGOs, companies, and farmer associations can help augment the conditions of farming by supporting access to quality inputs, expansive irrigation systems, and modernization of equipment. Such organizations can also support marketing, management, and access to markets. Farms should also shift to commercial agriculture. Diversifying crops allows farms to remain competitive. High value crops can greatly increase the money farms have available to them.

Water.org is a program that provides sanitation and water to several urban and rural communities (Water.org). The organization makes use of members of local communities to operate its microfinance program (Water.org). Water.org has created a sub-program that goes by the moniker WaterCredit (Water.org). WaterCredit provides families with small loans to maintain their households. Small loans to households in India (Water.org). “Locally-based partners are better positioned to understand and navigate

social, political, and economic issues impacting projects ... they are also more informed about local financial resources for cost-sharing in projects” (Water.org). Water.org along with employing locals, educates the communities it operates within on hygiene, health, and project on how to reduce costs for water (Water.org). The organization also offers help to obstacle that the community water committees. The program is operating in eleven states Andhra Pradesh, Karnataka, Madhya Pradesh, Maharsashtra, Rajashthan, Bihar, Chhattisgarh, Orissa, West Bengal, Assam, and Tamil Nadu (Water.org). As well as the union territory Pondicherry (Water.org). This is organization is an excellent candidate for scaling.

In summary, the situation of rural families in India is dire and needs to be addressed urgently. Malnutrition, failing infrastructure, and lack of access to water and sanitation plague rural communities. With the appropriate solutions put and place and proper execute, four of the Millennium Development Goals can be achieved. Augments to water and sanitation in rural communities, in the agriculture sector, to eradicate extreme hunger, which translates to a reduction in child mortality and, thus, children attending school more. Furthermore, improved sanitation means more access to sanitation products for women improves the self-esteem of women.

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