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India, Factor 2: Water Scarcity

Starving India

Death caused by starvation, meager salaries of \$1.50 a day, and 360 million suffering below the poverty line aren't things you'd think about when you hear the term "shining" India. Approximately 35.6 percent of men and 34.2 percent of women in India have a BMI (body mass index) lower than 18.5, which, according to the World Health Organization, means that a large majority of India's population is undernourished. Along with that, India has over 200 million people that are struggling with food insecurity, stated by the International Food Policy Research Institute. Many of these people are living off of meager, government rationed grains, rice, and tea, that they often don't receive (Parulkar). The country is also faced with several agricultural barriers such as unreliable monsoon rains due to changing weather patterns and outdated, no longer practical farming methods. A majority of India's land is ideal for farming, but the methods used are not. By the year 2030, over 1.6 billion people will live in India. The country needs to consider what up to date farming methods and better farming water conservation methods can do for its people. They also need to consider that they are the leading country in food insecurity and their population will only continue to grow (Brown).

An average household in rural India has five to six people. Roughly 60 percent of India's population is categorized as "poor" (Brown). Poverty is the number one reason for food insecurity. The poor in India do not have sufficient land to grow crops or have money to buy food. In rural India, crops are not grown for profit, they are grown for survival. Consuming less than recommended daily calorie intake, which is about 2,400 calories per person, many people in rural India are susceptible to calorie deprivation. Food is not the only concern in India. As many as 148 million people who live in rural India struggle to obtain clean drinking water. This can often lead to disease, even death (Ali). Grains, rice, beans, and tea are the most commonly consumed foods in rural India. These food are consumed because they are commonly grown in the villages in India, and they are the cheapest foods available. The people of rural India often go an entire day without eating anything. In fact, 37 percent of poor households in Udaipur, a major Indian city, that they've gone entire days without eating a single meal. In addition, 45 percent of adults and 12 percent of the children in Udaipur reported that they've had to reduce their meal size (Hurford).

In the destitute-stricken areas of India education is highly valued due to the fact that a large majority of the people that are exposed to such poverty-stricken areas want to create a better future for both themselves and their families. This want for a more preferable way of living makes for rigorous and competitive courses. Unfortunately, many of these dreams are crushed by the status of public education in India. Predominantly, most of the schools are government-funded and require that children from age 6 to 14 attend. Finances received from the government are insufficient and create undesirable learning conditions such as poor and unmaintained facilities, too little staff, and not enough schools. In 2009 the Right to Education Act went into effect making compulsory education free. Despite this Act, hardly any improvements have been made and the process for improved education is painstakingly slow ("The School...").

According to a World Health Organization report, India ranks 112th out of 120 countries in healthcare. Annually, India only spends 4.2 percent of its national GDP (Gross Domestic Product) towards healthcare services and equipment; the United States spends 18 percent of their GDP on healthcare. Only 30 percent of that 4.2 percent will actually be spent on healthcare. The rural population, which makes up 70 percent of India's total population, has extremely limited access or no access whatsoever to hospitals and clinics (Jayaraman). In addition, according to the World Health Organization, there are only about 6 doctors per 10,000 Indians (Parulkar). This can be looked at in comparison to the more urban areas of India that have plenty of hospitals and clinics, as well as modern technology and medicines. One of the biggest, if not the biggest barrier for Indians trying to receive proper healthcare includes the limited access to health insurance. Roughly 5 percent of all Indians are covered by health insurance, concluded by the World Bank and National Commission's report on Microeconomics. This often makes proper healthcare only affordable for middle and upper classes. HIV, malaria, tuberculosis, and diarrhea are prevalent and growing concerns in India that fuel the need for improved healthcare. Proper sanitation is another key factor that attributes to the disease-stricken people in India (Jayaraman).

Roughly three-quarters of India's rural population depends on the money earned from rural farmers. India is the leading producer in milk, pulses, and spices. It is the second largest producer of rice, wheat, sugarcane, fruit, farmed fish, sheep and goat meat, vegetables, tea, and cotton. The country is also home to the world's largest herd of cattle ("India..."). The average plot for a rural Indian farmer in 1970 was about 2.3 hectares, or 5.7 acres. However, today in India the average plot size for rural farmers has decreased to under 1.2 hectares, or about 2.9 acres ("In a Time..."). About 70 percent of India's total population (about 770 million people) is made up of people living in rural areas, as stated before. Of this 70 percent, 60 percent make their living and feed their families through farming themselves. A great deal of these farmers rely on rice grown in the wetlands of India. The rice farmers depend on the annual monsoon rains, so if the rains don't come, many farmers face devastation (Champ). Unlike here in the United States, India lacks both crop insurance and proper irrigation. The types of tools used by rural farmers in India are primitive and made locally. Lacking the money needed to buy modern farm equipment, Indians often turn to local tool makers for cheaper, outdated options. These tools are often made of wood, rock, bamboo, bones, scrap metal, or any other materials that can be found locally. Tools made by local artisans account for 80 percent of the total tools used by rural farmers in India (Karthikeyan).

It is clear that the methods used by farmers in rural India are old, outdated, and rely primarily on manpower. This prevents many farmers from moving forward and increasing the size of their operation. People simply don't have the money to purchase modern farm equipment such as proper irrigation, tractors, fertilizers, and pesticides. The agriculture industry is susceptible to droughts, flood, temperature fluctuation, and many other natural inhibitors. Only two fifths of India's total farmland has available irrigation. Lately, India's annual monsoon rains haven't been as reliable as they had in the years past, which affects the incomes of rural farmers. The income of the people living in rural India is small. Sometimes the provider of the household will only bring home a meager salary of \$1.50 a day (100 rupees). One hassle farmers face when bringing their produce to market includes the unfairly low prices they receive for the crops that they have labored so long and hard in the fields to obtain. In 2015, farmers were getting around two or three rupees (5 cents) for a kilo of potatoes (around two and a half pounds),

which was a fourth less than in the year 2014. A ruling made by Mr. Modi (an Indian government official) has also recently hurt the incomes of rural farmers. He reduced the minimum support-price for main foods consumed by poor Indians (“In a Time...”).

Nutrition is a huge concern in India. In fact, there are more malnourished children in India than there are in Africa. About four out of ten malnourished children worldwide are from India. Along with that, a Nation Family Health survey found that 46 percent (about 3 million) Indian children were underweight, and 79 percent have anemia. Overall, 21 percent of Indians are not getting proper nourishment. It is recommended that rural farmers get about 2,200 calories a day, which is more than in urban India because rural farmers have laborious tasks. However, this recommendation is scarcely met, the average intake being less than 1,900. Some of the poorest people in India consume even less than 1,500 calories. Protein consumption has also dropped in recent years by 14 grams. According to the UN’s Food and Agricultural Organization, the worldwide average daily intake of protein is 77 grams. The average intake in rural India is less than 50 grams. There are many factors and reasons why rural households don’t receive the right amount of calories and nutrition. One of the main reasons is corruption. According to the UN’s Standing Committee on Nutrition, less than 40 percent of the food intended for the poor never reaches them. Families also lack some essential nutrients provided by fruits and vegetables because they only get 1.8 percent of their energy from these foods (Srivastava).

Sustainable crop production is one of the main things that keeps rural Indians going. Many families depend on crops they raise in their backyards or plots. Without agriculture in rural India, many families would be even hungrier than they are now. But the farming practices are outdated. Improving the condition for India’s rural farmers could mean food security and healthy living for millions of people. With a gap growing between the supply and demand for water, the Indian government needs to take quite a few things into consideration when addressing sustainable agriculture in India. India needs to find innovative ways to deal with climate volatility. Many farmers rely on yearly monsoon rains, with hopes that it will later bring a plentiful harvest. Temperatures have been unusually high during India in the summers and it has been devastating for farmers. Since two-thirds of India’s total workforce accounts for farmers, the answer could be proper irrigation. Irrigation is scarce in India (60 percent of crops are rainfed), but with recent climate patterns it may be essential for the survival of agriculture in India. A report made by the World Bank concludes that it is possible that India will see 2 degrees Celsius change by the year 2040, which would decrease India’s crop production by as much as 12.3 percent (Fitzmaurice).

In order to create food security in India, it is vital that the national government, communities, and individuals work together. Already, there are a few programs that have made a “demonstrative impact” on India. The National Agro Foundation (NAF) is an initiative that is trying to make food security a reality. NAF is currently set up in about 250 villages throughout India, and has helped over 30,000 families. This may seem like a lot, but there are over 680,000 villages in rural India. Focusing primarily on rural farmers, women, and destitute communities, NAF instructs farmers on how to use more modern technology, practice proper waste management, and it also has programs that teach people how to read and write. The influence NAF has had on rural farmers in India has resulted in many improvements such as: increasing agricultural productivity by teaching farmers how to preserve resources, increasing the amount of land under cultivation in the villages that are being helped, and NAF has also taught several

villages how to use advanced technology. They've also set up a Research and Development Center, located in Chennai, where farmers can bring their soils to be tested. Organizations such as NAF are being privately funded. With the upscaling of projects like this and with government help organizations such as these can create a future for India that ensures food security for millions. With active participation from poor communities, experts and volunteers can work together to educate farmers on how to make their operations more successful. The help provided from NAF, or organizations like NAF, can also address other issues such as healthcare, unsanitary conditions, and problems with infrastructure, creating widespread food security (Govindarajan).

By the year 2030, it is expected that India will lose as much as 3.2 billion dollars due to the effects of water scarcity in India. Water scarcity can be directly related to food insecurity because it impacts the yield of crops, and can decrease the production of rice and wheat. The agriculture industry is in competition for water with industries, residents, and commercial businesses. The population in India is also exponentially growing so this poses another issue when it comes to water scarcity. A higher population creates a higher demand for water and a higher demand for food. The unreliable monsoon rains have created especially hot, dry summers, which have been devastating to farmers crops. With harsher summers, India's crops have been more vulnerable and the crops yields lower. Climate volatility has made the demand for irrigation and better water infrastructure evident. Nationally, the demand for water in India has increased by 0.4 percent. But, demands for water in the Brahmaputra, Brahmani, and Godavari Rivers have gone up significantly. In the Brahmaputra River, the water demand has gone up by 4 billion cubic meters, it has gone up by 6.4 cubic meters in the Brahmani River, and 9 billion cubic meters in the Godavari River. Water scarcity in India can negatively affect the prices of the crops grown there (Kumar). Since irrigation can be costly and consume large quantities of groundwater, and because groundwater levels are depleting due to overuse, it's important that India turns to more environmentally friendly alternatives to supply their crops with a sufficient amount of water. Having proper water storage and usage is vital because it fuels food production and economic growth. There are several simple, cheap ways the rural Indian farmer can help conserve water on their own farms. To reduce the impact that the harsh summers India has been having, rural farmers should grow cover crops, planting trees, and intercropping (growing two crops in the same field, at the same time). Irrigation can often waste up to 60 percent of the water used, so India needs to focus on water conservation (Campbell).

India needs a timely and cost-effective solution for its water problem. A large number of strategies have been implemented, but none have made a very large, desirable impact. There isn't just one big solution to India's problem with water scarcity. With combining different practices, however, farmers could reduce or possibly eliminate the problem. Cover crops are largely used to increase the fertility of soil, but it can be used for water conservation as well, by preventing runoff. Planting trees on the edges of fields, such as the drumstick tree, will help prevent excess water from irrigation from draining into nearby rivers, streams, or lakes. The trees will soak up the unused water and prevent it from being wasted, or possibly polluted. Many of the local above-ground sources of water are polluted in India, and trees would be a good barrier between the water sources and the fields (Campbell). Intercropping is probably one of the most effective ways for farmers to conserve water, and it's been proven to work in India. For example, Shri Davinder Singh (an Indian farmer), has successfully grown cabbage and onions side by side. This requires no extra land than it would require if just cabbage was grown, and there was no yield loss whatsoever (Punjab). This way, crops are easier to manage and they require less weeding, as well as less

chemicals for weed management. This works for both annual and perennial crops (Campbell). Micro-irrigation is another method that would tend to India's prevailing need for water preservation. Compared to flood irrigation, micro-irrigation saves energy, reduces weed problems, and cuts the cost of irrigation. Currently, only .5 percent of crops in Maharashtra, a state in the western region of India, are under drip irrigation. Micro-irrigation supplies water directly to the root of the plant, which is about 90 percent more efficient than using flood irrigation, depending on the crop. Approximately 80 percent of the crops grown in India can be grown under micro-irrigation. Micro-irrigation can also be used in various types of landscapes such as hilly lands, barren lands, and lands with shallow soil (Narayanamoorthy). This would be primarily useful for those Indians living close to a river. India has a large amount of rivers (the main ones being Indus, Godavari, Tapi, Sabarmati, Mahi, Narmada, Brahmani, Krishna, Pennar, and Cauvery) so they would be a practical source for irrigation. Even though the water demand has risen for some of these rivers, the use of micro-irrigation would minimize the usage of the water from the rivers, while also providing an alternative to traditional irrigation systems that consume more water (Info). The last method for conserving water, harvesting rainwater, can be used for plant, animal, and human use. Harvesting rainwater is fairly simple and can be used large scale or small. Rainwater is easy to collect, requiring no effort. It can even be collected as the rain is running off the roof of a farmer's house, stored, and then used later on.

With the implementation of water conservation practices and more efficient irrigation, India could increase the efficiency of the land. Many of the farmers in rural India are uneducated and may be unaware of these methods, or other methods that could improve their small-scale operations. With the help of organizations like NAF, and possibly some government-funded programs, India's rural farmers can become aware of these methods. So far, these organizations have made a large impact on a few select villages in India. Instead of building permanent centers, like NAF currently is, they can create movable centers so they can move from village to village. This would enable the programs to help out a village in India, and then they could move to the next village. For the most part, Indian farmers get their information by word of mouth. Many people in rural India have no access to computers, phones, and information isn't spread as widely as it is in the United States. The government also plays a vital role in the fight against hunger in India. Currently there isn't widely available crop insurance in India. This means if a farmer's crops were to be destroyed somehow, the farmer would most likely not be able to feed his family or provide certain necessities, such as a roof over their heads. India's government could help struggling Indian farmers by providing them with crop insurance for little or no cost. The upscaling and mobilization of these organizations would provide Indian farmers access to the information they need, which would improve yields and fight against the drought. Indian agriculture is vital because it provides rural families across the country with food to eat, and is often the only food they eat. Food security in India could become a reality to many families, it just takes the cooperation between the individual, the community, and the Indian government.

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