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China, Factor 9: Water & Sanitation

### **China: Water & Sanitation effects on Food Security**

China is one of the oldest civilizations known to man. Ancient China began with the Xia dynasty which lasted from (2070 - 1600 BCE) and it ended with the Qing dynasty, which lasted from (1644 - 1912). Modern China is now known as the People's Republic of China (Timeline of Chinese History and Dynasties, n.d.).

China is the world's fourth largest country after Russia, Canada, and the US. The Capital of China is Beijing. Beijing has an eight-hour time difference from Washington, DC. "Since the late 1970s, China has moved from a closed, centrally planned system to a more market-oriented one that plays a major global role. In 2010, China became the world's largest exporter" (The World Factbook, 2016). In 2015 China had the largest economy in the world, surpassing the US for the first time in history. The Chinese government is facing numerous economic challenges including corruption and other economic crimes, and reducing its high domestic savings rate (The World Factbook, 2016).

China is a nation with an ever-growing population. According to (The World Factbook, 2016) China's population size was 1,367,485,388 as of July 2015. The vast majority of China's rivers and lakes are highly polluted. According to the United Nations, though China is home to 21% of the world's population, it contains only 7% of the world's fresh water supplies. The majority of China's rural residents obtain their water from rain, rivers, streams, lakes, ponds, and shallow wells. As a result, intestinal and endemic diseases are rampant in many poor villages. Increasing the amount of clean water Chinese residents are able to obtain will help cut back on these diseases and illnesses (The World Factbook, 2016).

A typical subsistence farmstead consists of a man and woman and two children, though some families may have as many as twelve children (Riesselman, 2009). Ever since the late 1970's, China implemented an act called "One-Child policy". This policy was designed to control the population size in China. In 2013, China released a policy allowing couples to have a maximum of two children. The average household contains 2.97 individuals (Family size china, n.d.).

The Chinese believe in a yin and yang diet, something to help balance their lives. Rice is China's staple food and the word for rice is "fan" which also means "meal" (Food in China, n.d.). Rice can be eaten with any meal and it is eaten several times a day. Traditional foods the Chinese eat are scallions, bean sprouts, cabbage, and ginger root. The Chinese generally do not eat a lot of meat but pork and chicken are the most commonly eaten meats (Food in China, n.d.).

Rural education in China is poor and the amount of rural school dropouts is even worse. The percentage of elementary schools in Sichuan's Butuo Country dropped from 30% to 10% in less than ten years (Fang, n.d.). Due to the migration of people from rural areas to urban areas the education system in rural areas have suffered. The Chinese Society of Education, said the number of dropouts was around 620,000 in China, with a 4.58% rate in 2000; but in 2011, the number went up to 883,000, totaling at 8.89% (Fang,

n.d.). As a result, the teaching qualities in these schools are very poor, some students can barely write their own name after studying for years (Fang, n.d.).

More than eighty percent of China's 700 million rural residents have no health insurance. This has been the case for the past thirty years, since the collapse of the once-successful Rural Cooperative Medical System after the economic reforms of the early 1980s (Liu, n.d.). "Around 70 percent of the population in China that live in rural areas are primarily engaged in agriculture. For families in rural areas, their local government is often underfunded, medical clinics are few and far between, and the level of care is lacking" (5 causes of poverty in China, n.d.). Families that live in city areas are more likely to have healthcare than families that live in rural areas.

The livestock raised in rural China are horses, cattle, buffaloes, mules, donkeys, camels and yaks which all play an important role. The two most common livestock animals used in China today are cattle and horses. Crops grown in China are rice, corn, sweet potatoes, wheat, sugarcane, potatoes, barley, buckwheat, millet, oats, rye, sorghum, triticale, rapeseed, soybeans, sugar beets, cabbages, tomatoes, cucumbers, dry onions, watermelons, cantaloupes, apples, citrus fruits, bananas, mangoes, and tobacco leaves. On average, a rural farm owns a plot of land measuring 1.2 acres but can be as small as an eighth of an acre (Hays, 2013). Most crops are raised with pesticides, chemical fertilizers, and sewage sludge (Hays, 2013). The autumn harvest is a three-day festival when farmers collect crops and enjoy as a community what has been produced.

China faces several barriers when it comes to improving agricultural productivity. First, agriculture production in China is utilizing all current arable land. Ground water depletion in northern China is a major concern (Hays, 2013). Big portions of China's surface water are too polluted for crop irrigation. Innovations such as use of genetically modified organisms (GMO) crops are not allowed except for cotton. Agricultural life is difficult because taxes and fees are higher than the earnings. A typical farmer earns 5,000 yuan a year from selling crops and pigs. However, taxes and fees eat up about 4,000 yuan and children school fees eat up about another 2,000 yuan (Hays, 2013). This causes many farmers to go into debt. Due to lack of money in rural areas, farmers tend to eat only what they grow. This affects their overall nutrition because they aren't able to purchase a variety of foods that would increase the nutritional value through variations in vitamins and minerals needed for a healthy diet.

The effect on water and sanitation on the typical family in China is devastating. Nearly three-quarters of China's population-947 million people (including about 120 million in towns)-lives in rural areas (Rural Water Supply And Sanitation , n.d.). As mentioned earlier, most rural residents receive their water from rain, rivers, streams, lakes, ponds, and shallow wells. Rural residents often rely on unhygienic open pit latrines for sanitation. Thus, leading to intestinal and endemic diseases that become rampant in many poor villages (Rural Water Supply And Sanitation , n.d.). The Chinese government high priority is to have access to safe and conveniently located water and sanitary latrines in rural areas.

Over the years, China has worked to improve environmental protection laws regarding water. In June of 2008, China established a law to help with prevention and control of water pollution. "The new Law features many changes addressing issues such as including water environmental quality into the performance evaluation of the local governments; implementing severe legal punishment for un-approved water pollution discharges; and the enforcement of mass loading control for major water pollutants. The most significant modification relates to the section on legal liability/penalty, which has been updated to include much more detailed penalty rules and harsher punishment" (China's History of Environmental

Protection , 2010). It still remains to be seen if people will embrace new water standards. However, reducing water pollution will drastically help with improving drinking water quality for all people of China.

In 2012, Chinese government established national standards on drinking water quality. 106 indicators included in the standards will be monitored in urban water-supply systems nationwide (Drinking water and sanitation, n.d.). From the sanitation report of 2012 by WHO and UNICEF, the amount of piped water in China is 71%, and 69% of China's population now has access to improved sanitation facilities. Thus, helping China maintain and improve the amount of illness from water pollution. Though problems still exist, in both China's urban and rural areas water is frequently affected by chemical and household pollution, water-borne disease and water-contaminated accidents (Drinking water and sanitation, n.d.). Given the infancy stage of the new standards, it's too early to determine if the standards are sufficient or if they will need additional improvements.

Mu Xuequan argues that China's water and sanitation is improving. Nearly 95 percent of the Chinese population has access to improved drinking water sources, and 87 percent in China had improved sanitation facilities (Xuequan, n.d.). "For its part, 40 percent of the total, 1.4 billion people in the 2015 population estimate of China, gained access to the use of improved water facilities since 1990, the report said, while 37 percent gained access during the same period to the use of improved sanitation facilities" (Xuequan, n.d.). China's improvement for water and sanitation will help their country in the long run by reducing illnesses for both rural and city residents.

Continuing to improve water and sanitation would benefit China in many ways. China would see health, social, and economical benefits by improving water and sanitations. Water-borne and water-washed diseases cause infectious diarrhea. Improving the water supply and sanitation would help prevent unnecessary illnesses and deaths from occurring. Cutting down on the number of illnesses would then cut down on the amount of money spent to treat the illnesses. Money spent looking for doctors, medical facilities, medication, and missing work would also greatly decrease. Socially, healthier people lead to happier people. Healthier people also lead to a stronger workforce. Improving water and sewer would mean great things for children who are affected the most by water-borne diseases. Clean water and improved sanitation would automatically lead to higher school attendance that would lead to more opportunities for younger people. Those born into poverty would have a better chance of improving their future. In 2004, the World Health Organization estimated that for every \$1 spent to improve water and sanitation in the world, an economic benefit of \$3 to \$34 should be expected in return, depending on the region (Cost and Benefits of water and Sanitation Improvements at the global level, n.d.).

There are many factors affecting water and sanitation in China. Some of these factors are climate change, pollution, and population growth. Climate change effects China's water security, water supply and farming irrigation says Chen Lei (Minister of water resources). "China is vulnerable to the impacts of uncontrollable climate change as its water infrastructure is weak or unprepared for such changes," (Climate change threatens our water, 2011). China experiences water shortages of 40 billion cubic meters a year, with only two-thirds of cities facing increasing scarcity of water, said Chen. The population growth in China also affects water and sanitation. With China's ever growing population of 1.3 billion people, finding clean and renewable water can be a challenge. This is mostly due to the pollution filled in China's rivers, lakes, streams, and all other waterways. According to one report, "up to 40 percent of China's rivers were seriously polluted" and "20 percent were so polluted their water quality was rated too toxic even to come into contact with (Economy, 2013)."

Educating citizens on the importance of water conservation and the environmental impacts on polluting the waterways is important. Also, improving the water and sewage infrastructure inside the country for both rural and urban citizens. UNICEF is a nonprofit organization that sponsors a program called Community Approach to Total Sanitation, which is the global best practice for educating rural residents about basic sanitation. Basic sanitation is necessary for children's health, safety and development. Without access to sanitation facilities, including clean water and toilets, and without hygiene practices like hand washing with soap, children may get sick. Lack of sanitation may even impact their development potential (Unicef sanitation and hygiene, n.d.).

UNICEF also pilots a program called Water Safety Plan, which assists water treatment plants to analyze risks of contamination, and to develop plans for managing the risks and preventing pollutants from reaching end users (Unicef sanitation and hygiene, n.d.). This program has helped ensure access to clean water for all children. China's government may want to duplicate this program in an effort to reach more people. The more water treatment plants that can prevent pollutants from reaching end users, the healthier the population will be. In turn, China will save money on health costs related to water-borne diseases.

China's various communities along with the government will play a major role in improving water treatment and sanitation, which will help, improve health and food security. Using more piped water and sanitation is critical. Citizens that have water piped into their homes are recognizing the importance of clean water. Many are purchasing water treatment systems for their homes. There are two types of water treatment systems for homes. First, there is the point-of-use (POU) system. This system filters water as it comes through a sink in the kitchen or bathroom. Secondly, there is the point-of-entry (POE) system that is connected outside the home and filters all the water entering the home. Home treatment systems are important because many of China's water treatment plants are in need of upgrades. According to China's Ministry of Housing Urban-Rural Development, 2000 out of their 4000 water treatment plants were due to be upgraded between 2011 and 2015 (Water in China, n.d.). The good news is that China plans to build another 2358 treatment plants to meet the demands of the country. In order to accomplish that task, China is developing policies to allow foreign companies to invest in their water and sewer infrastructure (Water in China, n.d.). China may also want to supplement some of the cost related to POU and POE systems for those who live in homes.

The average family in China has the opportunity to improve water conservation as well as protect waterways. They first need to teach children the importance of keeping waterways clean and not wasting water. Communities need to actively participate in programs geared toward personal hygiene to avoid diseases and cut down on water pollution. Families need to make sure that they also don't use waterways for dumping waste. This includes bodily waste as well as waste from cleaning products used to clean clothes. Local farmers need to ensure they follow strict guidelines when using fertilizers on crops. Chemical runoff from fertilizers into waterways is a major source of pollution. Implementing basic environmentally friendly practices will go a long way in improving China's water and sewer system.

China along with every country should immediately fund an environmental science curriculum aimed at children entering school for the first time. The curriculum would teach environmental principles to improve health and wellness at a young age. The curriculum would focus on such as: water conservation, preventing pollution, recycling and sustainable agriculture practices. These classes would remain a part of the children's curriculum from elementary school through high school. Adults will be educated as well with the focus to educate children in an effort to develop environmental champions. Harnessing the energy and creativity of young people should be considered a national priority for every government. Nonprofits could help implement the program but funding should start at the federal government level.

In conclusion, although China seems to be moving in the right direction with improving their water and sewer systems, there is still a lot of work to be done. China has the largest population of any country on earth and it is continuing to grow. This means water and sewer infrastructure within the country will need to continue to grow and be upgraded. Clean water and proper sanitation affects China's citizens in many positive ways.

The growing migration of China's population from rural areas to more urban areas continues to put a strain on China's utilities infrastructure. In the past, China's rural areas were affected the most with diseases from contaminated water. This is still the case today but without proper sanitation, growing urban areas can easily be susceptible to disease. Educating citizens and investing in water and sewer infrastructure is crucial for the future of the country.

Clean water plays a huge role in agriculture as well. In April 2013, "The Chinese government recently passed a new regulation on water management, updating its system of use permits and stipulating charges for water consumption in agriculture. According to officials in the State Council (China's parliament), the move is expected to enforce water-saving measures in irrigation and motivate farmers to economize on water use" (China Issues New Regulation on Water Management, Sets Fees for Usage, n.d.). If China doesn't consistently enforce policies to keep its waterways clean, then the water used to grow crops will continue to adversely affect food grown. Many studies show that fertilizers are polluting a large portion of China's waterways. If farmers aren't held accountable for improper use of fertilizers or improper runoff of livestock waste, the environmental impact will continue to be catastrophic. Educating all of China's citizens on the environmental impact of water pollution and proper sanitation is crucial not only for them but for the world as a whole. Given China's population size, it is imperative that China plays a major role as a world leader in environmental change.

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