

Food Security in China: Challenges, Policies, and Projections

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This paper seeks to determine how China's recent trend towards increasing food imports threatens its security. By understanding the current challenges China faces and analyzing research on the ways China may need to adapt to these challenges, a better assessment on the effectiveness of policies put forth by the government to address food security concerns is made possible. To do so, this paper analyzes recent literature and studies regarding climate change and food production in China while also looking at current Chinese policies in this field. This analysis determines that China is unlikely to be food insecure in the coming decades, having ample productive and import capacity to meet the rising and changing demands of its citizens.

Introduction

Food Security was first defined at the World Food Summit in 1996 as “a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preference for an active and healthy life.”¹

Since then, this definition has gone through many changes and added quantifiers to better understand when food security becomes insecurity. The United Nations Food and Agriculture Organization (FAO) believes that the main quantifiers for food security are food availability, food access, utilization, and stability for all people.² In order to feed a world of 9 billion people, as projected by 2050, the global food production capacity may need to increase by up to 70% to maintain global food security.³ The world is facing many modern food challenges, growing populations, ecological desertion, and a changing climate—of which China is not exempt.

Traditionally, China has prided itself on being self-sufficient in terms of food production. Between the 1960s and 1990s, China’s level of self-sufficiency never remained much lower than 99%. In 1996, the government released a white paper pledging to maintain the nation’s food self-sufficiency at 95% and above⁴, to which they have been mostly successful in the years since, with this dipping to 94.5% self-sufficient as of 2015. However, it has been a concern that as the population continues to increase, and climate change, along with ecological degradation, continues to limit the production capacity of Chinese agriculture, China has had to look internationally for food sources. As such, Chinese food imports have grown from \$14 billion in 2003 to nearly \$107 billion in 2017.⁵

This paper will seek to determine how China’s recent trend towards increasing food imports threatens its security. It will contribute a better assessment on the effectiveness of Chinese government policies to address food security concerns by incorporating the current challenges China faces and analyzing research on the ways China may need to adapt to these challenges. This assessment will be formed by following the two divergent schools of thought regarding China’s food security. On one level, scholars believe that food security is the ability for everyone to have adequate access to quality and nutritional calories, while others within this field view food security as maintaining China’s level of food production self-sufficiency. Both will be analyzed in this paper as they represent the overall food situation for China to feed its people, as well as the balance of power China holds in the international arena for its own national security around the world.

Current Problems That Impact Food Security

China's rising population

As of 2018, China was home to nearly 1.38 billion people. While there is much debate surrounding when a population peak may occur, conservative estimates project that by 2030 the population will peak at about 1.45 billion people.⁶ Other estimates expect the population to decrease to 1.3 billion by the year 2050.⁷ China's decade-long one-child policy ended in 2015 when fertility rates had fallen well below replacement rates at about 1.5 children born per couple. Replaced by the two-child policy, China believed that this policy would quickly bolster fertility rates among women; however, rates have remained steady around 2015 levels.⁸

When the two-child policy was implemented, it was believed that it would have a greater and more direct impact on overall births. There have been many societal shifts within China recently that are likely to have contributed to the desire to have fewer children, such as increased education and occupational opportunities, as well as increased costs of living.⁹ Additionally, the perception of a "traditional" Chinese family changed during the implementation of the one-child policy, where many couples believe the ideal image of a family includes just one child. In a survey conducted by the Chinese government, it was determined that less than 30% of couples were interested in having a second child.¹⁰ Therefore, fertility rates are not expected to increase by much in the coming years, leading to an aging population. This is not unlike other developing countries throughout the world; most notably, the EU has an average fertility rate of only 1.55 throughout its member states.¹¹ China can then expect peak food demands to correlate somewhat closely with peak population numbers, a relationship that will be addressed later in this paper.

Urbanization

China is rapidly urbanizing and modernizing. As of 2016, China had reached 57% urbanization, and is expected to reach 80% by 2050.¹² Urbanization has corresponded to a shift in dietary demands of Chinese citizens as they demand more animal-based products over traditional crop-based diets. Additionally, the overall demand for calories increases with urbanization and growing incomes. Between 1978 and 2012, China achieved an average annual per capita growth in GDP of 8.5% PPP.¹³ Increases to per capita income have continued through current years as well; we have seen food consumption reaching 450kg per capita in 2015, up from 350kg in 2004.¹⁴ By 2009, this meant an average daily caloric intake of 3,036 kcal per capita, which was up from 2,163 kcal a day in 1980, and is higher than the 2009 global average of 2,831 kcal per capita.¹⁵ Therefore, overall demand for food will continue to increase as the

population increases, with food demand projected to peak around the same time as the population growth peaks.

Additionally, the makeup of the foods that urban populations consume differs greatly from traditional rural diets. As mentioned before, the demand for meat products increases, while the consumer demand for traditional grains such as rice and wheat decreases. However, the aggregate demand for grains increases, as grains are utilized as feed for livestock.¹⁶ Therefore, China will face the issue of needing to increase grain output to meet consumer demands. In order to do so, China has begun investing in land and agribusiness ventures all over the world to the point that, as of 2018, China was the fourth largest land purchaser in the world.¹⁷

Environmental Concerns

In addition to changing consumer demands, ecological degradation and global climate change have played a role in China's need to look internationally for land. Historically, China was heavily dependent on chemical fertilizers and the inefficient use of water resources to keep their crop yields high. This was to the detriment of the country's natural resources such as water and soil, which are now so acidic or overutilized that they are considered heavily degraded. Arable land in China is estimated at about 1.35 million km² as of 2016, and is expected to diminish to 1.2 million km² by 2050.¹⁸ Most of the losses to arable land have occurred since the year 2000.¹⁹ According to the FAO, almost 20% of China's current arable farmlands are considered degraded due to inefficient use of resources.²⁰

The chemical fertilizers in China were widely used as they increased crop yields by an average of 47.8%; however, it was found that excessive use of these fertilizers caused increased greenhouse gas (GHG) emissions as well as soil acidification.²¹ Additionally, water usage for agricultural use has been extremely inefficient. Crop irrigation makes up 60% of water usage throughout the country, but only between 30 and 40% of the water demanded is delivered to farmland.²² Rising demands for irrigation are further depleting groundwater tables,²³ and the Chinese Ministry of Ecology and Environment has also noted that 35% of the poorest counties in China are also areas with the greatest desertification.²⁴ This could lead to concerns of exacerbated poverty and food insecurity in these regions if the needs of the poorest are not sufficiently addressed.

Literature Review

The idea that China could potentially become food insecure was first introduced by Dr. Lester Brown in his 1995 article *Who Will Feed China? Wake-up Call for a Small Planet*, in which he theorized that China's growing population

would have such a high demand for food that they would in effect starve the rest of the world through imports.²⁵ The claims made in this article were swiftly and aggressively refuted. In the years following its publication Brown's claims were continually disproven, but that did not prevent people from questioning how China would manage to feed its ever-growing population. This section will draw on contemporary analyses to determine the overall state of China's food security as well as projections out until 2050.

In Fukase and Martin, it was concluded that China would be able to maintain food self-sufficiency of over 90% until 2030.²⁶ By looking at food and its relationship with growing incomes, they were able to analyze the effects of this on the supply and demand complexities China may face regarding grains. Key findings include the following: increased per capita income led to a sizable increase in food consumption, specifically in demand for non-grain related foods such as fruits, animal products, and oils. Also, at early developmental stages, the demand for food increases more sharply than what supply can meet, leading to increased imports. However, once higher income levels are reached, consumption growth begins to slow and the gap between supply and demand closes once production is able to meet current demands.²⁷

Demand and food production concerns are also analyzed in Du et al. They estimate that, given a population peak in 2030, peak food demand is expected to occur in 2036. China's ability to import high volumes of food will be sufficient only as long as international food prices remain cheaper than domestic prices.²⁸ However, China has made efforts to stock their National Grain Storehouses for this reason. As of 2017, China had restocked 84.5 million tons of food to their storehouses.²⁹ Surprisingly, they did not find that climate change would make a significant impact on grain yields. This was also corroborated by Ye et al. regarding climate change and CO₂ emissions. Additionally, Du et al. determined that expected climate change estimates would not decrease grain yields by more than 5% in 2050, and thus was not a driving factor for extensive concern³⁰ given that other measures to increase crop yields were implemented.

Climate change is expected to have impacts on all aspects of food security including access, utilization, and price stability.³¹ Ye et al. take a closer look at the potential food security outcomes for China due to climate change between now and 2050. Their methodology utilized two Intergovernmental Panel on Climate Change (IPCC) climate scenarios to determine possible outcomes with both optimistic and pessimistic development pathways for China in terms of sustainability. Most notably, they saw a marginal increase in plant photosynthesis potential with increased CO₂ concentrations due to climate change, which led to increased crop productivity. They determined that while the relationship between climate change and food production in China is poorly understood, current estimates show that compared to other factors such as population, technological advancement in agriculture, socio-economic

changes, and cropland availability, climate change is an increasingly minor concern for overall food demands. They even note that in the short term—between 2020 and 2050—climate change could even have moderately positive effects on major crops produced in China.

Anderson and Strutt take a different approach to food security by looking at the inequities that have emerged between rural and urban residents.³² They focus on determining China's ability to minimize undernourishment and allow all residents to have continued access to quality food at an affordable price point. Investments in agricultural research throughout the 1980s and 1990s increased food production; however, policies in the past decade were enacted that subsidized farmers to increase crop prices relative to those found in other countries. This effectively raised the cost of domestic food by 15% compared to neighboring countries. They argue that policies such as this threaten the food security of China's poor by pricing them out of the market. As China's percentage of imports is expected to increase in the coming decades, this could pose additional risks. However, Anderson and Strutt note that if development indicators continue on their current trajectory for incomes and agricultural outputs, China has the potential to be "better fed" in 2030 than it was in the early 2000s, regardless of the fact that the country is relying more heavily on imports.³³

All in all, there is consensus between these articles that China is currently facing varied and extreme challenges regarding food security. However, most analyses show that should the government be able to properly implement certain policies on sustainable agriculture practices, increase crop yields, and maintain competitive prices for necessary imports, China should be able to meet domestic demand. Even when looking from the perspective of the red line for self-sufficiency set at 95%, China's food security is not likely to be severely jeopardized over the next several decades.

Chinese policies in place

This section will analyze recent policies implemented by the Chinese government to determine how effective they are at meeting current food demand. The challenges faced by China are ever changing, and as has been discussed, older problems have been solved only to make way for more modern hurdles for the country. Looking at ways to feed their people and increase their sustainable development, the Chinese government has recently been enacting policies and programs to lighten the current burdens.

Starting in 2004, China began to implement new agriculture-related policies under their commitment to the *San Nong* issues which include agriculture, rural areas, and farmers. These were additionally addressed in the Number One Document between 2004 and 2016 as three of the most important

issues the government would be addressing in those years.³⁴ The policies implemented under these initiatives focused on increasing crop production, increasing crop prices, and thus farmer wages, as well as a renewed effort to curb undernutrition in rural populations. As mentioned previously, the subsidies provided to farmers that increased crop prices are also what contributed to the ability to import food more cheaply than to purchase the same crops domestically. Additionally, it was determined that based on the 200 million farm households that received these subsidies, the amount was too insignificant (about \$130 USD) to have lasting effects for increasing these families' overall income.³⁵

In 2016, the Chinese Nutrition Society released an updated Chinese Food Pagoda to show what a healthy, balanced diet should look like. It recommends a wholesome balance of cereals, legumes, fruits, meat products, and dairy to maintain a healthy diet. Compared to the previous recommendations from 2007, the overall recommended daily amounts of eggs, fruits, and meat products (beef, pork, and poultry) have decreased, while the recommended daily allotment of nuts, soybean products, and seafood has increased.³⁶ Additionally, recommended daily walking activity and water intake have been added since 2007. This highlights the Chinese government's push to promote a healthier lifestyle that depends less on livestock and fruit products for daily nutrition, and puts a renewed focus on the traditional importance of cereals and vegetables.

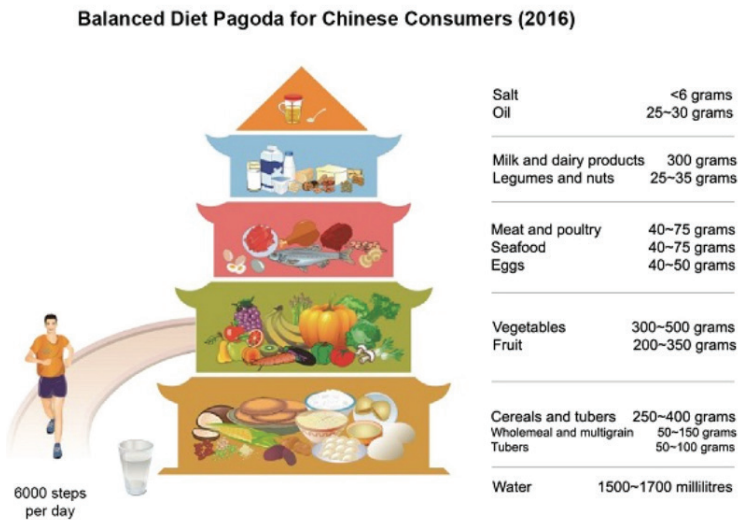


Figure 2. Chinese Nutrition Society 2016 Balanced Diet Guidelines³⁷

Additionally, the guidelines include ways of reducing food waste. Nearly one-sixth of all the grain produced in China is wasted either through industrial purposes—the production, transportation, or processing of grain—or through consumer waste. Therefore, it only seems appropriate that China would be trying to address this issue by encouraging consumers to limit their waste with measures such as emphasizing the importance of eating more meals from home with family rather than frequent eating out.

Starting in 2015, China began to add a focus on ecological sustainability by implementing policies that included reducing their dependence on chemical fertilizers, reducing (and eventually stopping) the discharge of agricultural waste, and curbing further soil pollution. As mentioned previously, China has about 1.35 million km² of arable land, which is expected to diminish to 1.2 million km² by 2050. China has set a “red line” for arable land at 1.2 million km², where they cannot dip below this level of land available for crop production.³⁸ They plan to construct high standard farmlands throughout the countryside to better keep up with food demand and limit land desertification. These high standard farmlands are expected to increase crop yields by 15-20% according to government media reports, and they plan to construct roughly one million km² by 2050.³⁹ The policies mentioned fall under their “Soil Pollution Control Plan of Action” released in 2016 where China plans to curb soil pollution by 2020, stabilize and start improving the soil quality by 2030, and then have a generally improved soil environment by 2050 to combat the overwhelmingly degraded soil conditions.⁴⁰ Chinese leadership is also seeking methods to cap the current use of chemical fertilizers by 2020 and reduce usage annually to zero by 2030. Additionally, China is creating a water pricing mechanism to accurately price water and reduce overconsumption and increase conservation around the resource by the same deadline.⁴¹

Labor productivity among Chinese farmers has historically remained low compared to other similar countries that can keep crop production arbitrarily low.⁴² This has been attributed to a high number of farmers producing crops or livestock on small plots of land. Therefore, in the early 2010s, China began to offer landowners the option to transfer or rent their land to other farmers. The government further supported land consolidation by reducing the bureaucratic red tape and high costs of participating in these programs. By 2015, official data showed that roughly one-third of qualifying households had transferred their land to consolidate land ownership.⁴³ The goal of this is to have fewer farmers working larger plots of land, and that economies of scale will make the farmers productive in aggregate.

Another tactic China is using to meet domestic food demand is through international land and agribusiness procurements. China has purchased an estimated 3.2 million hectares of land between 2000 and 2018, making it the fourth largest land buyer in the world.⁴⁴ Such procurements have been met with

pushback, however, most notably in Australia where Chinese companies were blocked twice from purchasing one of Australia's largest cattle corporations in 2015 and 2016.⁴⁵ According to a study conducted by the U.S. Department of Agriculture, as of 2016, over 1,300 Chinese corporations owned "crop and livestock farming, fishing, processing, farm machinery, inputs, seeds, and logistics" in over 100 countries, totaling over \$26 billion in value.⁴⁶ Such investments enable China to extend its influence on these countries while also meeting domestic food demand.

In the last 15 to 20 years China has taken large strides to ensure the people's future is one with food security. The central government's policies and tactics have varied widely to meet the many challenges. From the most recent data regarding the soil action plan, assessments were expected to be completed by the end of 2020 to determine a course of action moving forward.⁴⁷ Data on these assessments have not yet been released. Therefore, while it seems that China has robust policies in place to address food security challenges, the successful implementation of these programs is even more essential for their effectiveness.

The bottom line: is China likely to have a food shortage?

While China has faced concerns due to the previously rising population and continuing urbanization trends, population growth has since slowed due to prior fertility measures and long-lasting societal changes surrounding couples' desire for fewer children. This decreases the pressure for expanding food production with a peak population expected in 2030, and while urbanization is likely to increase overall demand for food, this is expected to peak in 2036. Therefore, in terms of increasing crop productivity, this is likely only needed to continue through 2036.

To combat environmental concerns, China is implementing several programs for more efficient use of their natural resources as well as restorative policies to increase crop productivity moving forward. Key deadlines for some of these programs, specifically for soil preservation, are in the next ten years, which will be crucial for their success in maintaining crop self-sufficiency. Additionally, China has done well in implementing land reform to allow for better labor productivity and the transition of many farmers to other industries; however, China should also relax the *hukou* household registration system so that individuals transitioning out of farming are more easily able to transfer their labor skill sets elsewhere.

Given all of these factors, this paper concludes that China is unlikely to have a shortage of food. Through its current crop productivity levels and access to international markets for imports, China being considered food insecure in the traditional sense of not being able to supply enough food to meet the

basic nutritional requirements for all citizens is improbable. Due to national security concerns of overreliance on imports for feeding its population, China is projected to rebalance the import-to-domestic food production ratio, as suggested by government documents. A surprising outcome of this research relates to climate change: China may be in a unique situation where climate change is working in its favor in the short term, unlike the many other countries that are already seeing negative environmental impacts. If this trend continues, China may not only achieve high self-sufficiency in food production, but also potentially become a global food exporter. Based on these findings, the speculation that China is undergoing severe food insecurity is likely overblown, and correct government implementation of agriculture and environmental policies can help China avoid such a state in the coming decades.

Notes

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