

**Christina Ng**, Midwood High School New York, NY  
Japan, Climate Volatility

### **Japan: Rising Temperatures**

Situated in East Asia, surrounded by water, isolated from South Korea and China lies Japan. Known for their popular cuisine and culture like sushi and anime, Japan faces food insecurity that is relatively unknown to outsiders. Despite being one of the richest countries in the world due to their innovative technology, Japan has not been able to escape from food shortages. Concerns have risen due to its high cereal import dependency and its low food self-sufficiency rate, raising questions about whether Japan can even feed its own population or if they will always be dependent on other nations. In 2008, Japan's food self-sufficiency rate was 41% and has only continued to dwindle. The government is attempting to raise this percentage to 50% in 2020 (Barrett and Notaras, 2012). If they are unable to lower their carbon emissions and regress global warming, this problem could become a reality.

With a population of almost 130 million people and over 80% of the population urban, the majority of Japanese people are still unable to live the minimum standard of living and depend on government assistance. However, less than 1% of the population receives assistance and the requirements are becoming increasingly harder (Hosaka and Peter). Housing in Japan is incredibly small and costly. Thus, most couples only have one or two offsprings (TekCarta, 2012). Additionally, most singles have no intention of getting married and having children (Ryall, 2016).

A typical Japanese meal consists of a bowl of rice, miso soup, pickled vegetables, and fish or meat. They also eat a variety of noodles such as udon, soba, and ramen. Since Japan is an archipelago, seafood is common. Popular dishes are sushi and tempura which includes fish such as squid, octopus, eel, and shellfish (Japan Zone). People buy their food from supermarkets, food stores, and stalls. Since space is limited in Japan, community gardens can be found on the rooftop of train stations (Meinhold, 2014). Families enjoy going to these gardens for picnics despite the high rent price for a plot.

In Japan, education is highly valued and crucial. Although the government spends less on education compared to other countries, their education system is seen as a model for others to follow. The Ministry of Education, Culture, Sports, Science, and Technology (MEXT) is responsible for the curriculum, evaluations, standards, and pay scales for teachers and administration. Local governments are responsible for hiring teachers, supervision of schools, budgets, and special programs. Education is only mandatory until middle school, but most students go on to high school. Tests are especially important in Japanese culture because to get a good job, you must go to a good university in which you take a test for. The universities you can apply for depends on the high school you attend; which also depends on the high school entrance exams. Thus, cram schools and extra tutoring for these entrance tests have become popular (Richey, 2015).

Japan has the world's lowest infant mortality rate and longest life expectancy thanks to universal coverage. All citizens are insured and they can choose their own healthcare providers. Premiums are based on income and medical professionals are in control of care while the government regulates health care financing and health insurance. Health insurance plans can be broken down into four groups: government managed plans, society managed plans, mutual aid association (MAA) insurers, and plans for day laborers. Most plans cover ambulatory and hospital care, extended care, and most dental and prescription drugs. They don't

cover abortion, cosmetic surgery, traditional medicine, certain hospital amenities, some high-tech procedures, and childbirth (Fahs).

Minimum wage in Japan is 780 yen (\$6.30) which is enough to buy a bowl of noodles. The government plans to increase the minimum wage by 3% to increase consumer spending and encourage people to buy more domestic products. This increase of about 30,000 yen a year (\$268), could cover the grocery bill for two weeks in the average household (Mayger and Ujikane, 2015).

There are multiple barriers to improving agricultural productivity. Although urban agriculture in Japan is more productive than their rural counterparts, agricultural land use has decreased by over 40% due to urbanization. The number of people interested in farming and agriculture is dropping at alarming rates. For example, in Tokyo, the number of families involved in agriculture has fallen by 60% since 1975 (Peñaranda, 2011). Another barrier is the regulation of the land. The Ministry of Agriculture, Forestry and Fishery (MAFF) is responsible for urban agriculture while the Ministry of Land, Infrastructure, Transportation and Tourism (MLITT) is accountable for urban planning. These two ministries have different criteria for what land can be used for urbanization or farming, thus causing conflicts. Another hurdle is tax barriers; landowners pay higher taxes in order to maintain productive farmland in urban areas. Special provisions exist to grant tax exemptions to active urban farmers, complemented by incentives by cities (Peñaranda, 2011). Despite this, the lengthy commitment and requirements are not worth it for many.

A major barrier to improving employment and wages is the corporate culture and lack of women in the workforce. In Japan, it is common to work long hours often stretching beyond midnight. Promotion is based on overtime rather than performance. Once hired, it is near impossible to take career breaks. As a result of the immense pressure, many young adults commit suicide (Economist, 2014). In fact, 35% of Japan's population is over 60 years old. The population of Japan is expected to decline to 83 million in 2100 (Hutt, 2016). Due to the population decline, the working age population is expected to decrease by 40% by 2050. After the recession in 2007-09, more women became housewives and males became the breadwinner. The female labor in Japan is 63% lower compared to other developed countries. Seventy percent of women stop working for a decade or more while raising children. Tax rules keep women's earnings low. A man is able to claim a tax deduction of almost \$4,000 as long as his spouse's income does not exceed \$150,000. In the pension system, as long as a wife's annual income remains under a set number, she can receive a national pension without paying for premiums (Economist, 2014).

The energy demand in Japan has negatively impacted climate volatility. After the Fukushima nuclear plant disaster in 2011, Japan has had to import most of its energy. As a result, more people turned towards burning fossil fuels for energy, causing a surge in greenhouse gasses in the atmosphere. Fossil fuels such as coal, oil, and gas have dominated the world energy consumption and supply since the 1800s (U. Akpan and G. Akpan, 2012). However, it has also produced an incredible amount of carbon emissions, accounting for over 80% of greenhouse gas emissions in 2008. Many industrialized countries besides Japan such as the United States and China still use fossil fuels to ignite the economy in areas such as electricity and heat as well as transportation. However, these greenhouse gases end up trapped in the earth's atmosphere, and the extra heat produces a rise in temperature that produces disastrous results for the world and agriculture (U. Akpan and G. Akpan, 2012).

Globally, the world is challenged by rising temperatures and water levels. For Japan, the danger of climate change is producing disastrous effects for their diets from plants to seafood and everything in between. The

need for climate change is necessary; the food at Japanese dinner tables could become luxury items or things of the past (Washio, 2013). In 2013, climate experts predicted an average increase of 2.1 and 4 degrees Celsius in the country's temperature by the end of the century. A minuscule rise could prove devastating for Japan's most basic crop: rice. The rise in temperature would worsen weather patterns, bringing in heavier rains and floods. Regardless if farmers can keep up with the quantity of rice, the quality of rice will severely decrease. Even currently, the filling of rice grains has worsened and more white, immature grains have been harvested. It has been noted that the reproduction of rice is responsive to high temperatures and hot conditions, resulting in sterility (Washio, 2013). The pressure of climate change has already affected fruit crops in northeastern Japan, Hokkaido, the agricultural sector. There have been multiple occurrences of abnormal fruit such as peaches with brown flesh (Johnston, 2016). Already, the Japanese are import dependent and if these temperatures produce the same effect in other countries it is unclear how the Japanese will be able to feed themselves.

A big part of the Japanese diet is seafood. Some popular forms appear in sushi, tempura, and sashimi. The threat of rising temperatures could make finding some fish species such as salmon and saury harder to find during certain times of the year. An estimated 30% of coral reefs are expected to disappear in the next 30 years (Nature Asia). In northern Japan, warm ice floats near Hokkaido deprive the fish and shrimp of necessary nutrients. Despite having only 2% of the world population, Japan is responsible for 10% of the global fisheries catch, and by 2100, catches of coastal species are estimated to drop by 70% (Nature Asia).

A possible solution would be to eat whales. In 1986, the International Whaling Commission banned commercial whaling. According to the Japan Whaling Association, in their video "You're still against eating whale?" the whale population is increasing by 4% each year and consumes more marine resources than humans. In other words, the seafood that could be consumed by humans is being diminished by the whales. Smaller whales are growing in numbers and reproduce quickly. Eating whales would balance out the ecosystem (Kirby, 2014). The act of whaling receives condemnation across the globe since whales are considered endangered. However, in Japan, whaling is considered a tradition.

The Japanese government is working to combat climate change. After 2011's earthquake, tsunami, and Fukushima nuclear accident, Japan has been actively trying to cut their emissions. Japan has laid out its own plans for greenhouse gas emission reductions for post 2020. The "Intended Nationally Determined Contribution" (INDC) vows to cut Japan's greenhouse gas emissions by almost 30% from the 2013 level by 2020. In addition, Japan has contributed \$1.5 billion to the Green Climate Fund (GCF) to support developing countries since they are most vulnerable to the aftermaths of climate change (Oike, 2015). The trends for carbon emissions in Japan are inadequate. It is reported that if all countries were to adopt the INDC, global warming would increase by 3-4°C in the 21st century (Climate Action Tracker, 2016). During the U.N climate change conference in Warsaw, Japan decided that it would reduce its emission target to 3.8% below its 2005 levels because they couldn't reach their initial target in the INDC. Japan will not be able to compete with other countries in terms of renewable energy. Its energy needs are dependent on fossil-fuel imports which increase the greenhouse emissions and widens its trade deficit.

Despite these efforts, the fact remains that Japan is the fifth-largest greenhouse gas emitter. In addition, compared to other developed economies, Japan has the lowest carbon emission reduction of about 20% by 2030. Previously, Japan had pledge to cut 25% of its 1990 emissions by 2020 (McCurry, 2015). The figure to blame is Prime Minister Shinzō Abe, who is close to big industry and power monopolies, who are not fighting for a new climate change policy. As a result, Japan has been accused of building more coal-fired plants in place of nuclear options (McCurry, 2015).

For Japan to return to a stable, energy supply, they could return to using nuclear power. However, another nuclear meltdown incident may also happen at any given moment.

Already, Japanese citizens are taking part in climate change. In a 2007 survey, 98% of respondents agreed that climate change was either a “serious problem”, or a “somewhat serious problem” (Nature Publishing Group). In order to transform this into actions, the national government is encouraging citizens to partake in reducing their carbon footprint such as unplugging electrical appliances, turning off the water, using shopping bags and even recycling (Nature Publishing Group).

One other way the government is attempting to push through less carbon emissions is through “zero-energy buildings” that use renewable energy (Borrás, 2014). Prime Minister Shinzo Abe is trying to push forward a goal of having all “new public buildings zero-energy by 2020, and private buildings by 2030...” (Borrás, 2014). The power from these buildings comes from the rooftop and three-wall solar PV which is on the sides of the buildings. The energy from the sun gets stored into batteries to keep lights on at night and on rainy days (Borrás, 2014). However, the new side-panel tech is expensive and not on the market commercially yet.

Another possible solution would be to adopt a system of hydroponics and aquaponics in Japan. By using hydroponics in their agriculture, Japan would be able to grow plants without needing soil. Aquaponics would allow them to raise fish and grow plants together in one, integrated system. This would combat the problem of the lack of fertile soil and space in Japan. Furthermore, it could integrate more youth with agriculture since there would be a technological component. After the Agricultural Basic Law in 1961, which stated that farms should be owned by those who cultivated the land, the agricultural working population dropped from 11.96 million to 2.52 million between 1960 and 2005 (Yamashita, 2008). The government has already taken measures with the Rural Labor Squad program, which trains urban unemployed youth to work in the farms. Prime Minister Taro Aso hopes this program will resolve the concern over the lack of younger workers and end of farms (Tabuchi, 2009).

In Japan, hydro farms or “soilless culture” have been practiced since 1946 in Tokyo (Ikeda). Popular systems include water culture and aeroponic. One hydroponic farm in Japan resides in an abandoned Sony chip manufacturing facility in Miyagi, near where the earthquake and tsunami struck in 2011. This factory opened in July, 2014 and produces roughly 10,000 heads of lettuce each day (Borrás, 2014). In this factory, “moisture resistant LED grow lights that mimic... wavelengths needed to stimulate the plant growth” (Borrás, 2014). These lights also use 40% less electricity than traditional bulbs and are computer controlled, giving plants a period of darkness each day. In this smaller, indoor farm, it can produce 100 times more lettuce per square foot compared to the traditional outdoor farm.

Overall, in the next decades, climate change will become a serious issue in all countries and the whole world. It does not affect only Japan, the United States of America, or even France. It affects all of us. Japan must reduce their carbon emissions so their food and culture does not become a thing of the past. They must take control over the situation and slow it down. This will ensure that Japan will no longer have to be reliant on other countries for food imports to sustain themselves.

## References

- Akpan, F. U., & Akpan, E. G. (2012). The Contribution of Energy Consumption to Climate Change: A Feasible Policy Discussion. *International Journal of Energy Economics and Policy*, 2(1). Retrieved from [www.econjournals.com](http://www.econjournals.com)
- Barrett, FD. B., & Notaras M. (2012). *Future of Food in Japan*. Retrieved from <https://ourworld.unu.edu/en/future-of-food-in-japan>
- Borrás, J. (2014, October 2). *Japan Pushes for Net Zero Standard on New Buildings* Retrieved from <https://greenbuildingelements.com/2014/10/02/japan-pushes-for-net-zero-building/>
- Climate Action Tracker. (2016). *Japan*. Retrieved from <http://climateactiontracker.org/countries/japan.html>
- Economist. (2014, March 28). *Japanese women and work Holding back half the nation*. Retrieved from <http://www.economist.com/news/briefing/21599763-womens-lowly-status-japanese-workplace-has-barely-improved-decades-and-country>
- Fahs, C. M. *Health Care Resources and Utilization*. Retrieved from <http://www.nyu.edu/projects/rodwin/lessons.html>
- Green Guardian. *The Connection Between Recycling and Global Warming*. Retrieved from <https://doitgreen.org/topics/climate-change/connection-between-recycling-and-global-warming/>
- Hosaka & Peter. *The State of the Urban Poor in Japan*. Retrieved from <http://www.jca.apc.org/nojukusha/nojiren/e-home/text/achr990921.html>
- Hutt, R. (2016, February 26). *Japan's population is shrinking: What does it mean for the economy?* Retrieved from <https://www.weforum.org/agenda/2016/02/japans-population-is-shrinking-what-does-it-mean-for-the-economy/>
- Ikeda, H. *Soilless Culture In Japan*. Retrieved from [https://www.hydrofarm.com/resources/articles/soilless\\_japan.php](https://www.hydrofarm.com/resources/articles/soilless_japan.php)
- Japan Info. (2015, June 2). *A Guide to Garbage Disposal in Japan*. Retrieved from <http://jpninfo.com/9826>
- Japan Zone. *Japanese Food: The Basics*. Retrieved from <https://www.japan-zone.com/culture/food.shtml>
- Johnston, E. (2016, August 6). *Climate change threatens nation's agriculture*. Retrieved from <http://www.japantimes.co.jp/life/2016/08/06/environment/climate-change-threatens-nations-agriculture/>
- Lim, A. (2009, June 30). *Japan to Suffer Huge Climate Costs*. Retrieved from <https://ourworld.unu.edu/en/japan-examines-costs-of-climate-change>
- Koga, Hiroki. (2016, April 15). *How a Japanese Vertical Farm is Growing Strawberries using LED for the First Time*. Retrieved from <https://agfundernews.com/how-a-japanese-vertical-farm-is-growing-strawberries-using-led-for-the-first-time5691.html>

Mayger, J., & Ujikane, K. *Japan's Minimum Wage Only Enough for a Bowl of Ramen*. Retrieved from <https://www.bloomberg.com/news/articles/2015-07-30/japan-s-minimum-wage-only-enough-for-a-bowl-of-ramen>

McCurry, J. (2015, April 17). *Can Japan's climate policy get back on track after Fukushima?* Retrieved from <https://www.theguardian.com/environment/2015/apr/17/can-japans-climate-policy-get-back-on-track-after-fukushima>

National Center on Education and the Economy. *Japan: System and School Organization*. Retrieved from <http://ncee.org/what-we-do/center-on-international-education-benchmarking/top-performing-countries/japan-overview/japan-system-and-school-organization/>

Natureasia. *How blow the winds of change*. Retrieved from <https://www.natureasia.com/ja-jp/advertising/sponsors/climate-change/intro>

Nature Publishing Group. *Stopping the surge*. Retrieved from <https://www.natureasia.com/ja-jp/advertising/sponsors/climate-change/policy>

Oike, A. (2015, July 30). *Japan's action plan to fight climate change*. Retrieved from <http://www.japantimes.co.jp/opinion/2015/07/30/commentary/japan-commentary/japans-action-plan-to-fight-climate-change/>

Peñaranda, M. R. (2011, September 20). *Japan's Urban Agriculture: Cultivating Sustainability and Well-being*. Retrieved from <https://unu.edu/publications/articles/japan-s-urban-agriculture-what-does-the-future-hold.html>

Richey, M. (2015, August 26). *20 Differences Between Japanese and Western Schools*. Retrieved from <https://www.tofugu.com/japan/japanese-schools-vs-american-schools/>

Sugiura, T., Sumida, H., Yokoyama, S. (2012). Overview of Recent Effects of Global Warming on Agricultural Production in Japan. *JARQ*. 46(1). Retrieved from <http://www.jircas.affrc.go.jp>

TekCarta. Retrieved from <https://www.nakono.com/tekcarta/databank/households-average-household-size/>

Washio, K. (2013). The Prediction of Climate Change and Rice Production in Japan. *Rice Research*, 2(1). Retrieved from <http://dx.doi.org/10.4172/jrr.1999e103>

Winfield-Hayes, R. (2016). *Japan and the Whale*. Retrieved from <http://www.bbc.com/news/world-asia-35397749>

Wrigley, F. (2014, May 15). "Recycling in Japan" or "Reasons to get it right and avoid eternal shame". Retrieved from <http://en.rocketnews24.com/2014/05/15/recycling-in-japan-or-reasons-to-get-it-right-and-avoid-eternal-shame/>

WWF. *Nippon Changes Climate impacts threatening Japan today and tomorrow*. Retrieved from [https://www.wwf.or.jp/activities/lib/pdf\\_climate/environment/WWF\\_NipponChanges\\_lores.pdf](https://www.wwf.or.jp/activities/lib/pdf_climate/environment/WWF_NipponChanges_lores.pdf)

