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The *Global Majority E-Journal* is published twice a year and freely available online at: [http://www.american.edu/cas/economics/ejournal/](http://www.american.edu/cas/economics/ejournal/). The journal publishes articles that discuss critical issues for the lives of the global majority. The global majority is defined as the more than 80 percent of the world’s population living in low- and middle-income countries. The topics discussed reflect issues that characterize, determine, or influence the lives of the global majority: poverty, population growth, youth bulge, urbanization, lack of access to safe water, climate change, agricultural development, etc. The articles are based on research papers written by American University (AU) undergraduate students (mostly freshmen) as one of the course requirements for AU’s General Education Course: Econ-110—The Global Majority.

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**ISSN 2157-1252**

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Global Majority E-Journal

Volume 9, Number 1 (June 2018)

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Dirty and Thirsty: The Struggle for Clean Water and Sanitation in Brazil and Nigeria

Kyanna Alleyne

Abstract
This article compares and contrasts the qualities of sanitation and water supply in Brazil and Nigeria. More than one third of Nigeria’s population have little to no access to potable water. While the number of people without access to water and proper sanitation in Brazil is smaller than in Nigeria, there are great inequalities across each country. Those living in urban slums are typically left with scarce access and very poor sanitation. This article connects the lack of accessible water to poor sanitation in each country. Although both countries have seen progress in both issues, there are still a great number of people suffering. While analyzing these issues and their effects on the people of each country, this article will also analyze what led to the progress and how that progress can be continued.

I. Introduction
Water scarcity is an issue affecting the entire globe and it is likely to intensify in the future. With nearly one billion people in developing nations without access to safe water, there is no debating the need for change. In the same right, there are about 2.5 billion people in the world lacking access to sanitation. Two countries that are not exempt from these issues and their effects are Nigeria and Brazil. Nigeria has become the country with the largest economy in Africa since 2014. While Brazil is known to make up 33 percent of Latin America’s economy. While both countries make significant strides in their overall developments, there are still gaping holes within the water and sanitation sectors. Not only are these sectors important to their increasing development economy wise, it is very crucial for the populations’ health and wellbeing of both nations. In both countries these issues are most felt by those living in the rural areas- secluded from the resources found in the city.

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1 According to United Nations Children’s Fund (UNICEF) and World Health Organization (WHO) (2017), 844 million people lack access to basic drinking water service.
According to a World Bank (2016) report, Brazil is blessed with almost 20 percent of the world’s water resources, however there are large populations within the nation that have very little access to safe water. Nigeria, on the other hand, has a much lower potential access to water, which only makes improvements in the water and sanitation sectors more difficult to achieve. The progress of increasing access to water in urban areas in Nigeria has become a large focus, though it has not been addressed consistently over the last few decades. While Brazil has seen progress, more needs to be achieved in order to handle the looming water crisis. This article closely examines the similarities and differences of problems in the water and sanitation sector in these two countries and attempts to offer insight on future tactics that may be successful.

II. Literature Review

Given that water and sanitation issues remain serious in Brazil and Nigeria, there are ample sources analyzing the individual sectors in each country. Ghisi (2005), Barreto et al. (2010) and Nobre et al. (2016) discuss the water and sanitation sectors of Brazil. Ademiluyi and Odugbesan (2008) and Mut'a’Hellandendu (2012) do the same for Nigeria.

- Ghisi (2005) analyzes the potential productivity of utilizing rain water in residential sectors of Brazil. The article discusses the average water availability in Brazil in comparison to the rest of the world. While most of Brazil’s regions are at or above the world average in 2000, both the Northeast and Southeast regions are much lower than the world average. The article continues to note that because of Brazil’s increasing population size, these regions will face extreme water scarcity as soon as the end of the 21st century. In order to resist the looming extreme water crisis, programs should be developed to harvest rainwater and reuse it within the population. Because Brazil’s average rainfall is higher than the world average in all of its regions, this strategy could potentially solve the soon to be seen water crisis.

- Barreto et al. (2010) explain the results of an experiment, where interventions within the sanitation sector were tested for their effectiveness in Salvador (a Brazilian city). The intervention program, called Bahia Azul sewerage, was introduced in Salvador and the experiment tried to measure the levels of diarrhea and hookworm before and after the intervention program began. One of the results was that there was an overall decrease in diarrhea in the poorest region by 42 percent. This article exemplifies that intervention programs within the water and sanitation sectors, especially ones that are sustained, are extremely important for the populations, especially in the poorest regions.

- Nobre et al. (2016) discuss the recent droughts in southeastern Brazil that began in 2011 and continued through the time their paper was written. These droughts, as discussed in the paper, have had detrimental effects on many sectors in these areas. While agriculture being one of the most effected, others effected included hospitals and schools. The article notes that this drought has cost around 5 billion USD in the agriculture sector in 2014 alone. Nobre et al. highlight the impact of the lack of water access has on its population and economy as a whole and for its individuals.

- Ademiluyi and Odugbesan (2008) focus on the poorest regions of Nigeria and the lack of water and sanitation structures for the population. The article first examines the problems surrounding Nigeria’s water and sanitation structure, like why there is no reliable source of water for the populations in the poorest regions, and whether these sources are vulnerable to drought or if they are contaminated. The contamination piece is related to the
lack of a sanitation standard in Nigeria, as fecal matter cannot be properly disposed of and ends up within the already poor water supply. The article also discusses the lack of a sustainable fix for these poor systems.

- Muta’a Hellandendu (2012) describes the increasing water issue in Nigeria, as water is becoming scarcer for many of those living in poverty ridden regions. The article shows that only 30 percent of the population have reliable access to clean drinking water. The article continues to discuss the impacts that the lack of water (and poor sanitation) has on the people of Nigeria, which include widespread malaria, diarrhea, hepatitis, hookworm, etc. The article concludes by recommending policies to have clean water reaching the majority of the population. As these impacts can make the difference between life and death, the need for these changes is emphasized.

III. Empirical Background

As Figure 1 shows, Brazil has seen solid increases in its GDP per capita, increasing from $10,273 in 1990 to $14,533 in 2015. Though Nigeria has made no progress from 1990 to 2003, it has made immense progress since, increasing from $3,143 in 2003 to $5,639 in 2015. Overall, Brazil’s GDP per capita is about three times that of Nigeria.

Figure 1: PPP-adjusted GDP per capita (constant 2011 international $)

![Graph showing GDP per capita comparison between Brazil and Nigeria](image)

Source: Created by author based on World Bank (2017).

Given these large differences in income per capita, Figure 2 shows that there are also large differences in terms of life expectancy between Brazil and Nigeria. Both countries have seen increases in their life expectancy rates since 1970. While Brazil’s has increased from 59.2 years to
74.7 years, Nigeria’s has increased from 41.2 years to 53.0 years. In other words, Brazil’s life expectancy increased by 15.5 years, while that of Nigeria increased by only 11.8 years. One explanation for Nigeria’s lower progress are the lost decades of the 1980s and 1990s, during which Nigeria has not made any progress at all, and we also saw that in Figure 1.

**Figure 2: Life Expectancy at Birth (in years), 1970-2015**

![Life Expectancy at Birth, Total](image)

Source: Created by author based on World Bank (2017).

**Figure 3: Adult Literacy Rate (percent of people ages 15 and above)**

![Adult Literacy Rate](image)

Source: Created by author based on World Bank (2017).
While data on literacy rates for each country were poorly reported in the past, Figure 3 still illustrates the relatively large progress made in Brazil compared to the relatively little progress made in Nigeria. Brazil has increased its adult literacy rate from 74.6 percent in 1980 to 92.6 percent in 2015, while Nigeria increased from 55.4 percent in 1991 to 59.6 percent in 2015. Nigeria’s data actually shows a relatively sharp decline from 54.8 percent in 2003 to 51.1 percent in 2008, which is inconsistent with both, the increase in GDP per capita as well as the increase in life expectancy during that period. Our next section will examine if the same is true for progress in the water and sanitation sectors.

IV. Discussion

IV.1. Access to Safe Water

Figures 4 and 5 shows, respectively, rural and urban access to safe water in Brazil and Nigeria. Comparing the two figures clearly shows that the lack of access to water is much more an issue in rural areas than in urban areas, especially in Nigeria. Though access to safe water is now considered to be a basic human right, for many decades more than 50 percent of Nigeria’s rural population and more than 20 percent of Brazil’s rural population had no access to drinking water.

**Figures 4 and 5: Rural and Urban Access to Safe Water, 1990-2015**

![Graph showing improved water source, rural and urban access in Brazil and Nigeria, 1990-2015.](#)

Source: Created by author based on World Bank (2017).

While there has been steady progress in both countries since 1990 (the first year such data is available), there have been many decades in which large percentages of the populations of these two countries lacked this basic human right. As of 2015, only 87 percent of Brazil’s rural population had access to safe water, while in Nigeria only 57.3 percent of Nigeria’s rural population had access to safe water.

In the rural areas of Nigeria, a reliable water source is a blessing, though one not found by many. As shown by Muta’aHellandendu (2012), although Nigeria has been involved in many large water supply projects, creating a sustainable water supply for the rural areas of Nigeria has not been achieved. Based on the data Abui et al. (2016) had, more than 50 percent of the country did not
have safe access to water, and most of those were people located in the rural areas. Many of the population in these areas spend great amounts of time getting water from very distant locations. This far distance to any water source keeps children out of school and the adults of families out of work. On top of this, the water sources that are utilized by those in rural areas are not reliable, as they could be contaminated by fecal matter and other substances due to poor management (Ademiluyi and Odugbesan, 2008).

Though the problem of not having access to safe water continues to be a bigger problem in rural than in urban areas, many of Nigeria’s urban areas are still struggling, including the Greater Metropolitan area of Lagos (which has a population of about 21 million). Those living in Lagos today know of water scarcity all too well as only about 1 in every 10 people in Lagos has a consistent source of safe water. A bill passed in March 2017, which criminalizes the informal water sector, has been labeled as a “death sentence” for those not having access to the formal water sector. In doing so, the government has exacerbated water scarcity (Mosbergen, 2017).

The water situation in Brazil resembles the one felt by the city of Lagos in Nigeria. There is lots of water in Brazil, but the problem is determining a way to harness it safely and distributing it to the population for use. Creating new hurdles are the repeating droughts many large cities in Brazil face; Sao Paul being one of the hardest hit by the droughts (Nobre et al., 2016). These droughts are felt everywhere. However, two important reservoirs (in Cantareira and Alto Tiete) dropped to below 20 percent of their full capacity during August 2015 (Nikolau, 2015). Further advancing the issue in Brazil are man-made extreme losses of water, linked to deforestation in Brazil, which according to the World Bank (2016) has increased almost exponentially in recent decades.

While the two countries face vastly different obstacles, there is one that both countries (and almost every developing nation in the world) faces: population growth. As shown in Figure 6, both countries face rapidly increasing populations. Hence, the number of people needing access to water is also increasing, leaving both nations with another obstacle to climb.

**Figure 6: Total Population (in million), 1970-2015**

Source: Created by author based on World Bank (2017).
IV.2. Water and Sanitation

In both countries, the water and sanitation sectors go hand in hand. As water scarcity issues become more prevalent, the topic of sanitation also becomes more problematic. In both countries, rural areas that are already struggling to find a reliable water supply are also dealing with the issue of water pollution, partly due to lack of sanitation and the negative effects it has on the population. While we have referred to some sanitation issues in the previous sections, when the aspect of sanitation is more closely examined, it is clear that the sanitation sector is not just a subsection of water scarcity; it is its own entity causing its own set of issues.

In Brazil, a main issue of insanitary water is caused by industrial companies. Industrial pollution has led to multiple rivers being no more a source for drinking water (World Bank, 2016). On the other hand, in Nigeria, the sanitation problem stems mostly from fecal matter contaminating the water supply of the population. With this contamination not only does drinking water put the population at risk, the water they bathe in, wash their hands, wash their food, etc. is all dangerous. As detailed in Muta’a Hellandendu (2012), contaminated water can lead to health issues such as malaria, diarrhea, hepatitis, hookworm and many more.

Figure 7: Access to Improved Sanitation Facilities, 1990-2015

![Graph showing access to improved sanitation facilities](image)

Source: Created by author based on World Bank (2017).

Figure 7 shows that there has been significant progress made by Brazil, as their overall access to sanitation facilities has increased from 66.6 percent in 1990 to 82.8 percent in 2015. On the other hand, Nigeria has digressed in the population’s overall access to sanitation facilities from 38.1 percent in 1990 to only 29 percent in 2015. As Figures 8 and 9 show, the largest issue for both countries is the access to sanitation facilities in rural areas. While Brazil has made substantial progress since 1990, still only slightly over 50 percent of the Brazil’s rural population has access to sanitation facilities. In the case of Nigeria, since 1990, less of the both, the rural and urban populations have access to improved sanitation facilities, with the access rates having declined more in rural areas than in urban areas.
IV.3. Water, Sanitation and the Economy

The need for water and sanitation is crucially important for the livelihood of the individuals in each nation as explained above, but the water scarcity puts both country’s economic growth in jeopardy. As shown in figure 10, both countries continue to use more than 50 percent of their fresh water supply for agricultural production.


![Graph showing rural and urban access to sanitation, 1990-2015.](image)

Source: Created by author based on World Bank (2017).

IV.3. Water, Sanitation and the Economy

The need for water and sanitation is crucially important for the livelihood of the individuals in each nation as explained above, but the water scarcity puts both country’s economic growth in jeopardy. As shown in figure 10, both countries continue to use more than 50 percent of their fresh water supply for agricultural production.

Figures 10: Percentage of Annual Freshwater Use in Agriculture

![Graph showing percentage of annual freshwater use in agriculture.](image)

Source: Created by author based on World Bank (2017).
Though both economies do not rely heavily on agriculture (Brazil has lots of industry and services, while Nigeria’s economy is dependent on oil), agriculture remains a vital pillar in both countries’ future economic success. With an increasing plausibility of a water crisis, this potentially leaves Brazil’s and Nigeria’s overall economic performances in trouble. In Brazil, past droughts have had an immense effect on its freshwater supply. As stated in Nobre et al. (2016), it was estimated that droughts have cost Brazil around US$5 billion in one year alone. As shown in World Bank (2016), given that Brazil is the second largest food exporter in the world, Brazil’s looming water crisis will have impacts on the entire world’s food supply as well, especially those heavily reliant on Brazil’s products.

As for Nigeria, the relationship between the economy and the water scarcity is not as direct. Nonetheless, the lack of water can have an immense effect on the country’s GDP and economic performance. As mentioned earlier, in many cases the closest water supply to many families in Nigerian communities is a great distance away. Making the trip to get water for basic needs may take upwards of 5 or more hours each way, which takes children out of school and other family members away from job opportunities (Abui et al., 2016). In the long run, this absence due to the distance of water supplies will have a negative impact on the economy (Ademiluyi and Odugbesan, 2008). Or in worst case scenarios, people with an unreliable water source may fall ill from drinking contaminated water. Causing them to miss work and school for long periods of time depending on the illness (Abui et al., 2016). Whether the effect directly or indirectly related, the lack of access to safe water has a potentially detrimental effect on both country’s GDP and economic performance.

IV.4. Successes and Failures: The Difference between Nations

Interventions to improve the water and sanitation sectors have been attempted in both nations. For Nigeria, these attempts date back to the year 1976 (Abui et al., 2016). As seen in the graphs above, Brazil’s attempts throughout many years have actually lead to progress and improvement. Whether an intervention attempt succeeds or fails depends on a number of factors. In 1996, a successful sanitation sector intervention was seen by Northeastern Brazil. A great deal of construction work was done in order to reach the goal of improving sewage coverage in the region. Prior to the attempt, only 26 percent of families had adequate sewage coverage; after the intervention more than 80 percent of households in the region had sewage coverage. With the improvement in the sewage coverage, the number of those affected by related diseases decreased immensely (Barreto et al., 2010). While this is an example of a successful intervention in Brazil, very little success has been seen by attempted interventions in Nigeria.

There are many reasons why the improvements seen in Brazil are not seen in the country of Nigeria as well; poor fund management, undedicated government, educational issues, etc. A major issue is found in one of these reasons, undedicated government. If the government is not motivated to improve the water and sanitation sectors, there will be no improvement. In Nigeria, there is a pronounced issue with those finding power only wanting it solely for the power and the riches rather than the chance to improve the country and the cities within it (Abui et al., 2016). The difference in successes and sustainability of interventions is reflected in the developmental gap between the two countries (as was provided in the empirical background section above). Throughout many years, Nigeria has adopted multiple programs to improve the water and sanitation sectors from more than 15 different organizations, but has not seen major success (Abui et al., 2016). Although Nigeria has faced troubles in the past with improving the water and
sanitation sectors, there is no reason for the attempts to cease. The only way for Nigeria to find success and for Brazil to continue to have success is for both countries to maintain focus on the water and sanitation sectors until sustainable improvement is achieved.

V. Conclusion

If Brazil and Nigeria continue to work for progress in these sectors, innovative ideas and techniques will emerge. This innovation has already been seen in Brazil, for example the use of rainwater savings to attempt to solve the water crisis. Almost all of Brazil’s regions receive an above average amount of rain, being able to trap this rain and use it for all different needs could be a solution that solves- or helps solve- the very real and dangerous water crisis that is still looming in Brazil. While this tactic will take construction of roofs better equipped to trap rainwater and not all people in every region will be able to attain the rain collection goal, this is still an innovative idea that can be sustained in many regions throughout Brazil (Ghis, 2006).

There have been many ideas for the improvements of these sectors in Nigeria that have just not been implemented. Ideas such as drilling more concrete boreholes to insure consistent water supply, introducing wetlands to help with contaminated sources, etc. (Muta’aHellandendu, 2012). It may be many years before Nigeria finds success within its own regions as it is behind Brazil development wise, however, the key to improving the water and sanitation sectors is to keep the task one of the main priorities of the nation. Brazil should do the same, even though they have begun to see progress sustaining the progress through future droughts and crisis will be the hardest task.

More challenges are coming for these nations. Increased populations, increased deforestation, the increase use of natural resources, the increase of numbers of droughts; these all combine to create a very dangerous and almost inevitable crisis that almost every nation/region in the world will have to handle. Denying this crisis its due attention will only hurt the populations and economies of those nations more than that has already been done.

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Gender-based Education Inequality in China and India

Abigail Murphy

Abstract
This article looks at gender-based education inequality in China and India. Over the last several decades, China and India have seen great improvement in the education sector. However, surveys and statistics suggest that there is still much to accomplish. This article analyzes the different ways gender-based education inequalities permeate their societies and their progression to a more equal education system. It reviews the historical context and views on female education, examines youth and adult literacy rates, years of schooling and school enrollments over time.

I. Introduction
Education inequality is an issue that plagues most of the developing world. In countries still dealing with severe sexism, girls are the first to be left out of educational opportunities when resources are sparse. With education is lacking from the very start, girls are more likely to not make it to the high school level. Early drop outs have devastating effects on these girls, who are subsequently more vulnerable to childhood marriage, teenage pregnancy and so on.

This article will discuss the factors that contribute to gender-based education inequality in India and China. Despite having fast-growing economies, both of these countries face drastic economic disparities that contribute to inadequate education. In addition to this, both countries are still fighting sexist values that have been engrained into their society for thousands of years. Despite improvements over the past few decades, girls in India and China still lack the education they deserve.

Throughout this article, we will discuss how girls are negatively impacted by education inequality. The literature review summarizes several of the most prominent writings on this topic, focusing on how gender-based education inequality affects each country individually. The empirical background provides socioeconomic information about both countries. After foundation is laid by the literature review and empirical background, the discussion section will address the key issues regarding the topic based on analyzing data specific to education. Finally, the conclusion will summarize the topics discussed and propose future measure that both countries can take to address this pressing issue.
II. Brief Literature Review

There is an extensive amount of literature on education inequality in China and India, especially with regards to gender-based education disparities. Hagedorn and Zhang (2010), Liu (2005), and Song, Appleton and Knight (2006) focus on China, while Fuke (2007), Mukhopadhyay (2008), and Sahni and Shankar (2012) focus on India. In each case, these authors look at the degree of gender-based education inequality in these countries and how it negatively impacts the country as a whole.

- Mukhopadhyay (2008) closely analyzes the role of education in the empowerment of women in West Bengal, India. The article proposes that women’s education in India is falling behind despite the country’s economic advancements. It suggests that this is because of the culture in India surrounding women. The article highlights how the importance of marriage and the dowry dramatically hinder a woman’s educational advancement. Lastly, Mukhopadhyay suggests solutions to end the practice of intra-household and social discrimination of women.

- Fuke (2007) uses India as an example of gender disparities in education worldwide. The article looks at how the Education for All (EFA) framework lines up with India’s national strategy for improving education inequality. The way in which negative ideologies about women in India factor into the national strategy towards combatting gender-based education inequality is also discussed in this article.

- Sahni and Shankar (2012) discusses how India’s government on both the national and local levels as failed girls in giving them an equal and adequate education. The article notes that education inequality reform is drastically different based on geographic location. This is related specifically back to India and the extremely different communities in various regions of the country.

- Liu (2005) examines how gender inequality has plagued China for thousands of years. The article discusses how the Confucian ideology, whose have beliefs permeate every aspect of Chinese since the beginning of time, highly discriminates against women and limits their social status. Because of this, changes in education for Chinese women have faced strong resistance. Liu analyzes how cultural biases against women have led to women in the world’s most populous country to fall behind.

- Hagedorn and Zhang (2010) discusses the immense ground China has covered when it comes to decreasing gender-based education inequality. The article discusses how cultural advancements for women in China played into their advancement in education. Some of these cultural advancements include the end to foot binding and the end to China’s One Child policy. This article uses the cultural setbacks Chinese women have faced to explain why women’s education in China is lacking in the modern day.

- Like Sahni and Shankar (2012) discuss for India, Song, Appleton and Knight (2006) examine how geographic location and socioeconomic status affect women’s education. The article discusses how, when families are living in poverty and need more family’s members to work, the girls are the first to be pulled from school. This is especially prevalent in China, where girls are considered to have less worth to a family than their brothers. Song, Appleton and Knight (2006) stress how female enrollment in school through the secondary level is key to any economic or social progress in China.
III. Empirical Background

Figure 1 shows the purchasing power parity (PPP)-adjusted GDP per capita of China and India based on constant 2011 dollar from 1990 to 2015. In 1990, China’s GDP per capita was $1,526, while that of India was with $1,773 slightly above China. Both countries have seen continuous increases in their GDP per capita. China’s GDP per capita increased more than seven times from 1990 to 2015, reaching $13,572 in 2015. India’s GDP per capita increased more than three times from 1990 to 2015, reaching $5,733 in 2015.

**Figure 1: GDP per capita, PPP (constant 2011 international dollar), 1990-2015**

![Graph showing GDP per capita, PPP (constant 2011 international dollar), 1990-2015](image)

Source: Created by author based on World Bank (2017).

Though still impressive overall, India’s progress has been much lower than China’s, especially during the 1990s, which can be explained by differences in economic policies. Following its independence from the British Empire in 1947, India followed import substitution industrialization (ISI)\(^1\) until it experienced a severe balance of payments (BoP) crisis in 1991. Following the BoP crisis, India started to open up its economy in the early 1990s. On the other hand, China started to move towards a market-based economy in 1978, which was followed by an economic boom ever since in China.\(^2\)

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1 As detailed in Mukhopadhyay (2008), import substitutional industrialization is a development strategy replacing imports with domestic production.

Figure 2: Poverty Headcount Ratio at $1.90 a day (2011 PPP, percent of population)

Source: Created by author based on World Bank (2017).

Figure 2 shows the poverty head count ratio in percent at $1.90-a-day (in 2011 international dollars, that is, purchasing power parity (PPP)-adjusted) for both India and China. The $1.90-a-day measure is considered to measure extreme poverty. Over the last 30 years, both China and India have had a continuous decrease in the percent of people living below $1.90-a-day. China’s percentage, although higher than India’s in 1981, decreased at a higher rate than India’s. Somewhere in between 1993 and 2004, China’s percentage of people living in poverty went below that of India.

Figure 3: Poverty Headcount Ratio at $3.10 a day (2011 PPP, percent of population)

Source: Created by author based on World Bank (2017).
Figure 3 shows the poverty head count ratio in percent at $3.10-a-day (in 2011 international dollars, that is, purchasing power parity (PPP)-adjusted) for both India and China. Between 1981 and 1993, both countries had over 75 percent of their populations living below $3.10-a-day. However, similar to Figure 2, China’s percentage of people living below $3.10-a-day has continuously dropped, while India’s poverty decreased at a much slower rate.

Figure 4 shows the life expectancy at birth for both genders in India and China from 1970 to 2015. Overall, females typically have the higher life expectancy than males in both countries, though males had a higher life expectancy than females in India from 1970 to 1983. In 1970, the life expectancy at birth in China for men and women was 57 and 60 years, respectively. In the same year, the life expectancy for men and women in India was 48 and 47 years, respectively. China’s overall higher life expectancy most likely stems from its overall higher quality of life. Poverty is a pressing issue in both countries, but less so in China. Over the course of time, China’s life expectancy increased by about 15 years, while it increased by about 20 years in India. Hence, in the present day, the gap between China’s and India’s life expectancy has been reduced slightly despite that the gap in income per person has become bigger.

**Figure 4: Female and Male Life Expectancy at Birth, 1970-2015**

Source: Created by author based on World Bank (2017).

**IV. Discussion**

There are many aspects of education that can be analyzed from a gender inequality standpoint. This section will first lay the foundation for understanding these disparities in by highlighting the countries’ opinions of female education. Next, it will look at youth and adult literacy rates, focusing specifically on gender disparities. Lastly, it will display the analyze the male and female school enrollment and mean years of schooling.
IV.1. Historical Context and Views on Female Education

Before analyzing specific data on education, it is necessary to have an understanding on both the historical and current educational climate in China and India. There are two subjects that provide brief insight into views on female education: Confucianism in China and the dowry in India.

Confucianism is an ancient Chinese ideology that still has traces in modern China, despite originating thousands of years ago. This ideology emphasized family and social order and rationality. Liu and Carpenter (2005, p. 277) described early women’s education as “severe gender discrimination over five thousand years of civilization. (…) They were excluded from receiving a comparable education to men; Confucian ideology initiated that patriarchal practice.” Many aspects of a woman’s life were considered in comparison to that of a man. This carried over into the importance of male over female education. Despite the fact that education equality improved drastically under the rule of Mao Zedong, this did not change the opinions of female education.

Dowry is a unique factor to problems that stem from deep sexist views in Indian society. A dowry is a transfer of funds to the groom by the bride’s family in return from her hand in marriage. Despite having been outlawed for many decades, dowries are still frequently used in India. As pointed out by Fuke (2007), because it is expected that the male will have the highest level of education, a woman with a substantial amount of education may lead to a costlier dowry. This leads to the family to have to choose between a costly dowry or a girl’s education.

Figure 5 represents data from a survey conducted by the global market and research organization Ipsos. The original survey contained 17,551 responses from people between the ages of 16 and 64 across 24 different countries. The question asked was as follows: “Are men more capable than women in working, earning money, being educated and teaching?” Out of all countries in the survey, China had the highest number of yes answers and India had the third highest number of yes answers.

**Figure 5: Are men more capable than women in working, earning money, being educated and teaching?**

![Chart showing data from a survey conducted by Ipsos.](source: Created by author based on Ipsos Survey (2017)).

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The results from China showed that 62 percent of respondents believed that men were more capable in these areas. In India, the results were not far off with 60 percent responding yes. For context, the United States only had 20 percent of respondents answered yes. 60 percent of respondents answering yes may not seem like a significant statistic, however, this means that the majority of the population in both of these countries believe that men are overall more capable than women. This depicts the societal sexism previously mentioned.

Figure 6 represents data from a survey undertaken by the Pew Research Center (2010). The original survey contained 22,990 responses from people above the age of 18 across 22 different countries. The question asked was as follows: “Do you agree that a university education is more important for a man than a woman?” India had the highest number of yes answers and China had the fourth highest number of yes answers.

**Figure 6: Do you agree that a university education is more important for a man than a woman?**

The results from India were multiple points higher than that of any other country. 63 percent of respondents in India responded yes and 53 percent of respondents in China responded yes. Although having the results right around 50 percent may not seem like a significant figure, these numbers are significantly higher than those of other leading countries in America and Europe. This figure is significant because it shows that when impoverished families are forced to choose between sending a boy and a girl to school, they will continuously choose the boy.4

**IV.2. Youth and Adult Literacy Rates**

Literacy rate is one of the figures most frequently used to understand the overall education level in a given country. Low literacy rates do not only indicate weak education; they may also be seen as instruments leading to further inequality in income, work, and status, especially for women.5 It

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5 Song, Appleton and Knight (2006).
is important to consider not only the literacy rate of the school-age population, but also the adult population as a whole. By looking at both of these statistics, it is easier to see the differences in the past and present state of education.

Figure 7 shows the overall youth literacy rates for China and India. Youth literacy rates are a critical factor in analyzing education in a given country because it shows what percent of the school-age population has received a basic level of education. The data is sparse for the last three decades; however, it is still useful to understand the overall trends in literacy rate. From 1982 to 2015, youth literacy rates for men and women in China rose from 95 percent to 99 percent and from 82 percent to 99 percent respectively. In India, youth literacy rates for men and women rose from 66 percent to 91 percent and from 40 percent to 87 percent respectively. India had the largest overall increase in literacy rates but China had much higher literacy rates to begin with.

**Figure 7: Female and Male Youth Literacy Rate (between the ages of 15-24)**

![Graph showing female and male youth literacy rates](chart)

Source: Created by author based on World Bank (2017).

In addition to looking at this data generally, it is also important to analyze literacy rate discrepancies based on gender. From 1981 to 2015, India had much larger differences in literacy rates between males and females than China. Over this time span, the literacy rate gap dropped from 26 percent to 4 percent in 2015. For China, the literacy rate gap went from 13 percent to nonexistent in 2015. It is important to note that female literacy in China in 1981 was double that of India at the time. This shows that, overall, China’s youth population is more educated than that of India.

Figure 8 depicts the adult literacy rates for both countries. This figure differs from figure 7 because it includes information not only about the 15 to 24-year-old demographic, but rather the entire...
adult population. Like the youth literacy data, the information available between 1981 and 2015 is sparse; however, it is still useful to understand the overall trend. From 1982 to 2015, adult literacy rates for men and women in China rose from 79 percent to 98 percent and from 51 percent to 94 percent, respectively. In India, adult literacy rates for men and women rose from 54 percent to 80 percent and from 25 percent to 62 percent, respectively.

Figure 8: Adult Literacy Rate (percent of ages 15 and above)

Overall, adult literacy rates in China and India have grown over the past three decades. The adult literacy rate for women in China increased by 43 percent from 1981 to 2015: the largest of any other group in this figure. Every group saw an overall increase in literacy over the timespan. Up until 2006, over 50 percent of the adult female population in India were illiterate. Of these women who are literate and attending school, only a few of them will end up reaching the pay level that is required to reach economic independence.\(^6\)

Figures 7 and 8 show the past and present state of education in China and India. The differences in literacy rates, especially in India, between the two figures show how specifically women’s education has improved between 1981 and 2015. Youth literacy rates being higher for women in China and India leads to a positive outlook on the future of education in these countries.

Source: Created by author based on World Bank (2017).

\(^6\) Mukhopadhyay (2008).
IV.3. Evolution of Years of Schooling and School Enrollment

Education is more than just being literate; there is much more for students to learn before they can adequately contribute to society. A formal education can change every aspect of a child’s life. It is crucially important for women in developing countries to receive a formal education because educated women are more likely to send their children to school than educated men are.7

Figure 9 shows the mean years of schooling in China and India. This data is broken down by gender and country and represents the average amount of schooling for individuals over a 25-year timespan. All of the groups saw an increase in the amount of schooling; however, every group started at very different amounts. The mean years of schooling for women in China started at 4.8 and rose to 7.2 while the mean for women in India started at 1.7 and rose to 4.8. The mean years of schooling for men in China started out at 5.2 years and rose to 7.9 while the mean for men in India started at 4.1 and rose to 8.2.

There are large discrepancies in mean years of schooling for women in China and India. In 1990, the mean numbers of years spent in school for women in China was 4.8 years. India had this exact same mean years of schooling, 4.8, 25 years later. Figure 9 shows the fact that women in India on average get two or more less years of schooling than the other groups displayed. The mean years of schooling for females in China is only one year less than that of men in China while the mean years of schooling for females in India is half that of men in India. Women in India not only have less years of schooling compared to women in China but also to the opposite gender in their

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7 Song, Appleton and Knight (2006).
country. Mean years of schooling for women in both countries was increasing until 2014 and has plateaued since.

Figure 10 shows the gender parity index (GPI) for gross primary school enrollment for both countries. The GPI is the ratio of girls to boys enrolled in primary school. A GPI less than one means that there are less girls than boys enrolled. A GPI higher than one means there are more girls than boys. Despite some data gaps (which have been filled by averaging the data for specific years), the figure is still useful to understand the overall trends. From 1971 to 2007, the primary school enrollment for boys and girls approached being equal for both China and India. In 2012, both countries had officially reached a GPI slightly above one. From 2012 to 2015, China maintained a GPI around one, while India’s GPI continued to increase. This can be explained by India’s gross primary school enrollment for girls being above 100 percent (which is due to some girls attending primary school beyond being primary age, like due to having started primary school late or repeating grades). In other words, India’s higher GPI does not necessarily imply that India has a higher net primary school enrollment ratio for girls than China.

**Figure 10: Gross Primary School Enrollment (Gender Parity Index)**

![Figure 10: Gross Primary School Enrollment (Gender Parity Index)](image)

Source: Created by author based on World Bank (2017).

Figure 11, which shows the gender parity index (GPI) based on gross secondary school enrollments, also shows an overall steady increase for both countries. In 1974 (which is the first year with data available for both countries), the GPI for primary school enrollment in China and India were 0.72 and 0.65, respectively. In 1976, the GPI for secondary school enrollment were 0.68 and 0.46, respectively. These lower GPIs for secondary school enrollment than for primary school enrollment indicate that there were less woman continuing onto secondary education than there were men. Fortunately, the secondary school enrollment GPIs for both countries have continued to increase and reached one in 2013 in both countries.
Figure 11: Gross Secondary School Enrollment (Gender Parity Index)

Source: Created by author based on World Bank (2017).

Figure 12 shows the GPI for gross tertiary school enrollment for both countries from the early 1970s to 2015. It shows that India’s GPI is improving more or less continuously. Even though there is a large data gap for China between 1981 and 2002, we can assume that the GPI was increasing for most of this time period. For tertiary school enrollment, China reached a GPI of one in 2008, while India reached a GPI of one in 2015.

Figure 12: Gross Tertiary School Enrollment (Gender Parity Index)

Source: Created by author based on World Bank (2017).
Figures 10 to 12 show that decades ago, less and less women were enrolled relative to men the higher the education level. However, the gender parity gap is getting smaller and smaller (that is, the gender parity index is increasing) over time, and has been mostly eliminated or even reversed during the last few years. This is promising for work and social equality.

V. Conclusion

When it comes to education reform, policy makers often work from the top down; implementing policy to reform the educational system in the hopes of improving standardized testing scores and statistics. However, this is not an effective way to reform. For many countries, there are other factors that contribute to unequal education for men and women. China and India both face different problems regarding gender-based education inequality. However, by closely analyzing data from both countries, it is possible to create custom strategies to curb gender-based education inequality.

China has had great success in equalizing the number of males and females in the classroom and assuring them basic education. The most important action for China to take is to work to maintain this great progress. As previously mentioned, sexist views surrounding education still exist in China today. Because of this, there must be a conscientious effort to maintain female success in education and carry it into the work place and society in general.

Education in India has improved greatly over the past 40 years; however, there is still much work to do before they will reach adequate equality. Like China, India must work to combat indoctrinated sexist views about female education. They must focus on improving literacy rates as a first step in improving education overall. As the two most populated countries with 2.5 billion people combined, the fight for education equality is even more pertinent.

References


Tilling the Earth: Improved Seed Use in Ethiopia and Brazil

Michael O’Neill

Abstract
This article looks at the use of improved seeds in Ethiopia and Brazil, two countries for whom agriculture is an important force but who are at dramatically different levels of development. Brazil has undergone a productivity revolution in agriculture since the 1970s, transforming from a net importer of food to the world’s largest net exporter. Ethiopia is heavily reliant on agriculture for its GDP, yet faces high food insecurity and rural poverty. This article examines how and why gaps exist in the adoption of improved seeds between the two countries. It concludes that Brazil has mounted many of the obstacles Ethiopia now faces, and thus suggests Ethiopia follow Brazil by example.

I. Introduction
Agriculture has been fundamental to the economies of both Brazil and Ethiopia. However, even though both countries are developing countries reliant on agriculture, they are quite different places, and a large part of their divergence can be explained by divergences in agriculture. Brazil is much larger and richer than Ethiopia, and its agriculture has powered its large economic growth in recent decades, while Ethiopia faces widespread poverty, and needs to dramatically improve its agriculture to escape it.

This article explores the idea that Ethiopia today faces many of the same obstacles that Brazil did in the 1970s and has since overcome, and thus suggests Ethiopia follow Brazil by example. It begins by comparing how dependent each country is on agriculture and how that affects the lives of its people. Then, it will narrow its focus onto one facilitator of agricultural intensification, the use of improved seeds, and examine how both countries have met and implemented this opportunity for growth. This is a multifaceted issue, and it is therefore examined in three categories that explain whether or not farmers have ended up planting improved seeds in their land: the seed market structure, production capacity, and policy.

As this article will show, the use of improved seeds, and agricultural technology altogether, has great consequence on the performance of a country’s agricultural sector as well as the daily lives
and food security of its people. Thus, this is an issue of great import and it is intriguing to know why some countries differ on this issue.

II. Literature Review

Most of the research currently conducted on Brazil’s agriculture tends to analyze how the country accomplished the feat of a productivity revolution starting in the 1970s, and often it moves on to addressing Brazil’s current issue of environmental stability, which might be concomitant to such a productivity revolution. For Ethiopia, the literature is generally diagnostic of the various food-insecurity issues the country has faced. As a point of interest, the literatures converge in that many researchers compare progress in Brazil to potential progress in Sub-Saharan Africa, suggesting Brazil can be a model for the region.

*The Economist* (2010) traces Brazil’s agricultural revolution of the 1970s and its relevance today. The article explains that, in the midst of a global panic about food shortage, Brazil shifted from being a large net importer of food to the first “tropical agricultural giant.” The author lauds the model laid forth by Brazil, which focuses on agricultural research, capital-intensive large farms, and openness to trade and new farming techniques. It also argues that the struggling countries of Africa and Asia would more effectively develop by following this example (which includes giant farms, genetically modified (GM) crops, and science instead of subsidy) than by following the contemporary “small and organic” advice. Regarding sustainability, the author argues that Brazil’s intensification in the cerrado (its savanna region), is an example of how to divert activity in the more-precious rainforest.

Ferreira et al. (2012) places more concern on the sustainability of Brazil’s agriculture, citing academic discussions about Brazil’s deforestation, destruction of biomes, and increases in the use of harmful pesticides and fertilizers. The authors present disturbing data in this vein: three of Brazil’s six biomes have lost at least 50 percent of their natural habitats, and the coastal Atlantic Forest has lost 88 percent of its native vegetation. The authors also trace the large gaps in knowledge about the effects of an ecologically changing Brazil, and claim such gaps leave the country open to policy decisions deleterious to its ecology. The authors discuss the Forest Act, an example of a policy aimed at protecting Brazil’s ecology, but one that has been controversial and uninformed by scientific research. Ultimately, they assert, with a stronger channel between scientists and politicians in Brazil, both economic growth and ecological preservation can be harmoniously reached.

Dorosh and Rashid (2012) outlines Ethiopia’s agricultural system. The authors describe the state of food in Ethiopia as a “complex reality,” because of Ethiopia’s great geographic diversity at an extremely local level, and its dramatic fluctuations in governance, policy, and weather shocks. They assert that food security crises owe as much to policy as natural disaster, and explain the ways that better Ethiopian policy can mean better food security by tracing the history of Ethiopia’s government, which was once socialist and has since liberated to a democracy that has privatized and opened up trade. They then describe the current focus of the Ethiopian economy, an initiative called the Agricultural Development-Led Industrialization strategy (ADLI). It has “dramatically” shifted the focus of government investments away from industry and large farms and toward broad-based growth of smallholder agriculture. They maintain this has been very successful, and are optimistic for its continued success, since Ethiopia’s recent improvement in agricultural production and markets has, among other things, markedly increased household consumption and almost halved poverty.
Baye (2017) points to the Ethiopian cultural fabric surrounding farming. She explains that Ethiopian peasants have continually been content with subsistence farming, and that traditionally, Ethiopians have practiced polyculture farming, meaning the regular rotation of various crops and livestock to meet the nutritional needs and security of one’s family and community. Traditionally, peasant farmers have dedicated only a small portion of their efforts to growing cash crops to bring to the markets. Above this backdrop, Baye claims, as Ethiopia reached the 20th century, several problems arose. First, governmental efforts to control and divide portions of land disconnected farmers and stripped their power to subsistence farm. Second, under these new divisions, Ethiopia’s regular low productivity became a bigger problem. Under the free polyculture system, diversity of crops made up for low yields; under the fragmented system, emphasis on production highlighted Ethiopian deficiencies in seed selection, fertilization, and land fertility. Hence, Baye (2017) highlights the shortcomings of the government before its 1974 reforms and traces their implications today.

III. Empirical Background

This empirical background section provides an overview of the stages of development Brazil and Ethiopia have reached, which has implications on the importance of agriculture and the stakes for agricultural growth in both countries. As Figure 1 shows, Ethiopia is a much poorer and far less developed country than Brazil. Throughout the period of 1990 to 2015, Brazil’s GDP per capita has dwarfed Ethiopia’s: Until 2015, the average Ethiopian person had never reached even 1/10th of the GDP per capita of an average Brazilian person.

**Figure 1: Brazil's and Ethiopia's PPP-adjusted GDP per capita, 1990-2015**

![Graph showing GDP per capita, PPP (constant 2011 international $)](image)

Source: Created by author based on World Bank (2017).
Food insecurity is regularly high in Ethiopia, even in years when the country is free from natural disasters like droughts. Examining some poverty and health indicators, it is clear that Ethiopia has far greater strides to make in ensuring the wellbeing of its people. The World Bank (2017) data show sobering concerns for Ethiopia: For instance, as of 2015, 32 percent of the Ethiopian people are undernourished based on a measure of adequate dietary energy. Comparatively, Brazil is currently in a much better position. Based on World Bank (2017) data, Brazil’s undernourished population has been below the 5-percent threshold since 2005, though still a distressing issue, recognized to be statistically nominal. A comparison of the evolution of this measure in both Ethiopia and Brazil can be seen in Figure 2.

![Figure 2: Percentage of Total Population Undernourished in Brazil and Ethiopia](source)

Given the lack of food, many Ethiopian children are stunted, underweight, and experience wasting. Based on World Bank (2017), as of 2014, in children under 5 years of age, the prevalence of stunting stood at 40.4 percent in Ethiopia (compared to 7.1 percent in Brazil), the prevalence of underweight children was 25.2 percent in Ethiopia (compared to 2.2 percent in Brazil), and the prevalence of wasting (which is defined as the proportion of children under age 5 whose weight for height is more than two standard deviations below the median for the international reference population ages 0-59) was 8.7 percent in Ethiopia (compared to 1.6 percent in Brazil).

Ethiopia’s economy is also currently much more reliant on agriculture than Brazil’s. As of 2015, Ethiopia’s agricultural industry accounted for 40.9 percent of its GDP, while Brazil’s agriculture accounted for 4.9 percent of its GDP. In 1973 and 1984, Ethiopia experienced two major famines. This was at a time when agriculture made up closer to 60 percent of the Ethiopian economy, and hence, these disasters had devastating effects not only on the country’s food security and citizens but also on its GDP, manifest in 1984 and 1985 when Ethiopia’s GDP fell 2.8 and 11.1 percent, respectively (World Bank, 2017).
Brazil, meanwhile, has transformed economically since the 1970s. Though agriculture hasn’t historically been nearly as instrumental to the Brazilian economy as the Ethiopian—only comprising 12.4 percent of the GDP as far back as 1970—Brazil still more transformed to its current rate of 4.9 percent. Brazil has recently become a Newly Industrialized Country (NIC), which, somewhat ironically, has hidden the exceptional growth and revolution of its agricultural sector beneath the meager performance of its industrial and service sectors in the last 40 years (Chaddad 2016). Brazil and Ethiopia’s annual GDP growth in percent and annual value-added agricultural growth can be seen beside each other in Figure 3, clearly demonstrating a stronger link between the movement of the two in Ethiopia. (Data for Ethiopia did not begin being collected until 1982, while Brazil’s began in 1970.)

Figure 3: Ethiopia’s and Brazil's Growth in GDP and Value-added Agriculture

![Ethiopia's Annual GDP Growth and Value-Added Agricultural Growth](image)

![Brazil’s Annual GDP Growth and Value-Added Agricultural Growth](image)

Source: Created by author based on World Bank (2017).
Correlation analysis further shows the respective links of agricultural growth to total GDP growth in these two countries. Figure 4 shows the scatterplots of Brazil and Ethiopia’s annual GDP growth as explained by annual value-added agricultural growth: In Ethiopia, there is an extremely strong correlation between the two, with a correlation coefficient of 0.835. In Brazil, there is a weak correlation of 0.137.

**Figure 4: Ethiopia's and Brazil's Correlation between GDP Growth and Value-added Agricultural Growth**

Brazil’s agriculture is now commonly seen as a model for African countries like Ethiopia. Nonetheless, Brazil’s agricultural productivity revolution is an exception to the rest of the country’s economic performance: it occurred *despite* the country’s productivity on the whole being relatively low and stagnating since the 1980s. One useful indicator to review is growth rate of total factor productivity (TFP), which is a ratio of output to input showing production efficiency. As
shown in Table 1, there is a large discrepancy between Brazil’s TFP in agriculture and Brazil’s TFP of the whole economy. The data here point to the fact that, while Brazil’s agricultural sector has largely been a success story, the country faces several other economic obstacles that continue to qualify it as a developing country.

Table 1: Total Factor Productivity (TFP) Growth in the Brazilian Economy (1971–2012)

<table>
<thead>
<tr>
<th>Period</th>
<th>TFP growth (percent) [Source: Bonelli (2013)]</th>
<th>TFP growth (percent) in agriculture [Source: Gasques et al. (2014)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971–1980</td>
<td>2.0</td>
<td>N/A</td>
</tr>
<tr>
<td>1981–1990</td>
<td>-1.2</td>
<td>2.22</td>
</tr>
<tr>
<td>1991–2000</td>
<td>0.3</td>
<td>3.47</td>
</tr>
<tr>
<td>2001–2012</td>
<td>0.8</td>
<td>4.06</td>
</tr>
</tbody>
</table>

Source: Chaddad (2016), Table 1.5, p. 10.

Finally, the stakes are higher for Ethiopia’s agriculture because far more of Ethiopia’s population, and impoverished population, lives in rural areas, with limited city and market access. As of 2015, 80.5 percent of Ethiopians lived in a rural area, and that number is growing— it grew 1.9 percent in the same year. Meanwhile, only 14.3 percent of Brazilians lived in a rural area in 2015, at a growth rate of -0.9 percent that year. Further, agriculture accounts for the employment of three-fourths of Ethiopians, and 90 percent of the poor live in rural areas (Dorosh and Rashid, 2012).

Ethiopia is uniquely un-urbanized: in 2015, the country was 19.5 percent urban while its surrounding region, Sub-Saharan Africa on the whole, was 38 percent urban. Though Ethiopia continues to make strides in its market access, as of 2009, 45 percent of Ethiopians still lived more than 5 hours from a city of 50,000 people (Schmidt and Kedir, 2009). Hence, Ethiopia is an agriculture-based country and the best and most immediate way to reach the country’s many impoverished people (33.5 percent of the country living below $1.90 a day in 2010) is through agriculture. As the World Bank (2008) World Development Report 2008: Agriculture for Development outlines, a productivity revolution for Ethiopia’s many smallholding farmers is in order.

IV. Ethiopia’s and Brazil’s Use of Improved Seeds

IV.1. Agriculture and Productivity: Cereal Yield

While Ethiopia is strongly dependent on its grain production for the survival of its people, the country faces low cereal yields. As shown in Figure 5, as of 2014, Ethiopia’s cereal yield per hectare of harvested land was almost exactly half that of Brazil. While Ethiopia’s yield lags, the rate has grown markedly since the 2000s, and is ahead of the average rate of its Sub-Saharan African neighbors, so there is reason to be optimistic about the future. Interestingly, Brazil’s yield has skyrocketed even more in recent years, almost doubling since 2000. This can be accounted for by the technological advancements Brazil’s agricultural system has made.
IV.2. Agricultural Technology: Improved Seeds

One of the main drivers of increased crop yields is the use of improved seeds. These are seeds that are developed, through organic or chemical methods, to have desirable qualities, especially higher yields and the ability to survive in adverse conditions like unfamiliar climates. There are three types of improved seeds: “open-pollinated seeds,” which are created by selecting and saving desirable naturally reproduced seeds; “hybrid seeds,” which are created by cross-breeding two desirable plants, and which lose their effectiveness and cannot be replanted after one season; and “genetically modified seeds,” which are created by inserting any desirable gene from an organism into a plant’s genome (Cho, 2013).

IV.3. Ethiopia’s Improved Seed Use

As Spielman et al. (2011) point out, the use of improved seeds has been historically sparse in Ethiopia, and though use has risen in recent years, the gains have been inconsistent and volatile. The dissemination of improved seeds through market forces is a tricky situation. Since there are extensive research and development (R&D) costs, and farmers can replant open-pollinated and genetically modified seeds effectively for many seasons without needing to buy new seeds, it is hard to have a profitable improved seed business.

Thus, in Ethiopia, widespread adoption of improved seeds has been difficult, and as of 2007–2008, improved seeds covered an average of only 4.7 percent of Ethiopian cropland, as shown in Figure 6. Even Ethiopian wheat, which diverges from this figure in being predominantly improved — 71 percent of Ethiopian wheat was in 2002 — points to a larger issue; a 2005 study showed that only 43 percent of the area under improved wheat varieties was sown with varieties released since 1995 (Spielman et al., 2011). That is, the rest of those seeds have been continually replanted, free of charge, since then. As this is undoubtedly a disincentive for a capitalistic seed market, the production and distribution of improved seeds has been largely left into the hands of a state-owned
The Ethiopian Seed Enterprise (ESE), and the endeavor has been largely stagnant since around 2000.

**Figure 6: Area Under Improved Seed Application and Quantity of Improved Seed Distributed (Cereals Only), 1993/94 to 2007/08**

![Graph showing area under improved seed application and quantity of improved seed distributed from 1993/94 to 2007/08.](image)

Source: Spielman et al. (2011), Figure 3.1, p. 11 (referring to Ethiopia, CSA (various years) as source).

### IV.4. Issues with Ethiopia’s Improved Seed Market

Still, Ethiopian farmers want new improved seeds and recognize their transformative ability. The issue, however, is that the public improved seed system in Ethiopia consistently fails to supply the amount of seed demanded by farmers. In 2008, the supply of improved seeds in Ethiopia’s five major cereals fell short of demand by 72 percent.

One of the main reasons this figure consistently falls short is the insufficient provision of improved seeds by Ethiopia’s research system to be multiplied and produced. In charge of R&D and the following provision of seeds are federal and regional research centers and universities, and inefficiencies at these institutions have often resulted in major issues for seed production. Mainly, government officials recognize that the public funds allocated to universities for agricultural research are inadequate, and that universities themselves lack valid infrastructure and qualified researchers (Belete, 2014). Indeed, formal academia is rather nascent in Ethiopia: from 2000 to 2011, the number of Ethiopian universities quickly grew from 2 to 32. Undergrad and postgrad enrollment both more than doubled in this short period. However, research in Ethiopian universities did not see a commensurate growth, and is today clustered in only a handful of universities, likely because of the obstacles cited above. Hence, Ethiopia’s research activities do not meet the demands for growth by the country’s industry. A private company cannot expect to stay in business with a meager and sporadic supply of input: Without a sense of stability, private companies are not incentivized to enter the seed business.

With the R&D wing of the seed market remaining a public endeavor, along with the above disincentives for private seed companies, those who do choose to enter the seed market often end
up serving as subcontractors for the public Ethiopian Seed Enterprise. Thus, the ESE’s pricing dominates the market. This discourages private enterprise because the ESE sets a rigid 5 percent profit margin pricing on its seeds, which is not enough for private companies to recoup their investments in production. While to some degree, the nature of improved seed development requires public help, since there is a long and often-expensive R&D period and farmers’ replanting can fizzle out investments, there nonetheless is a strong market for private production and retail distribution even in other Sub-Saharan African countries, yet Ethiopia remains dominantly public in this realm.

IV.5. Issues with Ethiopia’s Improved Seed Production

While Ethiopia’s public seed market’s structure presents many challenges for the dissemination of improved seeds to farmers and thus for agricultural intensification, there are also closely related issues in the production of improved seeds that contribute to the supply and demand gap (as mentioned, supply was short 72 percent for the five major cereals in 2008).

Of the seeds they have received, Ethiopian farmers have long reported two issues. The first is receiving defective seeds, which may be dirty, broken, and/or not germinating. The second is of not receiving seeds in a timely manner. If not received promptly, farmers can either have on their hands seeds past their optimal planting time or seeds rendered ineffective after changes in weather conditions. As Dorosh and Rashid (2012) highlight as a central complexity to Ethiopian agriculture, Ethiopia is both regionally and climatically diverse on an extremely local level, so environmental conditions hinder the potential for sweeping agricultural initiatives.

The volatile Ethiopian environment also explains the inadequacy of the production itself of improved seeds. When there are droughts in Ethiopia, seed production falls just as crop production does. The ESE’s precipitous drop in seed production during the severe 2002–03 drought in Ethiopia can be seen in Figure 7. A remedy for this is to grow seeds on irrigated land, and since irrigated land is sparse in Ethiopia, the expansion of which is an urgent endeavor (Spielman et al., 2011).

**Figure 7: The Ethiopian Seed Enterprise’s Raw Seed Production from 2000 to 2008**

![Figure 7: The Ethiopian Seed Enterprise's Raw Seed Production from 2000 to 2008](image)

Source: Spielman et al. (2011), Fig. 3.6., p. 16 (referring to Ethiopia, ESE (various years) as source).
Furthermore, Ethiopian smallholding farmers themselves are often used as contract growers of improved seeds for the ESE. All the diverse issues of market, policy, and environment impinge on farmers’ production here. For one, poor weather translates to poor production. For another, the ESE pays its contract farmers a 15 percent premium over grain market prices for good seeds, but the volatile grain market incentivizes smallholders to default on these contracts (Spielman et al., 2011): Since grain prices rise at planting time and fall at harvesting time, farmers are tempted to sell the seeds when they get them (perhaps after receiving them late or rendered suddenly inappropriate for local weather changes, anyway) on the market instead of working to grow them only to receive a lower price from the ESE. In effect, this hinders the ESE’s ability to bulk up on the improved seeds they want, which, in the long game, would help the private market and smallholders themselves, making it a vicious cycle.

IV.6. Issues with Ethiopia’s Improved Seed Policies

One of the largest hindrances to an active private improved seed market in Ethiopia is the country’s failure to secure intellectual property rights (IPRs). IPRs would grant the innovator of new seeds better ability to recoup investment costs after demanding payment from farmers who choose to use their seeds, which is currently not a reality in Ethiopia. In fact, IPRs are a relatively new concept in Ethiopia; the country’s first patent law was established in 1995 and it was not implemented until 1997. A national system for intellectual property did not begin until 2003, with the establishment of the Ethiopian Intellectual Property Office (EIPO) (Belete 2014). Still today, Ethiopia is not a member of the World Trade Organization (WTO), the organization through which other countries sign treaties honoring international IPRs. A widespread culture of disregard for international IP3s thus exists in Ethiopia; in two examples, Ethiopian shopping malls commonly have pirated movie kiosks, and Ethiopian companies frequently copy the branding of international companies (*The Economist* 2017). Local officials generally show little care for violations of international IP like these, and this translates to attitudes toward domestic IPRs.

The Ethiopian government has recently begun advocating for more IPR laws and stronger enforcement in hopes of attracting foreign investors and becoming more competitive in the global market. As well, Ethiopian officials have debated heavily about whether the country’s universities should claim IPRs on innovations (including agricultural ones) made by their researchers as a way to commercialize their findings and transfer them into real industry. Officials in government, higher education, and industry alike cite that there is an issue with the connection between university research and industry application in Ethiopia.

But research done by Belete (2014) concludes that up and down the system in Ethiopia, gaps in knowledge about IPRs and the ability to implement them seriously inhibit IPRs’ potential to advance the country’s agriculture and industry on the whole. Belete (2014) finds that Ethiopian academics often don’t know about intellectual property and rarely consider IPRs as a tool for transferring research outputs to industry. As well, they stress that industry application is not their primary goal. Moreover, Ethiopian industries are overwhelmingly ill-equipped to incorporate new research from universities, often lacking the skills, technology, and training to, and the capacity to take the risks this entails. Governmental organizations, such as the EIPO, lack the training, experience, and knowledge to seriously handle patent applications and draft beneficial policies.
IV.7. Brazil’s Improved Seed Use

Brazil, meanwhile, has overcome many of the obstacles Ethiopia now faces. Researchers widely believe that without Brazil’s major advances in agricultural technology—particularly, the development of seeds viable to grow in its *cerrado* region (a tropical savanna once thought infertile)—its agricultural revolution would not have happened. Today, Brazil has a robust improved seed industry. In 2009, more than 2.17 million tons of seeds were produced in Brazil (Morin, 2010). Brazilian farmers use improved seeds at a very high rate in absolute as well as relative numbers, partially because Brazil is home to many large agribusinesses oriented toward production and export. Even still, rates of improved seed use are high for crops sold predominantly domestically as well. In fact, as shown in Table 2, as of 2010, domestic sorghum seeds were 90 percent improved and domestic corn seeds were 84 percent improved.

**Table 2: Brazilian use of improved seed for selected crops (in tons of hectares)**

<table>
<thead>
<tr>
<th>Crop</th>
<th>Production 07/08 (t)</th>
<th>Production 08/09 (t)</th>
<th>Area Planted 08/09 (ha)</th>
<th>Area Planted 09/10 (ha)</th>
<th>Effective Demand for Improved Seed</th>
<th>Potential Demand for Improved Seed 1/</th>
<th>Level of Utilization to Seed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybeans</td>
<td>1,242,839</td>
<td>1,290,788</td>
<td>20,831,900</td>
<td>23,239,000</td>
<td>892,378</td>
<td>1,394,341</td>
<td>64</td>
</tr>
<tr>
<td>Corn</td>
<td>292,867</td>
<td>232,595</td>
<td>14,409,810</td>
<td>13,030,200</td>
<td>218,907</td>
<td>260,604</td>
<td>84</td>
</tr>
<tr>
<td>Wheat</td>
<td>275,621</td>
<td>337,703</td>
<td>2,403,000</td>
<td>2,428,000</td>
<td>244,742</td>
<td>339,920</td>
<td>72</td>
</tr>
<tr>
<td>Irrigated Rice</td>
<td>81,210</td>
<td>83,932</td>
<td>2,026,100</td>
<td>1,982,400</td>
<td>130,838</td>
<td>237,888</td>
<td>55</td>
</tr>
<tr>
<td>Dry Beans</td>
<td>14,798</td>
<td>48,115</td>
<td>4,183,200</td>
<td>3,789,600</td>
<td>25,011</td>
<td>227,376</td>
<td>11</td>
</tr>
<tr>
<td>Sorghum</td>
<td>8,137</td>
<td>8,665</td>
<td>798,000</td>
<td>780,600</td>
<td>7,025</td>
<td>7,806</td>
<td>90</td>
</tr>
<tr>
<td>Cotton</td>
<td>6,945</td>
<td>10,291</td>
<td>747,100</td>
<td>836,000</td>
<td>5,518</td>
<td>12,540</td>
<td>44</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,072,614</strong></td>
<td><strong>2,174,872</strong></td>
<td><strong>46,713,829</strong></td>
<td><strong>47,207,200</strong></td>
<td><strong>1,569,442</strong></td>
<td><strong>2,583,251</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note: 1/ Potential seed demand is total seed use in Brazil and effective seed demand is current improved seed use.

3.8: Brazil’s Improved Seed Market

Brazil’s improved seed market begins with a strong research system. A crucial factor in Brazil’s development of this system was the country’s establishment of various graduate education programs in the agrarian sciences in the mid-20th century (Ramalho et al., 2012). The first Brazilian course in Plant Genetics and Breeding was established at ESALQ (The Luiz de Queiroz College of Agriculture) in 1969. Interest in studying the agrarian sciences was small and concentrated in Brazil until the creation of EMBRAPA (The Brazilian Corporation for Agricultural Research) in 1973, which was spearheaded by the Brazilian Ministry of Agriculture, Livestock, and Food Supply. Hence, by largely a federal effort, EMBRAPA created agricultural research jobs in Brazil that sought candidates educated in agrarian sciences at a graduate level. This created a pragmatic and covetable position in Brazilian society to research agricultural technology.

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1 The author recreated the table and corrected the numbers for potential demand for improved seed for soybeans and cotton based on the level of utilization to seed (last column).
Still, strong research alone is not sufficient to power a seed market; crucial is the connection between R&D and production, as we have seen as a shortfall in Ethiopia. Hence, for Brazil’s seed market to have grown in this early period, it required attracting private businesses. As I will explore more below, this was largely accomplished by Brazil’s securing of IPRs for improved seed innovations. As a result of IPRs, starting in the 1990s, large corporations began acquiring domestic seed companies and negotiating licensing agreements with research institutions like EMBRAPA, linking innovation to production after finding profit in the seed industry.

Two companies that played a seminal role in Brazil’s developing improved seeds and making them available to farmers were Fundação Mato Grosso (FMT) and Coodetec (Chaddad 2012). Coodetec began as a research wing for a state-level farming cooperative in 1974. The cooperative funded this first project through the combination of public funds from the Wheat Research Fund and the Soybean Research Fund and local investments from farming cooperatives who were desperate for higher yields. When Coodetec developed its first improved seeds in the early 1980s, before IPRs were established, it was able to survive without royalties because of the regular contributions cooperatives made during the research stage in lieu. It was not until Brazil began protecting IPRs that Coodetec was emboldened to convert its research wing into a commercial seed company, seeing the new opportunity for profit from R&D. This was a correct estimation, as Coodetec’s revenues eventually increased from about US$1 million in 1995 to more than US$100 million in 2013, and its wheat seeds comprised 26 percent of Brazil’s national market share in 2003, showing the importance securing IPRs had in Brazil for the growth of improved seed research and the agricultural industry.

Fundação Mato Grosso (FMT) is an important case because it evinces the power state–industry cooperation had in developing the Brazilian improved seed market. FMT was founded in 1993 in response to shortcomings by Brazilian state research. Frustrated with EMBRAPA’s funding obstacles, FMT was born deciding to, again, as with Coodetec, receive its funding from farming cooperatives. For the success of its research, FMT was dependent on the agreement it then signed with EMBRAPA to use its germplasm for soybeans and to test seeds in various regions throughout Brazil. Without the agreement, FMT would not have had the wherewithal to produce the rapid innovations it then did in improved seeds, including soybean seeds finally able to flourish in the cerrado. By 1998, 77 percent of all soybean seeds produced in the state of Mato Grosso were developed by the EMBRAPA–FMT partnership (Chaddad, 2012). FMT was able to flourish by having the autonomy and financial incentive to innovate in addition to EMBRAPA’s resources, namely germplasm. Such a model should be compared to the situation in Ethiopia, where private entities have difficulty breaking away from being mere subcontractors of the ESE.

IV.9. Brazil’s Improved Seed Policy: Intellectual Property Rights

As we see a pressing systemic issue today in Ethiopia, until the mid-1990s, R&D efforts in plant genetics and breeding in Brazil were chiefly carried out by public institutions. Similar to Ethiopia, Brazil did not strongly protect researchers’ control over their improved seeds with IPRs. Producers given newly developed seeds for trial-runs were capable of saving them and replanting them without having to compensate the researchers (Chaddad, 2012).

However, in 1994, Brazil signed the WTO agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) and then began legislation to protect private intellectual property, a move which, as stated above, Ethiopia has yet to make. As a result, Brazil has since enacted several laws protecting the intellectual property of plant breeders, including the Plant Variety Protection Law.
Thus, a framework was set up in Brazil that assured private companies they’d be protected in their investments in R&D and that economically incentivized innovation by granting companies the ability to collect royalties and technological fees. As of April 2015, Brazil had 2,629 different plant cultivars protected (Campello Afonso, 2015), while, in Ethiopia, formal protection continues to be lacking. Brazil’s success of the seed industry since introducing IPRs suggests Ethiopia should similarly embrace IPRs.

IV.10. Effects of Improved Seeds on Brazil’s Agriculture

Brazil’s enabling factors of an incentivized class of agricultural researchers and protected intellectual property have had enormous consequence on its agricultural development. Even before intellectual property was secured, Brazilian innovations through research created long-unthinkable agricultural realities. In an instance, up until the late 1970s, barely any Brazilians ate apples: they were a “special-occasion” food, reserved for Christmas or a sick child; they were expensive and almost always imported. Since that time, with the introduction of clones and with artificial selection under south Brazil’s conditions, Brazil has not only met domestic demand for apples but has also become an exporter of them (Ramalho et al., 2012). Across the board, Brazil has made large advances in crop yield since 1974, a year when graduate study in agrarian science began in earnest and EMBRAPA was recently created.

Further, looking at the data for Brazil’s growth in cereal yield may lend insight into the role of intellectual property rights on intensification. The data from 1975 to 2014 show an average annual growth in cereal yield of 3.6 percent. However, up until 1994, when Brazil signed the WTO agreement on TRIPS, growth in yield averaged 3.2 percent; from 1995 to 2014, the average rate grew to 3.98 percent. After 1997, when Brazil enacted the Plant Variety Protection Law, the average rate until 2014 grew to 4.07 percent. Of course, this is not to imply direct causation. Still, as can be seen in Figure 5 above, Brazil’s cereal yield saw large spikes in growth in the period from 1995 onward that were not present beforehand. As well, the largest absolute growth in cereal yield came at +593.3 kg per hectare in 2003, the year the Seed Law was enacted.

V. Conclusion

As this article discussed, Brazil’s agriculture has transformed in the last forty years. Brazil has gone from a net importer that relied on food aid to the world’s largest net exporter. Ethiopia is currently facing many of the agricultural obstacles Brazil has recently mounted, and today, the survival of Ethiopia’s economy and its people is dependent on large gains in agricultural productivity. As Ethiopia is overwhelmingly rural and the majority of its citizens work in agriculture, a productivity revolution is now crucial to eradicating the country’s poverty. While the country has recently made bounds, it continues to struggle with this, especially with the widespread adoption of improved seeds.

However, Ethiopia’s obstacles in adopting widespread improved seeds are surmountable, as we have seen in Brazil. First, the country needs to begin securing intellectual property rights. This is the main reason private companies entered the Brazilian seed market; without IPRs, they saw the market as unstable and unprofitable. However, securing IPRs is not a hit-and-run deal. Many Ethiopians need comprehensive knowledge and training in IPRs, and the culture needs to change to see the value in protecting IPRs. Furthermore, the adoption of IPRs must be part of a bigger holistic strategy to improve Ethiopian life. As stated in The Economist (2017), one Ethiopian lawyer asked, referring to Ethiopia’s mass poverty: How would we pay for intellectual property?
As poverty remains widespread and devastating in Ethiopia, the country must secure IPRs in concurrence with several other human development programs that focus on uplifting impoverished Ethiopians. Efforts to increase education and household-income are essential.

In sum, for the growth of the Ethiopian seed industry, a steady federal hand needs to guide an economic matrix that incentivizes rigorous research and industrial profit while at the same time prioritizing improving the lives of poor Ethiopian farmers. This is no small feat, but Ethiopia’s recent progress in development affords confidence.

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The Girls of Our Future: 
Gender Inequality in Pakistan and China

Sophia Paynter

Abstract
This article looks at gender inequality in China and Pakistan. Both countries have histories of having issues with gender inequality, some are similar in both countries, some are different across the two countries. This article reviews the progress made in China and Pakistan on the issues of a) women’s education status, b) women’s lack of access to health services, and c) women’s place in the workplace. We show that China has largely eliminated its previous gender gap in education, Pakistan has made very little progress in terms of educational inequality. While China has a relative high rate of abortions, Pakistan has a high adolescent birth rate. Both countries continue to struggle with giving women equal opportunities in the work place.

I. Introduction
Of the eight Millennium Development Goals (MDGs) established by the United Nations in 2000, perhaps one of the most important and urgent goals is MDG-3: Promote Gender Equality and Empower Women. Women brought us into this world. It is unethical and unreasonable that there are distinctions in the way men and women are treated in developing countries. Promoting gender equality and allowing women equal rights would be beneficial to society as it would promote economic growth and reduce poverty.

According to Chaudhry and Rahman (2009, p. 164-165), in Pakistan, “[m]ale members of the family are given a better education and are equipped with skills to compete for resources in public arena, while female members are imparted domestic skills to be good mothers and wives. They are given limited opportunities to create choices for themselves in order to change the realities of their lives.” Nasrullah and Bhatti (2012, p. 273) state that “Pakistan is challenged with gender inequalities, and despite efforts, there is a wide gap between males and females in terms of employment opportunities, paid work, access to health services and health outcomes.” Pakistan is known for being one of the worst countries when it comes to women’s inequality. These two quotes are just a glimpse into ways women are discriminated in Pakistan.

On the other hand, despite multiple claims and statements that China is also among the countries with many issues of gender inequality, a report by the World Bank and Asian Development Bank (2006, p. 7) argues that “China has achieved a great deal through its efforts at implementing the basic state policy of equality between men and women in social economy and political affairs.”
However, Bauer et al. (2009, p. 334) challenge that statement by arguing that “[a]lthough the government has been quite successful at increasing women’s participation in the paid labor force, our research supports arguments that participation alone will not ensure equality between women and men nor will their participation necessarily upset the traditional sex-gender system.” There are mixed claims on China’s status regarding women’s inequality as a whole. As this article will show, while many indicators have improved significantly in China, there is still much to do in terms of eliminating gender inequality in China.

Following this introduction, this article provides a brief review of the literature. The third section provides some socio-economic background of the two countries. The fourth section examines three key aspects of gender discrimination: education, health, and employment. The article closes with some conclusions.

II. Literature Review

There is a large amount of information and data on gender inequality in Pakistan and China. Chaudhry and Rahman (2009), Nasrullah and Bhatti (2012), the World Bank (2005), and Salik and Zhiyong (2014) focus on Pakistan, while Bauer, Feng, Riley, and Xiaohua (1992), Stockman (1994), Song and Bian (2014), and a joint World Bank and Asian Development Bank (2006) report focus on China. All these publications focus on gender practices and inequalities that the two countries have faced and possible ways to move forward to improve the situation.

- Bauer, Feng, Riley, and Xiaohua (1992) focus solely on gender inequality in urban China and the position that women hold in urban Chinese society. They examine a variety of different aspects of inequality and how it is present, such as in education and employment. They point out many of the improvements that China has made in these topics but also the hardships and negative aspects.

- Chaudhry and Rahman (2009) investigate the impact of gender inequality in education on rural poverty in Pakistan using Logit regression analysis on primary data sets. They conclude that gender inequality in education has an adverse impact on rural poverty. They also come to the conclusion that household size and the female-male ratio have a strong positive association with the probability of poverty and that more education for girls would provide more employment opportunities for women and reduce poverty in Pakistan.

- Nasrullah and Bhatti (2012) focus more on the issues of gender inequality that make it difficult, or even impossible, for women to have health services in Pakistan. They write (on p. 273) that “male infants enjoy more family resources and care in terms of better nutrition and healthcare access than females of the same age” and that “female children are, therefore, susceptible to face more neglect and live in poor health compared to male children.” Furthermore, they explain how the poor health conditions/resources that women have affect their daily lives in many aspects.

- Salik and Zhiyong (2014) examine the reasons why there is discrimination toward women in higher education in Pakistan. They also explain the impact of that on women, and conclude by providing a declaration of prospects for the future.

- Song and Bian (2014) examine the inequality women face in China’s health care system. They explore whether gender differences exist in the use of health care by analyzing hospital admission, duration of hospitalization and medical expense of both genders in a Chinese hospital based on 156,887 patients, who were admitted for any reason to hospital in the Zhuhai Special Economic Zone between 2003 and 2009. While the average age and the duration of hospitalization were significantly greater among men, a larger proportion of hospitalized female underwent surgery compared to male. The total medical expense per inpatient indicated important differences between
genders, with higher expenditures observed among men. Furthermore, gender differences were observed in length of hospitalization and medical expense for five common conditions respectively and most differences favoring men were significant while differences favoring women were not significant. Among all the self-paid patients, men were also superior in all investigating variables compared with women. Based on these results, Song and Bian (2014) conclude that there are gender differences in the use of health care in China, which can partly be explained by social power relations. They therefore suggest that China should increase attention to gender and equity in health.

- Stockman (1994) proposes that there have been changes in gender inequality patterns in urban China in terms of the specific interrelationships of production and reproduction in Chinese work-units. After sketching out the historical background of the structural conditions for gender inequality in pre-revolutionary Chinese society, Stockman (1994) emphasizes the lack of institutional separation of household and enterprise, which has been conducive to the relatively greater gender equality achieved in communist China, while the more recent reforms introduce pressures to separate productive and reproductive functions, which are likely to erode the trends towards greater gender equality.

- A joint report by the World Bank and Asian Development Bank (2006) examined women’s inequality in China by focusing in on specific topics: population, health, education, employment, and governance. They provide lots of relevant information and scenarios and even explain how some of these things have improved for women.

- The World Bank (2005) examined the combination of social and cultural norms and the lack of opportunity for Pakistani women and how those things affect women’s lives. The authors provide many key issues regarding the lack of opportunity they face and provide possible solutions as well.

III. Empirical Background

The Islamic Republic of Pakistan is a South Asian country with a population of about 198 million. The common religious practice is Islam, which – the way it is interpreted and practiced – places many restrictions on women regarding the type of education they can get, what type of job they can work, what they can wear, and even their access to contraceptives.¹

The People’s Republic of China is an East Asian country. It is the world’s most populous country, with a population of around 1.4 billion. The language spoken is Chinese, and there is no primary religion that is widely practiced in China. The Chinese people have freedom of religion and there are therefore multiple different religions throughout.²

Figure 1 shows that China experienced a large and steady increase in its GDP per capita from $1,526 in 1990 to $13,572, which is a nearly ten-fold increase. On the other hand, Pakistan (which actually had a higher GDP per capita than China in 1990), experienced a very limited increase in its GDP per capita during most of the 1990s. Pakistan’s income per capita increased slightly from 2001 to 2007, after it stagnated once again and only started to grow again since 2012. Overall, Pakistan’s GDP per capita (PPP-adjusted) increased from $3,057 in 1990 to $4,706 in 2015. That is cumulative increase of 54 percent over 25 years, while China’s increased by 789 percent during the same time period.

Given that we examine the two countries’ literacy rates in the next section, the next indicator we compare China and Pakistan on is the percentage of people living in poverty, measured by the poverty headcount ratio at $1.90 a day (in constant 2011 PPP$). As Figure 2 shows, the two countries had about the same percentage of their populations living in poverty in 1987: 61 percent in China and 62 percent in Pakistan. However, poverty evolved very differently over time in these two countries. While Pakistan had a very drastic reduction in poverty from 1987 to 1996 (when it was slightly below 16 percent), Pakistan’s poverty rate increased from 1996 to 2002, and only decreased moderately after that. China saw a slight increase in the percentage of its people living in poverty from 1987 to 1990, after which poverty decreased relatively steadily, falling to below two percent in 2013.
The third broad development indicator we examine to determine China’s and Pakistan’s progress is life expectancy. Life expectancy is determined by many factors, such as access to health care, access to food, etc. Hence, life expectancy is an informative indicator. As shown in Figure 3, despite the considerable differences in the evolution of GDP per capita, China’s and Pakistan’s life expectancy shows (despite a difference in levels) very similar trends over the last few decades. In 1970, the life expectancy in China was approximately 58 years, and it went up to approximately 76 years in 2015. Pakistan’s life expectancy in 1970 was approximately 53 years, and that number went up to 66 years by 2015.

**Figure 3: Life Expectancy at Birth in China and Pakistan, 1970-2015**

![Life Expectancy Graph]

Source: Created by author, based on World Bank (2017).

IV. **Discussion**

Both countries continue to face considerable gender gaps. In the Global Gender Gap Report 2017 of the World Economic Forum (2017), which benchmarks national gender gaps on economic, education, health and political criteria, Pakistan was ranked 143rd, while China ranked 100th among a total of 144 nations. This section reviews the progress made in Pakistan and China on the issues of a) women’s education status, b) women’s lack of access to health services, and c) women’s place in the workplace.

IV.1. **Women’s Education Status**

The most important asset one can carry with through life is knowledge. While many women in industrialized countries take education for granted, in both China and Pakistan women are having trouble receiving an education they deserve. Not attending school or receiving an education from a young age, typically has consequences for the rest of a woman’s life. The World Bank (2005, p. 41) makes a short but strong point on the various positive aspects that an education can bring:

> Education makes women more productive both inside and outside the household. An educated mother can plan the size of her family, ensure the well-being of her children, and make better use of community services. Outside the home, women's education is associated with higher productivity in wage employment and in agriculture. Educated women are also more likely to participate in the political process; illiteracy is a major obstacle in accessing relevant information and dealing with electoral procedures and political issues.
Among 144 countries, China was ranked 102nd, while Pakistan was ranked 136th in the 2017 Global Gender Gap’s sub-index on Educational Attainment, which is based on four indicators: the ratio of female to male literacy and the ratios of female to male school enrollment in primary, secondary and tertiary schools.3

While Figure 4 shows the evolution of adult literacy for both genders, Figures 5 and 6 show the evolution of adult literacy rates for each country by gender. While the two countries vary greatly in terms of levels, one thing that was similar in the past is that in both countries, men had a significantly higher literacy rate than women. While China has mostly eliminated illiteracy for both women and men, there is still a huge gender gap in Pakistan.

Figure 4: Adult Literacy Rate in China and Pakistan for all available years

Source: Created by author, based on World Bank (2017).

Figures 5 and 6: China’s and Pakistan’s Adult Literacy Rates by Gender

Source: Created by author, based on World Bank (2017).

3 See World Economic Forum (2017).
Though not a major concern in China, one common reason for Pakistani girls not getting an education is the distance from home to an educational institution. With Pakistan being mostly a rural country (as of 2015, 61 percent of Pakistan’s population lived in rural areas), families feel unsafe sending their children to schools. Various reports have found that female teachers and students are often victims of assaults or threats in the rural areas. Issues like these becoming consistent invoke fear in female students and teachers, and like anyone, when one feels fear they do not want to approach it. It is important to note as well that in many conservative rural societies, girls and women are not even allowed to travel on their own, making it a lot more complicated to just get to school.

The World Bank (2005) examines how girls in rural areas have particularly high drop-out rates. Because they lack the knowledge and resources, girls who drop out of school live more accelerated lives. As a result, many girls and their families decide to get married at a young age. Their society assumes that “good marriage is the most important way to secure a girl’s well-being, security and respect.” Unfortunately, early marriage doesn’t always have positive effects. Nasrullah and Bhatti (2012) state that an estimated 42 percent of young girls in early marriages are getting pregnant prior to turning 20 years old. Women getting married young are also at a higher risk for being victims of domestic violence and abuse from their husbands or other male figures in the family. Because women take on so many responsibilities as both a mother and wife, the men do not know how to handle it as they are used to being the ones with all of the power.

In China, many issues related to educational inequality are cultural. One of the issues which causes a divide in China between women and men regarding equal education opportunity is the investments that Chinese families place over sons than daughters. However, Bauer et. al (1992, p. 349) challenge the idea that “the difference between men and women in education has to be understood within the context of a deeply rooted gender stratification system in Chinese society.” There is a belief that women will not do well or will not be successful in their careers, and hence, Chinese society does not want to invest in women’s futures and women’s education. Bauer et. al (1992) also argue that parents may feel more comfortable investing in their sons’ futures as they will remain part of the family beyond marriage, instead of marrying off into another family as women do. Bauer et al. (1992, p. 349) state:

Because women are likely to find sex discrimination in the labor market after graduation, the return to the investment in a daughter's education might be lower than that for a son. In addition, sons continue to be more likely to support their parents in their old age than daughters, and if parents can only invest in one child, it is therefore more prudent to do so in sons, where they themselves will be able to benefit from the investments, than in daughters, who will marry into another family.

IV.2. Women’s Lack of Access to Health Services

The gender inequalities in Pakistan impact and affect women’s access to health services in many ways. In order for women to be efficient and be able to take care of themselves and their children,
they have to be well-informed and educated. Just as mobility and transportation was an issue for Pakistani girls to get to school, mobility is also an issue for women to get proper health care. As quoted in World Bank (2005, p. 64), a study conducted in rural areas of Pakistan found that “[a]s many as 40 percent of respondents stated that the primary constraint to accessing health services was their mobility, and fewer (27 percent) stated that the primary constraint was proximity to the facility.”

The reason in which getting around town as a woman in this Pakistani society is difficult is because in the religion they practice, there are restrictions on women traveling alone. Not only can they not go alone, but they also can’t make decisions on their own. Before women can go to any type of health facility, they must first get permission from their husband or any man of the house. As documented in World Bank (2005, p. 65), this can be problematic if a woman or child has an emergency in the sense that the men can delay their decision, which ultimately causes harm.

One of the biggest issues with gender inequalities in healthcare in China is women picking up infections and diseases and leaving them untreated. The World Bank and Asian Development Bank (2006, p. 23) explain that “if women fall ill, they usually delay seeking medical treatment (due to lack of money and time), and also because their health is ignored and not prioritized by the family.”

Lack of education and knowledge regarding how to practice good hygiene, and knowing when one must visit a doctor are issues that many women in these two countries face and end up affecting them negatively. In rural China, many women feel pressure and vulnerability due to their social status as a woman in society which leads them to making risky choices. The man’s societal role makes him feel empowered and makes the woman feel pressured. Many Chinese women feel pressured to have unsafe sex, leading them to contract sexually transmitted diseases, such as HIV/AIDS.

The lack of knowledge in China shows in another way with the high rate of increasing abortions among young women. A report by the World Bank and Asian Development Bank (2006, p. 22) states that “women between 20 and 29 years old have the most abortions and the percentages of those who are unmarried vary from 23 to 65 percent depending on the region.” The report also explains that the fast-rising growth of abortions among young women could be due to lack of contraceptive knowledge, not enough counseling/service and unprotected premarital sex.

Ironically, as young women in China are having an increased amount of abortions, young women in Pakistan have an increased number of children at young ages, with an estimated 42 percent of girls getting pregnant before turning 20 years old. Both of these things are happening due to a lack of education and knowledge. Women need to become more informed and get more rights related to their bodies and their health before we can see improvements.

IV.3. Women’s Place in the Workplace

Probably the most relevant issue that women in China and Pakistan face regularly, and to which women in the United States can relate to, is inequality in the workplace. One issue that many women in Pakistan face is not having the knowledge or resources to obtain a higher-skilled and better paying job due to lack of a school education. Comparing the orange lines in Figures 7 and

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9 World Bank (2005), p. 64.
12 World Bank (2005), p. 86.
8 (female unemployment rates) with the orange lines of Figures 9 and 10 (male unemployment rates) clearly shows that Pakistani women have generally a much higher unemployment rate than Pakistani men. On the other hand, looking at the blue lines shows that Chinese men have a marginally higher unemployment rate than Chinese women.

**Figures 7 and 8: Women’s Unemployment Rates (total & youth), China and Pakistan**

![Graph showing women's unemployment rates](image)

Source: Created by author, based on World Bank (2017).

**Figures 9 and 10: Men’s Unemployment Rates (total & youth), China and Pakistan**

![Graph showing men's unemployment rates](image)

Source: Created by author, based on World Bank (2017).

In addition to overall discrimination against women, the labor participation rate for Pakistani women is very low. “According to the Pakistan Integrated Household Survey at the end of the 1990s, only one in four adult women (aged 10 and older) participated in the labor force, a far lower


rate than the nearly 70 percent participation for men."

Many women (especially in China) also become discouraged when performing the same tasks as men for lower compensation and less benefits.

More efforts need to be made in both countries to reduce gender discrimination in the workplace, and in Pakistan, specific actions have to be taken to lower women’s unemployment rate. On the supply side, women need to be motivated and provided more resources to get the proper education needed. On the other hand, more job opportunities also need to be provided for women who do not have the same level of education.

V. Conclusion

Although it may seem unobtainable for the women who live through it, the lack of opportunity for women in these two societies needs to be dealt with and handled. Every woman deserves the right to an education, health, and a secure job. To be in the year 2018 and still have issues regarding male dominance and sexism is sad.

Regarding the inequalities in women’s education, more efforts need to be placed in order to make more institutions reachable for women who may live farther. If more women can be given the opportunity to get an education equal to that of a man’s, there would be more opportunities for higher-paying jobs and better lifestyles them and their children as well. Next, on the topic of health, it is urgent that young girls especially become informed and educated on all things sex, diseases, and hygiene. It is also important that they become aware of contraceptives and ways in which they can obtain them.

Finally, regarding inequality in the workplace. This topic may take longest until we see change, as it is a bit harder to do something about since it ties in so closely with societal roles. As stated by the World Bank (2005, p. 103), investing in female workers’ skills and promoting education and empowerment can be one big step into making a change. Gender inequality is common all throughout the world. If more people become aware, informed, and educated, perhaps one day we will be able to see a world in which a man and woman are treated the same.

References


