The Role of Women's Education in the Rate of Infant Mortality in Sub-Saharan Africa

by

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ABSTRACT

Infant mortality is a sad reality that the entire world faces. However, some regions and countries experience it more at higher rates than others. Sub-Saharan Africa is one of the regions that unfortunately experiences some of the highest rates of infant mortality around the world. Looking at past research has shown a strong correlation between female education and lowering infant mortality. This study will take a deeper look at the relationship between the two. This is a cross-national, comparative study looking at the rate of change in infant mortality from 2007 to 2017. Access to clean water, war and conflicts, and foreign aid are other important factors that can give us much needed answers to the questions that we have.

INTRODUCTION

Infants have many needs that must be met in order to survive. Failing to meet these needs can result in poor health and even death. There are many actions that can be used to prevent infant mortality around the world such as breastfeeding, access to nutrition, knowledge of the danger signs in children's health, access to water, sanitation, and hygiene, and vaccines (Huber, 2016). The world as a whole has made considerable progress over the last several years, and many children have better chances of survival. In 2017, 1 in 26 children died before the age of five as compared to 1 in 11 in 1990 (UNICEF, 2018).

However, despite the continual improvements in the global community in the rate of infant mortality, there is still a persistent problem. And that problem seems to be manifested in Sub-Saharan Africa. An estimated 5.4 million deaths of children under the age of the five years old were reported in 2017 alone, and about half of those deaths were reported in Sub-Saharan Africa (UNICEF, 2018). Sub-Saharan Africa has the highest risk of death in the first month after birth and is among the regions that demonstrate the least amount of progress. Surprisingly, Sub-Saharan Africa has shown an improved decline in its under-five mortality rate with the annual rate of reduction doubling between 1990-2000 and 2000-2011 (African Leadership for Child Survival). Mortality rates for all age groups have declined in Africa, but the rate of child deaths seem to be focused on the youngest age group. According to UNICEF (2019), "85 per cent of all deaths to children under age 15 [are] occurring among children younger than 5." Because of this persistent issue, we must strive harder to end infant mortality and improve the survival rates of children.

Not all countries in Sub-Saharan Africa have a high infant mortality rate. In fact, some countries in the region can be seen as shining examples in being able to lower their infant mortality. Phil Clark notes that Rwanda was able to cut its rate of child mortality in half from 2000 to 2015 due to rural healthcare and education. This was an incredible achievement for the country and ended up becoming the biggest child mortality reduction in the world at that time. UNICEF said that it was, "one of the most significant achievements in human history" (Clark, 2018).

Prior research has shown a correlation linking maternal education and the rate of infant mortality (Keitzman, 2017). Infant mortality is defined as infants dying within their first year of life. A big impact on infant mortality is not only the mother's health, but also her behavior, actions, and choices. As women and girls gain access to quality education, they are more likely to not only make better choices for themselves and their own health but also for the health and wellbeing of their future families.

Thesis

This thesis is a comparative, cross-national study looking at the rate of change in infant mortality in Sub-Saharan Africa from 2007-2017 with a focus on maternal education. Kenya, Ghana, Chad, and the Democratic Republic of the Congo are the four countries that will be examined in this study. I chose these countries to compare and contrast either their success in reducing infant mortality or their stagnancy in reducing it. A literature review will explore some of the factors that cause infant mortality, a focus on infant mortality in Sub-Saharan Africa, and a look at the data regarding education for women and girls. This thesis is based on prior research which will also be examined. After reviewing the literature and previous research, I will compare the data for the four

countries and determine if maternal education truly had an impact in lowering infant mortality. A discussion of the results and future policy decisions will follow.

CHAPTER I – LITERATURE REVIEW

Infant mortality has received considerable attention through the years. This chapter explores the literature focusing on the determinants of infant mortality. After looking at an overview of the general causes of infant mortality, I will explore literature specifically on Sub-Saharan Africa. This is followed by a discussion of research on violence and women's education.

Determinant Factors

Many factors are known to contribute to the rate of infant mortality. Huber notes that pneumonia, premature birth, defects at birth, birth complications, diarrhea, and infections (malaria, sepsis, measles) are some of the top causes worldwide (2016). In addition, neonatal sepsis was one of the biggest factors for under-five mortality in Africa with 15% of newborn deaths being attributed to infections in the delivery process in 2010 (African Leadership for Child Survival). Injuries, like suffocation, and sudden infant death syndrome (SIDS) are other causes of infant mortality (CDC, 2019). Lack of access to clean drinking water and sanitation also contributes to infant mortality. Ezeh et al note that infants and children are, "more vulnerable to the health hazards associated with unimproved water supply and sanitation; their immune, respiratory, and digestive systems are still developing, and children play in areas where contaminants may accumulate" (2014).

Another potential cause of infant mortality could be domestic violence. There is not very much research on this topic yet, however, Ahmed et al explain two different

possibilities. They said, “One possible pathway is the direct effect of blunt physical trauma and the resultant fetal death or subsequent adverse pregnancy outcome. A second potential pathway is elevated maternal stress levels and poor nutrition, both of which are associated with low birthweight or preterm delivery and are well-known risk factors for perinatal and infant mortality” (2006).

Infant Mortality in Sub-Saharan Africa

In Sub-Saharan Africa, seeking medical attention for pneumonia has increased from 36% in 2000 to 46% in rural areas, and from 49% and 52% respectively in urban areas (African Leadership for Child Survival). Additionally, 11% of under-five deaths worldwide were attributed to diarrhea, but nine-tenths of these deaths were concentrated in Sub-Saharan Africa. Diseases that are transmitted through insects, like malaria, are another factor in infant mortality. In 2000, a meager 2% of children under five in Africa slept under nets treated with insecticides. In 2010, the percent increased dramatically to 38%. Tanzania, Niger, and Mali have increased the use of insecticide treated nets to over 60% (African Leadership for Child Survival). Access to quality food and poor nutrition is another factor. Stunting rates for growth in Sub-Saharan Africa have decreased, however, from 47% in 1990 to 40% in 2011. Yet, malnutrition is still high. Another big factor for preventing infant mortality is vaccines. The immunization coverage in 2011 in Africa was estimated to be 77%. Additionally, 6% of deaths for under-five children in Sub-Saharan Africa were due to HIV (African Leadership for Child Survival).

Women's Education

Quality education helps contribute to a happier and more fulfilling life. In their article "Girls' Education Overview," the World Bank says that, "Better educated women tend to be healthier, participate more in the formal labor market, earn higher incomes, have fewer children, marry at a later age, and enable better health care and education for their children, should they choose to become mothers" (2019). But does the rate of infant mortality really decrease when the education of women and girls increases? For instance, Adewuyi et al state that. "…infants whose mothers had no education…were found to have the highest IMR" (2017). And according to Heath and Jayachandran, they state that, "… there is considerable evidence that female education delays fertility and leads to healthier children once a woman has them" (2017).

However, many young girls do not receive access to quality education because of a number of different reasons. UNESCO estimates have said that 130 million girls between the ages of six years old and seventeen years old are not in school. In addition, 15 million girls that are primary-school age – half of them located in Sub-Saharan Africa – will never enter a classroom (The World Bank, 2019). The biggest factor that is keeping girls from receiving an education is poverty. Studies have continuously shown that girls who experience multiple disadvantages and hardships – like low family income, living in remote or underdeveloped regions, having a disability, or being a part of a minority ethno-linguistic group – are the most behind when it comes not only to access to education, but the successful completion of it (The World Bank, 2019).

Violence is also an important factor that impacts the access to education and prohibits a safe learning environment. For example, research has demonstrated that one in

three Haitian women (between the ages of fifteen and forty-nine) have experienced either physical and/or sexual violence. Of the women who received money for sex and sexual favors before turning eighteen, twenty-seven percent said that schools were the most common location to be solicited (The World Bank, 2019). Another important factor that is limiting access to education is child marriages. Girls who are married as children are more likely to drop out of school and are less likely to complete their education than their peers who marry later in life. In addition, the effects of child marriages negatively impact the health and education of a child bride's future children and her own opportunities to earn a living (The World Bank, 2019).

Solutions

Despite all of this, there are ways to improve access to education. Education for girls is implemented and improved through policy decisions. Heath and Jayachandran have stated that, "Recent evidence indicates that providing cash or in-kind benefits to parents who keep their daughters in school, building schools or improving facilities, and developing programs to reduce general gender disparities can all lead to increases in girls' education" (2017). A look into prior research may also provide more information on the topic.

CHAPTER II – PRIOR RESEARCH AND RESULTS

This Honors Thesis builds on my prior research on infant mortality (Keitzman, 2017). That study was a cross-national empirical study of the determinants of infant mortality rates in thirty countries selected at random in Asia[1], Africa[2], and the Middle East[3]. I tested the influence of five independent variables: rising food prices, war and armed conflicts, maternal education, breastfeeding, and teenage pregnancy. A look at the variables I chose accompanied with the literature will be followed by a discussion of the results.

Variables

My first independent variable, rising food prices, was chosen because as prices become higher, food starts to become unattainable. This results in an increase of infants dying because there is not enough access to food. Lee et al state that "… one of the critical factors influencing food security comprises high and rising food prices because they increase hunger, malnutrition, and mortality among infants and children of poor families" (2015). My hypothesis was as follows: As food prices increase, the infant mortality rate will also increase.

My second independent variable was war and armed conflicts. Important resources like food, medicine, and other supplies can be taken away from locals by the

[1] China, Japan, South Korea, Cambodia, Nepal, India, Malaysia, Thailand, Indonesia, Singapore
[2] Kenya, Democratic Republic of Congo, Nigeria, Ghana, Senegal, Ethiopia, Somalia, Chad, Sudan, Tanzania
[3] Iran, Iraq, Syria, Saudi Arabia, Libya, Yemen, Lebanon, Egypt, Sri Lanka, Pakistan

enemy or military. Without valuable resources, infant mortality increases. According to Lindskog, “Several studies have demonstrated an association between war and infant mortality in other settings. Infant mortality was higher during the 1991 Iraq war than before or after the war and the increase in mortality was greater in the regions that already had higher pre-war mortality” (2016). My hypothesis for this variable was as follows: As war and armed conflicts increase, the rate of infant mortality also increases.

My third independent variable was maternal education and is the focus of this paper. My hypothesis was as follows: As the rate of maternal education increases, the rate of infant mortality will decrease.

My fourth variable, breastfeeding, was chosen because if a mother regularly breastfeeds her baby, the likelihood of infant mortality will decrease. Breastmilk contains a lot of vital nutrients for babies, and when a baby is sick, enzymes in the mother’s milk can sense it and change themselves to suit the needs of the baby. Lamichhane et al found that infants, “…who were not breastfed were found to have significant higher odds of dying compared to their counterparts” (2017). My hypothesis for this variable was as follows: As the percent of mothers who breastfeed increase, the rate of infant mortality will decrease.

My last independent variable was teenage pregnancy because when young, teenage girls get pregnant, they are less likely to know how to raise a child and are more likely to not be able to make the best decisions regarding their health and the health of their baby. The infant’s life is at risk due to a lack of information, experience, and because of the age and maturity level of the mother. Adewuyi et al found that, “For both surveys, infants whose mothers … gave birth to her first child at the age younger than 16

years … were found to have the highest IMR" (2017). My hypothesis for this last variable was as follows: As the rate of teen pregnancy increases, the rate of infant mortality will also increase.

These cases and variables were measured mainly between the years 2015-2016, with a few exceptions. The data was taken from the World Bank, the United Nations Statistics Division, and the UCDP.

Results

The results showed that maternal education had the biggest impact on the rate of infant mortality. This could be seen in the bivariate correlation (Table 1) and in the regression model (Table 2). But when I looked at the regression model without controlling for maternal education (Table 3), the independent variables of teenage pregnancy and war were the most statistically significant. This led me to believe that maternal education had a direct impact on teenage pregnancy, which then had a direct impact on the rate of infant mortality. In addition, I concluded that war also affected mother's education in certain countries which also affects the rate of infant mortality. One independent variable that I did not look at in the past was clean water. Looking back, different results may have presented themselves had this variable been included. Because maternal education ended up being so important in my prior research, this made me want to explore the relationship in more depth through case studies.

Looking at past research and identifying some of the main causes of infant mortality around the world helps to compare and contrast the four countries of this study.

Table 1 – Correlation Matrix

	Food Price	War	Mom Educ	Breastfeed	Teen Preg	Infant Death
Food Price	1.000 (18)	0.047 (15)	-0.004 (17)	0.182 (16)	0.170 (18)	0.155 (18)
War	0.047 (15)	1.000 (24)	-0.270 (22)	0.241 (22)	-0.044 (24)	0.265 (24)
Mom Educ	-0.004 (17)	-0.270 (22)	1.000 (28)	-0.085 (22)	-0.812** (28)	-0.802** (28)
Breastfeed	0.182 (16)	0.241 (22)	-0.085 (22)	1.000 (24)	-0.091 (24)	-0.111 (24)
Teen Preg	0.170 (18)	-0.044 (24)	-0.812** (28)	-0.091 (24)	1.000 (30)	0.828** (30)
Infant Death	0.155 (18)	0.265 (24)	-0.802** (28)	-0.111 (24)	0.828** (30)	1.000 (30)

Table 2 – Multiple Regression.

n = 30

Multiple R-Squared: 0.793*

FOOD PRICE	BETA = 0.084	r = -0.089
WAR	BETA = 0.232	r = 0.301
MOM EDUC	BETA = -0.993*	r = -0.764
BREASTFEED	BETA = -0.542	r = -0.017
TEEN PREG	BETA = -0.063	r = 0.599

Table 3 – Multiple Regression without Controlling for Maternal Education.

n = 30

Multiple R-Squared: 0.653*

FOODPRICE	BETA = -0.047	r = -0.023
WAR	BETA = 0.484*	r = 0.249
BREASTFEED	BETA = -0.131	r = -0.182
TEEN PREG	BETA = 0.758**	r = 0.669

CHAPTER III – CASE STUDY & FINDINGS

To explore the role of maternal education on infant mortality further, this thesis examines whether changes in infant mortality in a set of Sub-Saharan African countries reflect changes in maternal education. These countries are Kenya, Ghana, Chad, and the Democratic Republic of the Congo. I chose these countries to compare and contrast either their success in reducing the rate of infant mortality or their stagnancy in reducing it. According to the World Bank, Kenya and Ghana made considerable progress in reducing their rate of infant mortality from 2000-2017. In 2000, the rate of infant mortality in both countries was 64 deaths for every 1,000 live births. In 2017, the rates for each country dropped to about 33 deaths and 35 deaths respectively for every 1,000 live births. However, Chad and the Congo failed to make as much progress improving from about 100 and 107 deaths respectively to about 73 and 70 deaths respectively for every 1,000 live births from 2000-2017 (The World Bank, 2019).

This thesis is a cross-national, comparative study looking at the rate of change in infant mortality over the course of ten years from 2007-2017. The purpose of this study is to look at past data for the rate of infant mortality in each country and see whether or not maternal education either does or could play a greater role in keeping infants and young children alive. I personally believe that this study is important because infants and children are still dying by the thousands each year in Sub-Saharan Africa despite efforts to reduce the rate. I am a strong advocate for human rights, specifically women's and children's rights, and I want to see a world where children are no longer dying from preventable causes. I believe that if more girls in underdeveloped countries and regions

receive quality education, they will make better choices not only for their own health and wellbeing but also the health and wellbeing of their future families.

An infant death will be defined as an infant dying within their first year of life. The infant mortality rate is defined as the number of infant deaths per a thousand live births. My main focus in this study will be maternal education and will be defined as education for girls from the ages of eleven to sixteen years old. Additionally, I will be looking at other factors like war, access to clean water, and foreign aid that may also have an effect on the rate of infant mortality in these countries.

Kenya

Kenya is one of the countries that has made considerable progress in reducing its rate of infant mortality. In 2007, the rate of infant mortality was about 44 deaths per every live 1,000 births. The biggest decrease in infant deaths was actually from 44 deaths in 2007 to 41 deaths in 2008. From there, it has steadily continued to decline. As of 2017, the number of deaths has reached about 31 for every 1,000 live births (The World Bank, 2019). In fact, the rate is still continuing to decrease as the years go on (The World Bank, 2019).

When it comes to education, Kenya made primary school free in 2003. Since that time, the enrollment rates for primary school as a whole have increased by 84%. However, it appears that education for girls is still lacking despite efforts to narrow the gender gap in schools. In areas where poverty is high and there are low levels of gender equality, as little as 19 percent of girls are enrolled and attending primary schools. In other regions, about 1 in 15 girls has the ability to attend primary school (Hine, 2018).

There is also a high rate of dropouts for girls in Kenya. Of the students who enroll in their first year of school, about 1 in 5 successfully make it to their eighth year of school. These incredibly high dropout rates are due to female genital mutilation, poverty, early marriage, and other factors (Kassie, 2018). Because gender disparities in education are still pretty high, then there must be other factors present to result in a low infant mortality rate in Kenya.

Access to clean water for drinking and hygiene might offer different answers. According to the Kenya National Bureau of Statistics, water sources have improved across the entire country from 2007 to 2015. In 2007, 57.7% of the population had access to improved water sources and in 2015, that percentage increased to 63.2%. Additionally, the percentage of people using basic water drinking services went from 52.23% in 2007 to 58.46% in 2015 (2017).

War, armed conflicts, and violence can also have a serious influence on the rate of infant mortality. Kenya appears to still be full of violence. This includes high levels of gender-based and sexual violence, intercommunal violence, low levels of consistent violence, violence related to election cycles, and an increase in terrorist attacks (Rohwerder, 2015). The high levels of violence are due in part to border conflicts, ethnic intolerance, zoning for political parties, fighting over resources and land, increase in small arms, weak security, and poverty, marginalization, and underdevelopment. There has also been violent Islamic activity in a few different regions of the country and terrorist attacks have seen an increase as well due to Kenya's continual military involvement in Somalia (Rohwerder, 2015).

Foreign aid and assistance may also affect the rate of infant mortality as outside resources and funds can increase the quality of life for children. In 2008, 82% of the funds that were appropriated for Kenya went toward health. Of that percentage, 2% went to family and reproductive planning ($13.2 million) and 1% went toward maternal and child health ($6.76 million). Both aim to prevent infant mortality. In 2017, the funds for health equaled 80% ($594.3 million). Of that percentage, 4% ($26 million) went to family planning and reproductive health and 3% ($16 million) went toward maternal and child health (foreignassistance.gov). UNICEF has also played a big part in helping to assist Kenya. Their key humanitarian campaigns include improving health and nutrition outreach, vaccinations, providing sustainable clean water interventions, and more. In 2019, they want to allocate over $28 million dollars with about 16.4% for health initiatives (2019).

Ghana

Ghana is the other country in this study that has made considerable progress in reducing their rate of infant mortality. In 2007, there were about 52 deaths for every 1,000 live births. In 2017, the number of infant deaths decreased to about 36 (The World Bank, 2019). Although improvements can always be made to female education, Ghana has seen a significant improvement in education for girls. In efforts to address poverty, the Ministry of Education ended school fees across the nation in 2005 and implemented a capitation grant for all basic schools (UNGEI). And in 2017, the President made all secondary education free. The United States Agency for International Development (USAID) has also helped to offset costs. They have provided scholarships for 7,000 schoolgirls in Ghana. They also helped with building schools and rehabilitation. In

addition to financial costs, the higher rate of girls attending school in Ghana comes from governmental and non-profit agencies working together. In 1997, the Ghanaian government created the Girls' Education Unit in the Ministry of Education that implements a Girl's Education Officer in every district and region. UNICEF has also been involved in helping to develop and employ education strategies. The Global Partnership for Education (GPE) worked in Ghana from 2012-2016 in a collaborative effort with the Ministry of Education and UNICEF and they saw real results. Arguably the most impressive fact about female education in Ghana is that since the early 2000s, girls have consistently enrolled and attended both primary and secondary schools at higher rates and have closed the gender gap in school enrollment. In 2018, Ghana's national primary gender parity index (GPI) is at 1.01 as compared to 0.94 in 2004 (Eppenauer, 2018).

Ghana has also greatly improved their access to safe, drinking water across the country. In 2007, the percentage was already an astounding 79.5% and drastically increased to 88.7% in 2015 (Kenya National Bureau of Statistics, 2017). When it comes to war and armed conflicts, Ghana is generally considered one of the most stable countries in West Africa. However, Annan notes that Ghana has seen some low-level conflicts, like the Dagbon chieftaincy crisis. Despite being known for peace and stability, there has been some ethnic division in the northern region that has resulted in violent inter-ethnic strife (Annan, 2014).

Foreign aid and assistance also plays a part. In 2008, out of the funds that were appropriated for Ghana, 65% (about $52.5 million) were allocated for health. And of that percentage, 15% ($7.89 million) were specifically allocated for maternal and child health

and 15% ($7.7 million) were allocated for family planning and reproductive health. In 2017, 55% ($74.01 million) was used for health and of that, 16% ($12 million) was used for maternal and child health and 18% ($13 million) was used for family planning and reproductive health specifically (foreignassistance.gov). UNICEF has also done incredible work in Ghana to continually improve education, healthcare, sanitation and hygiene, and protection (UNICEF, 2019).

Chad

Chad is one of the countries that has not done as great in terms of reducing their infant mortality. In 2007, the rate of infants dying was about 90 deaths for every 1,000 live births. By 2017, the rate has decreased to about 73 deaths (The World Bank, 2019). Although this was still an improvement, there is much more to go to save the lives of infants in Chad. One possible reason to explain the still relatively high rate of infant deaths is the lack of female education in the country. Kim notes that Chad, "is deeply marked by both low schooling rate and high gender disparities in education" (2019). The Ministry of Education has said that the rate of schooling for both boys and girls, which is already low for primary school, drops even more during the transition period from primary to secondary school. However, the gap does widen greatly between boys and girls. Because of the gap in access to education, girls are typically more illiterate than boys, and there is an incredible lack of female educators in the system (Kim, 2019). The reason for this is largely attributed to the country's view on education for girls. Rather than attend school to gain an education, girls are expected to marry young and stay home to perform traditional gender roles. However, the education system shows signs of improving. The government of Chad started an education plan called PIET. It will be in

effect from 2018 to 2020 and consists of three parts: continue to provide quality primary education, improve the significance of education at each level, and improve the management and coordination for education (Kipfer, 2018).

When it comes to having access to clean drinking water, progress has been slow for Chad. In 2007, 48.2% of the population had access to clean and safe drinking water. Unfortunately, there is a gap and there are no data for the years 2008, 2009, 2010, and 2011. It does not pick back up until 2012 with 50.7% of the population having access to safe drinking water. There is another gap in the data where 2015 is the most recent with a meager 50.8% (Kenya National Bureau of Statistics, 2017). This has not been much of an improvement at all.

Chad is also actively engaged in its fourth Civil War, which started in 2005, along with other conflicts. The Civil War has included the Chadian government as well as several rebel groups. Sudan has been the main opponent in this interstate conflict. Several states of emergency have been called, many lives have been lost, and even two peacekeeping missions have been deployed (BBC News, 2018). Being engaged in an ongoing war and conflicts can seriously affect the rate of infant mortality for the worse.

Chad has a great need for foreign aid, and the United States has been helping. The USAID partnered with the U.N. World Food Program not only to give food but also to provide financial assistance to families in need and help farmers get the necessary seeds to grow more food (Ott, 2018). In 2008, of the funds that were appropriated for Chad, 3% ($2.21 million) of the funds went to health and 100% of that went directly to maternal and child health. In 2017, 4% of the funds ($1.15 million) went to health and all of those

funds went directly to nutrition (foreignassistance.gov). Obviously there still is a great need for maternal and child aid.

Democratic Republic of the Congo

The Democratic Republic of the Congo is the final country in this study and the second one that has not had much success in reducing the rate of infant mortality. In 2007, the rate of infant mortality was about 91 deaths for every 1,000 live births. The rate has been slowly decreasing and as of 2017, the rate is about 70 deaths for every 1,000 live births. This is an improvement, nonetheless, but more can definitely be done.

During the civil war from 1998 to 2003, more than 5.2 million children did not receive an education at all. Massive rape campaigns were constantly used as a tool of war during this time as well. Rape and domestic violence can negatively affect infant mortality as it harms the mothers and even young children. And despite the situation improving, the effects of war are still felt which then affects the level of education. In 2012, approximately 62.92% of girls were able to read and write. Still, there is more room for improvement. Some of the reasons that more girls are not in school receiving an education is because of the cultural mindset of girls staying in the home, poverty, and the opportunities to join armed groups. About 30% to 40% of children in armed groups are girls who were lured in with the prospect of wages and other things. In reality, most end up being drugged, raped, and/or forced to commit crimes (Jafry, 2018). This, in turn, greatly influences the number of girls who can receive an education.

Access to clean water is vital for survival and without it, infections, diseases, and death can occur. The population of the Congo is still in desperate need of clean and safe

drinking water. In 2007, 49.7% of the population across the country had access to safe drinking water. There are some gaps in the data but by 2015, only 52.4% had access to safe drinking water. Clearly, this needs to change.

The Congo has consistently been plagued by conflict and struggle. Despite being rich in resources, the people are still among the poorest in the world. The country has also been dominated by armed conflicts, political instability, and violations of human rights. In 2016, for example, conflict emerged in the Kasai region between the military and fractured ethnic militias. The Congo has endured more than 20 years of conflict and violence and about 6 million people have lost their lives. Additionally, the Ebola virus has returned to the Congo, and an outbreak has been identified in the northeast region of the country (World Vision, 2019). With all of the conflict, violence, and disease, resources and other aid can be restricted and children and infants may not get what they need to survive.

When it comes to foreign aid, the biggest issue is confronting the ongoing Ebola crisis. The Congolese government, the Ministry of Health, and the U.N. World Health Organization have released their strategic response plan. Through this plan and the funds it receives, it will help improve continuous public health activities, community engagement, communication about risks, financial planning, and security activities. And in Fiscal Year 2019, USAID contributed $197 million to help with the crisis and support the country. The funding supports preparedness for Ebola, community engagement, case management, assistance for food, dignified and safe burials for the deceased, surveillance activities, as well as preventing infection and control programming (USAID, 2019).

After looking closely at each country and comparing female education, clean water, war and violence, and foreign aid, we can start to piece together their effects on infant mortality and discuss solutions for the future.

CHAPTER IV: DISCUSSION AND MOVING FORWARD

In the four different countries many issues have contributed, either positively or negatively, to the rate of infant mortality. I wanted to take a deeper look at whether maternal education would play a big role in lowering infant mortality. A comparative matrix will showcase the different areas that were examined:

Country	**Changes in Female Education**	**Presence of Violence**	**Clean Water**	**Foreign Aid**
Kenya	Yes – Needs much improvement	Yes	Yes - Most	Yes
Ghana	Yes – Very good	No – Generally peaceful and stable	Yes – Most	Yes
Chad	No – Needs much improvement	Yes	No – About half of population	Yes
Congo	No – Needs much improvement	Yes	No – About half of population	Yes

And for the most part, that appears to be true with the exception of Kenya. I was surprised to learn that despite Kenya's success in lowering infant mortality, they were still struggling in terms of female education. Many girls still do not have access to school due to poverty, being married as a child, and genital mutilation. I had thought that their

rate of education for girls would be much higher but, ultimately, my original hypotheis was not supported by data from Kenya. It was also interesting to note all of the violence and conflicts that the country is still dealing with as well. They appear to have conflicts over many different issues. I assumed that because of their lower rate of infant deaths, that violence and conflicts would be either minimal or nonexistent. However, their improvement in access to clean water and the foreign aid that they receive from UNICEF and other countries may potentially be playing the biggest part.

On the other hand, Ghana ended up being the country demonstrating the most support for the original hypothesis. They have made tremendous progress in improving and furthering the rate of education for women and girls. All of the initiatives that have been taken to improve the system have been incredibly successful. The majority of the country having access to clean and safe drinking water definitely plays an important role in keeping infants and young children alive. For the most part, the general stability and peace of the country keeps infants and children from dying due to war, violence, and lack of resources. In addition, the aid that they receive only serves to help them continue to lower their rate of infant mortality and keep more babies alive.

In regard to the two countries that had higher rates of infant mortality, Chad and the Congo were essentially what I had imagined. They both still have low rates of female education and child marriages, poverty, and conservative mindsets have kept the majority of girls at home instead of in the schoolroom. Additionally, both Chad and the Congo are still dealing heavily with violence and conflict (even disease for the Congo), which negatively affects the countries' rate of progress nationwide. It is no surprise that infants are more likely to die when there is more violence and conflict rather than peace. Both

countries have also been relatively stagnant in improving their population's access to clean water. Due to this, it is more likely for someone to contract an illness or disease which, if left untreated, can very easily lead to death. Both countries are receiving foreign aid in order to improve their respective situations. This aid can be utilized for food, medicine and vaccines, education and materials, and security. As the years go by, we can only hope that both of these countries are able to prosper in the future with more children who are alive and thriving.

I personally believe that all countries need to continue to improve their education systems, specifically for women and girls. Education improves the lives and future of a nation's children and can bring more jobs and money to the economy. Governments should allocate more funds to go toward improving schools and enrollment rates. They should also focus on implementing more programs to help women and girls succeed. Mentorship and vocational programs for girls would greatly help. Other countries and worldly organizations can definitely help by contributing funds, resources, and their help.

If I were to look at this topic differently in the future, I would most likely put a greater focus on vaccines and healthcare as a way to keep children and infants alive. However, I believe that this study was beneficial and could be useful to others trying to lower the rate of infant mortality around the world. Unfortunately, the topic of infant mortality is something that will never fully go away due to a variety of different factors. But with improved access to female education, I believe that it is a step in the right direction.

Bibliography

Adewuyi, EO, Zhao, Y, & Lamichhane, R. 2017. “Risk factors for infant mortality in rural and urban Nigeria: evidence from the national household survey.” *Scandinavian Journal of Public Health.* Vol 45. Issue 5. (Mar): 543-554.

African Leadership for Child Survival. Africa Key Facts and Figures for Child Mortality [PDF File]. Retrieved from https://www.usaid.gov/sites/default/files/documents/1860/Africa%20Key%20Facts%20and%20Figures.pdf

Ahmed, S., Koenig, M. A., & Stephenson, R. (2006). Effects of Domestic Violence on Perinatal and Early-Childhood Mortality: Evidence From North India. *American journal of public health*, 96(8), 1423-1428. doi: 10.2105/AJPH.2005.066316

Annan, N. (2014). Violent Conflicts and Civil Strife in West Africa: Causes, Challenges and Prospects. *Stability: International Journal of Security and Development, 3(1).* p.Art. 3. doi: http://doi.org/10.5334/sta.da

BBC News. (2018). Chad profile – Timeline. Retrieved from https://www.bbc.com/news/world-africa-13164690

Centers for Disease Control and Prevention. (2019). Infant Mortality. Retrieved from https://www.cdc.gov/reproductivehealth/maternalinfanthealth/infantmortality.htm

Clark, P. (2018). Rwanda’s Recovery: When Remembrance Is Official Policy. *Foreign Affairs*, 97, 35-41.

Eppenauer, A. (2018). Five Facts About Girls' Education In Ghana. Retrieved from https://borgenproject.org/girls-education-in-ghana/

Ezeh, O. K., Agho, K. E., Dibley, M. J., Hall, J, & Page, A. N. (2014). The Impact of Water and Sanitation on Childhood Mortality in Nigeria: Evidence from Demographic and Health Surveys, 2003-2013. *International journal of environmental research and public health*, 11(9), 9256-9272. doi: 10.3390/ijerph110909256

Foreignassistance.gov. (2019). Foreign Assistance in Kenya. Retrieved from https://www.foreignassistance.gov/explore/country/Kenya

Foreignassistance.gov. (2019). Foreign Assistance in Ghana. Retrieved from https://www.foreignassistance.gov/explore/country/Ghana

Heath, R, & Jayachandran, S. (Aug 2017). The Causes and Consequences of Increased Female Education and Labor Force Participation in Developing Countries. *The Oxford Handbook of Women and the Economy*, 1-25. doi: 10.1093/oxfordhb/9780190628963.013.10

Hine, H. (2018). Girls' Education In Kenya. Retrieved from https://borgenproject.org/girls-education-in-kenya/

Huber, C. (2016). Child mortality: Top causes, best solutions. Retrieved from https://www.worldvision.org/health-news-stories/child-mortality-causes-solutions

Jafry, S. (2018). Girls' Education In The Democratic Republic Of The Congo. Retrieved from https://borgenproject.org/girls-education-in-the-democratic-republic-of-congo/

Kassie, B. (2018). Top 10 Facts About Girls' Education In Kenya. Retrieved from https://borgenproject.org/top-10-facts-about-girls-education-in-kenya/

Keitzman, K. (2017). The Causes of Infant Mortality by Country. Research Methods PS 3001, Fall 2017.

Kenya National Bureau of Statistics. (2017). Total population with access to safe drinking-water (JMP). Retrieved from http://kenya.opendataforafrica.org/prudzub/fao-aquastat

Kim, Y. (2019). Chad: Addressing prejudices against girls' education. Retrieved from https://blogs.unicef.org/blog/chad-addressing-prejudices-girls-education/

Kipfer, K. (2018). Girls' Education in Chad. Retrieved from https://borgenproject.org/girls-education-in-chad/

Lamichhane, R, Paudel, S, Zhao, Y, & Adewuyi, E.O., (2017). Factors associated with infant mortality in Nepal: a comparative analysis of Nepal demographic and health surveys (NDHS) 2006 and 2011. *BMC Public Health,* 17(1), pp. 1-18.

Lee, HH, Lee, SA, Lim, JY, & Park CY. 2016. "Effects of food price inflation on infant and child mortality in developing countries." *The European Journal of Health Economics: HEPAC: Health Economics In Prevention And Care.* Vol 17. Issue 5. (June): 535-551.

Lindskog, EE. 2016. “The effect of war on infant mortality in the Democratic Republic of Congo.” *BMC Public Health.* Vol. 16. (1) (October): 1059.

Ott, Z. (2018). The Ways That The US Benefits From Foreign Aid To Chad. Retrieved from https://borgenproject.org/u-s-benefits-from-foreign-aid-to-chad/

Rohwerder, B. (2015). Conflict analysis of Kenya. [PDF File]. Retrieved from http://www.gsdrc.org/wp-content/uploads/2015/12/KenyaConflictAnalysis.pdf

UNGEI. Ghana: Background. Retrieved from http://www.ungei.org/infobycountry/ghana.html

UNICEF (2018). Under-five mortality. Retrieved from https://data.unicef.org/topic/child-survival/under-five-mortality/

UNICEF (2019). Children in Africa: Key statistics on child survival and population. Retrieved from https://data.unicef.org/resources/children-in-africa-child-survival-brochure/

UNICEF. (2019). Kenya. Retrieved from https://www.unicef.org/appeals/kenya.html

UNICEF. (2019). UNICEF in Ghana. Retrieved from https://www.unicef.org/ghana/what-we-do

USAID. (2019). Democratic Republic Of The Congo. Retrieved from https://www.usaid.gov/crisis/democratic-republic-of-the-congo

The World Bank. (2019). Girls’ Education Overview. Retrieved from https://www.worldbank.org/en/topic/girlseducation

The World Bank. (2019). Mortality rate, infant (per 1,000 live births). Retrieved from https://data.worldbank.org/indicator/SP.DYN.IMRT.IN?end=2017&start=1960&view=map&year=2017

World Vision. (2019). DRC conflict: Facts, FAQs, and how to help. Retrieved from https://www.worldvision.org/disaster-relief-news-stories/drc-conflict-facts