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Gender, Education, and Development: An Analysis of the Impact of Educating Girls on the Economic Growth of Africa

Emebet Hailemariam Tessema
Skidmore College

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Research Question: How does closing the gender gap in education makes sense for Africa's Economy?

Hypothesis: In Africa, the economic benefit of education of females outweighs the economic benefit of education of males.

Emebet Hailemariam Tessema
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emebtess@gmail.com

Advisor: Dr. Joerg Bibow, Professor of Economics
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Skidmore College
Saratoga Springs, New York

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Abstract

Among numerous critical issues in Africa, the gender gap in education is the leading tragedy that continues to deteriorate Africa's economy. Several studies have demonstrated the various social and economic benefits of education, but without emphasizing the implication of the gender gap in education on Africa's economic growth. Millions of Africa's girls and women are not attending school, mainly because of the social norms hindering gender equality in educational resources. Education is a basic human right and its availability should not be limited based on social identities such as gender, class, or race. Women are 'untapped' resources in Africa and providing equal education opportunities could facilitate economic growth.

This study discusses the effects of education on the economic growth of Africa. It is a panel data analysis on 52 randomly selected African countries, investigating and comparing the economic benefit of education between women and men. In conducting this project, a fixed effect analysis is used to examine the human capital and social benefits of female education. After running three separate regressions that demonstrate the human capital and social gains of female education, the results show that there is a strong negative correlation between female education and infant mortality rates as well as a negative correlation between female education and fertility rates.

Additionally, according to the sample used in this empirical study, the fixed effect estimates convey that the economic benefit of educating females is stronger than that of males. A final regression that combines all three of the models conveys that an increase in female education and a reduction in infant mortality rate are some of the most significant elements in stimulating GDP per capita growth in Africa. These results are crucial as they can spur higher institutions to develop a policy that focuses on educating girls in order to minimize the gender gap in education in Africa, which, in the long run, can foster the economy and eradicate poverty.

Key words: female education, gender gap, human capital, social gain, economic growth

I. Introduction

Access to education is a basic human right. Parents, society, and the whole nation should equally accommodate every individual to experience this fundamental source of freedom. Both economic growth, in terms of Gross Domestic Product (GDP), and an individual's income are vital sources of experiencing various types of freedoms (Sen 2001). However, "basic education, health, political and social rights" are also crucial determinants of freedom (Sen 2001). There have been several human rights movements to foster gender equality, mainly in order to provide equal educational and other resources to women in Africa as well as globally. Women's suffrage movements, which started in Seneca Falls in 1848 in the U.S. and spread to various parts of the world, gave women the right to vote and later on to experience different forms of freedom. As a result, women started to have the capability to support themselves as well as to contribute to the economy (Beaudoin 1999). However, women's conditions have always varied across the continent. In many African countries, women still don't have the right to own property or the resources to empower themselves economically, socially and politically (Kevane 2004). Consequently, gender inequality is a serious concern as men monopolize the majority of resources. The issues of women in Africa are dire, impacting the economy negatively. The goal of this paper is to address the issue of gender gaps in education and its influence on Africa's economy.

This empirical paper uses measures such as expected years of schooling, GDP per capita, and infant mortality rate to illustrate the human capital and social gains of educating girls. Furthermore, the study examines and compares the economic benefit of education between females and males. This study is designed to raise awareness among national and foreign institutions in order to help them develop programs that can educate girls, while bringing Africa towards its targeted economic development. The next section of this study discusses why the gender gap in

education is a critical issue, analyzing some of the core concepts of this research paper. Section III examines the causes of the gender gap in education, while Section IV explores the human capital gains of educating girls. On the other hand, Section V discusses the social gains of female education. Section VI demonstrates the methodology of analyzing the human capital and social gains of the female education and its influence on GDP per capita growth. Section VII delivers the results and discussions of the empirical model and sample regression, and Section VIII provides an overview of policy recommendations as well as highlights certain crucial conclusions concerning the necessity of closing the gender gap in education in Africa.

II. Why Gender Gap in Education is an Issue

There are several studies explaining the lag in Africa's economic development and growth, but inadequate attention has been given to the education disparity in gender and its impact on the economic growth of Africa. Access to education is a basic human right and this opportunity should be available for every individual to empower him or herself economically, socially, and politically. Three out of the eight "Millennium Development Goals" set by the United Nations (UN) are directly related to education. The UN (2016) asserts that universal education improves maternal health, decreases infant mortality, and slows population growth. The benefits of education are ubiquitous. However, most of Africa's girls have been restricted from getting education, which hinders Africa's economy. Several studies illustrate how the gender gap in education is detrimental to GDP per capita growth. Dollar and Gatti (1999), a development research group from the World Bank, argue that a gender gap in education is not an "efficient economic choice," particularly in developing countries. They criticize the detrimental gender biased economic growth in Africa. The two development practitioners emphasize the necessity for investment in female education, which improves the economic performance of the country as well as the well-being of communities in

Africa. This paper argues that empowering women through education is the first step in achieving economic growth and sustainable development.

Female access to education varies greatly across the globe; countries in the global south have been determined to promote gender equality in universal primary education following the classical Millennium Development Goals set by the United Nations. Particularly, extreme poverty in numerous African countries has been the main trigger for various agents to take serious measures to boost the economy and eradicate poverty through providing access to education for everyone. However, Africa is behind in closing the gender gap in education, which is one of the main causes of its economic underdevelopment. According to Artadi and Sala-I-Martin (2003), if "primary school enrollment rates in African countries had been as high as those in OECD countries, the average annual growth rate of per capita income in Africa would have been 2.37 percent instead of 0.9 percent recorded in the last four decades." The inequality in educational opportunities is one of the most dismal components of economic growth in Africa (Artadi & Sala-I-Martin 2003). Licumba et al., while investigating the lag in economic growth and development in Africa, discovered that the gender gap in education is one of the most critical barriers to achieving growth and development in Africa (2015). Their study, entitled *Gender Equality in Education and Economic Growth in Selected Southern African Countries*, investigates how gender inequality in education impacts economic growth in Africa. Licumba et al. make use of Lagerlof's (2015) theoretical model to explain how human capital could be negatively affected by changes in gender equality in education, which impacts growth adversely in the members of Southern Africa Development Community (SADC) in Africa.

Several studies illustrate the gains of gender equality in education by emphasizing a strong positive correlation between female education and economic growth, such as Klasen et al.'s (2002)

Low Schooling for Girls, Slower Growth for All? Cross-Country Evidence on the Effect of Gender Inequality in Education on Economic Development. Their study highlights the long-term impact female education has on the economic growth of a country. These authors use both a cross-country and a panel data analysis to illustrate the concept that the gender gap in education affects economic growth by diminishing the human capital level (Klasen et al., 2002). Additionally, Klasen et al.'s study explains the ways in which female education influences population growth and indirectly impacts economic growth (Klasen et al., 2002).

In order to express the level of importance of educating women, some studies such as Benavot's (1992) discuss how the long-term economic benefit of female primary education is stronger than that of male primary education. Therefore, the existence of the gender gap in education puts more strain on economic development since girls and women are forced to be out of the economic activity due to their limited access to education. Boserup reinforces this claim by stating: "Access to schooling is crucial to women's capacity to benefit from modernization and gain access to rewarding jobs." Although they fail to consider the gender gap in education and its impact on the economic growth of Africa, higher institutions such as the World Bank are still aware of the outcomes of female education. The World Bank acknowledges that women are "major actors in the transformation process whether in terms of their direct involvement in the economy or their more tempered role as catalyst, facilitator and regulator of economic activity" and that they are the main agents in household productions (2005). This form of response from agencies reinforces the notion that women's education should be the key ingredient in creating a holistic policy for economic growth and development in Africa.

If women get as many equal educational opportunities as men, many developing countries can achieve positive economic growth. Josephine and Robert Dibie's study attempts to persuade

economic development agencies in Africa to take immediate action to increase female school enrollment rates (2012). The authors claim that "the African continent will move faster in its industrialization process" if women are encouraged to pursue higher levels of education (Dibie 2012). Similarly, Youssef (2011) finds that if women are limited from access to education it has a severe impact on economic growth. "The lack of schooling and jobs for women results in high fertility; high fertility in turn limits education and job opportunities," writes Youssef (2011). High fertility rates are likely to exacerbate the conditions of overpopulation, which are the root causes of poverty in a lot of developing countries. Consequently, the opportunity cost of not educating women, which widens the issue of gender gap in education, is very high and can severely endanger the economy of Africa.

Kevane's (2004) *Women and Development in Africa: How Gender Works* examines the theory of gendered economics as well as the socioeconomic ills that continue to undermine Africa's economic growth and development in the 21st century. Before Kevane's book, one of the earliest works on the issue of gender gaps in economic development was a book by Ester Boserup entitled *Woman's role in Economic Development,* published in 1970. In her book, Boserup emphasizes how various development policies and structural changes since colonization have been biased against women (Boserup 1970). Despite Boserup's (1970) argument that gender issues exacerbate the fragility of the economic development processes, many agencies still do not fully accept the role of female empowerment in the economic growth of developing countries. Africa is the leading example for failing to acknowledge the need to empower women though education. Nevertheless, some of Boserup's alarming facts concerning women's marginalization in the work force of developing countries forced some organizations to reassess their policies and give women roles in the labor force through investing in female education. Kevane's (2004) book uses several

economic models and empirical methods to urge higher institutions and politicians as well as economists to focus on the role of women in economic growth in Africa. He empirically demonstrates how women in Africa bear the burden of poverty the most and are always oppressed by the patriarchal society of Africa, which often leads to women's social, economic, and political subjugation (Kevane 2004). Boserup and Kevane's books are cornerstone frames to understand the construction of gender dynamics in Africa. Both Boserup's and Kevane's conclusions emphasize investment in female education and acknowledge that female education not only triggers a multiplier effect by improving the human capital which increases economic growth, but female education also provides social gains such as improving the reproductive health of a women and of her child.

Other studies, such as Herz and Sparling's (2004) extensive project, encourage African economic development agencies and related-organizations to react to the crisis of the gender gap in education and to scrutinize how that gap influences growth in Africa. Herz and Sparling (2004) address the boundless economic benefit of educating women, fostering economic growth, and creating sustainable economic development. Herz and Sparling argue that "investing in girls' education delivers high returns not only for female educational attainment, but also for maternal and children's health, more sustainable families, women's empowerment, democracy, income growth, and productivity" (2004). Their study posits that educating women is crucial since it is the only ensured form of investment that "pays off substantially" (Herz & Sparling 2004). Consequently, Lucumba et al.'s research stresses the necessity of "some policy adjustment in education planning within the region to ensure the retention of female students, as well as raising education quality, to stimulate economic growth" (Licumba et al., 2015). The results of the research convey that closing the gender gap in education by educating women is a vital process in

achieving economic growth in developing countries like Africa. Sociocultural ills in African communities continue to be a barricade against accessible education, exacerbating biases against women. These ills not only limit women's opportunities to be active parts of the labor force, but they also trap them into the vicious cycle of poverty. Adding to Licumba's et al. (2015) policy recommendation, this paper will emphasize the role of the government and community in fostering female education and in raising awareness about the long-term economic benefit of educating women by closing the gender gap in education.

III. The Causes of Gender Gap in Education

In numerous developing countries, particularly in Africa, access to education is limited in terms of its availability and affordability. Issues surrounding education have been proven to affect the safety and security of women in Africa. In their attempt at attaining a formal education, many women face discrimination and harassment, to and from school. This creates an unsafe school environment, which is not conducive to their learning processes. Consequently, this issue has created a serious gender gap in education in Africa, weakening the economic return of education. Apart from the various discriminations and harassments women and girls face that discourage them from getting basic education, there are many other causes of gender gap in education in many parts of Africa.

Several quantitative studies and empirical papers convey that the economic benefit of educating women is clear and one might ask why so many girls and women are out of school in Africa. Most studies associate the low female enrollment rates with the cost of educating them. While examining the state and dilemma of women in Africa, Herz and Sperling (2004) highlight the various costs of educating girls. The authors explain that, apart from direct school costs such as school tuition, there are several indirect costs that restrict girls' access to education. For instance,

they explain that the opportunity cost of sending daughters to school is higher than for sons because women often perform household or farm chores (Herz & Sperling 2004). Hence, if the girls are sent to attend school, this form of household contribution to their family would be compromised which might put parents into more poverty (Herz & Sperling 2004). Additionally, women are less likely to get to school because of indirect costs such as transportation and necessity items for school. This includes culturally appropriate attire, which many families cannot afford. Because of all the above costs of educating girls, the gender gap in education continues to be an ill to Africa's economy. Consequently, this acute issue of limited education opportunities for women in Africa further cripples African economic performance (Herz & Sperling 2004). In order to eradicate poverty through education, these socioeconomic and cultural barriers have to be given special attention (Herz & Sperling 2004).

Although female participation in the economy has been significantly rising in several African countries, women's full contribution to the economy is compromised by myriad sociocultural ills. The marginalization and discrimination of women starts at their homes and follows them to school and to the workplace, where one would assume that women would feel more empowered than at home. In most African households, mothers tend to only send their sons to school and keep their daughters for domestic roles at home (Herz 2011). Governments and higher institutions in Africa are far from achieving the ideals of gender equality in modern society. The multitude of negative impacts that gender inequality has on a society is pervasive and real, and it is the main malady in endangering Africa's economic development (Herz 2011). More specifically, the issue of the gender gap in education is ubiquitous, severely impacting economic growth in Africa. Herz (2011) discusses how in many developing countries "the more economic resources, such as education and job opportunities, are available to a group, the more they tend to

be more monopolized by men." This highlights the devastating gendered economic activity in Africa. Although various economic development agencies aim to address the gender gap in education and its influence on economic growth, women are still subjected to exploitation by the capitalist economic system. Gender inequality is one of the several critical issues in Africa that exacerbates the continent's underdevelopment problems. Lorber, based on Marx's theory, explains gender inequality as "demeaning women's abilities and keeping them from learning valuable technological skills…preserve them as a cheap and exploitable reserve army of labor" (Lorber 1994). Consequently, women are often deprived of their basic freedom of education, which in turn limits economic development in Africa (Sen 2001).

Furthermore, Herz and Sparling (2004) raise awareness about the various sociocultural or economic constraints that make the cost of educating girls higher than educating boys. Consequently, parents' cost of sending their daughters to school should be compensated in order to increase girls' school enrollment rates. Adding to this, studies show that "educating girls generally produces greater gains in productivity and income than educating boys, and educating girls has as much or more impact on national economic growth," regardless of the lag in their economic start (Herz & Sparling 2004). Supporting this idea, the World Bank's (2003) 100-country intensive study claims, "increasing the share of women with secondary education by 1 percentage point boosts annual per capita income growth by 0.3 percentage points on average, according to a 100-country" (World Bank 2003). Educating women clearly guarantees an economic benefit and it should be a crucial matter. In her study, Dr. Gupta (2014) strongly supports the ideas discussed at the *1985 World Conference on Women* in Kenya, stating, "although women are half of the world's population, they are oppressed by the hegemonic masculine system and are unable to have access to equal opportunities" (Gupta 2014). Gupta argues that to fully utilize the

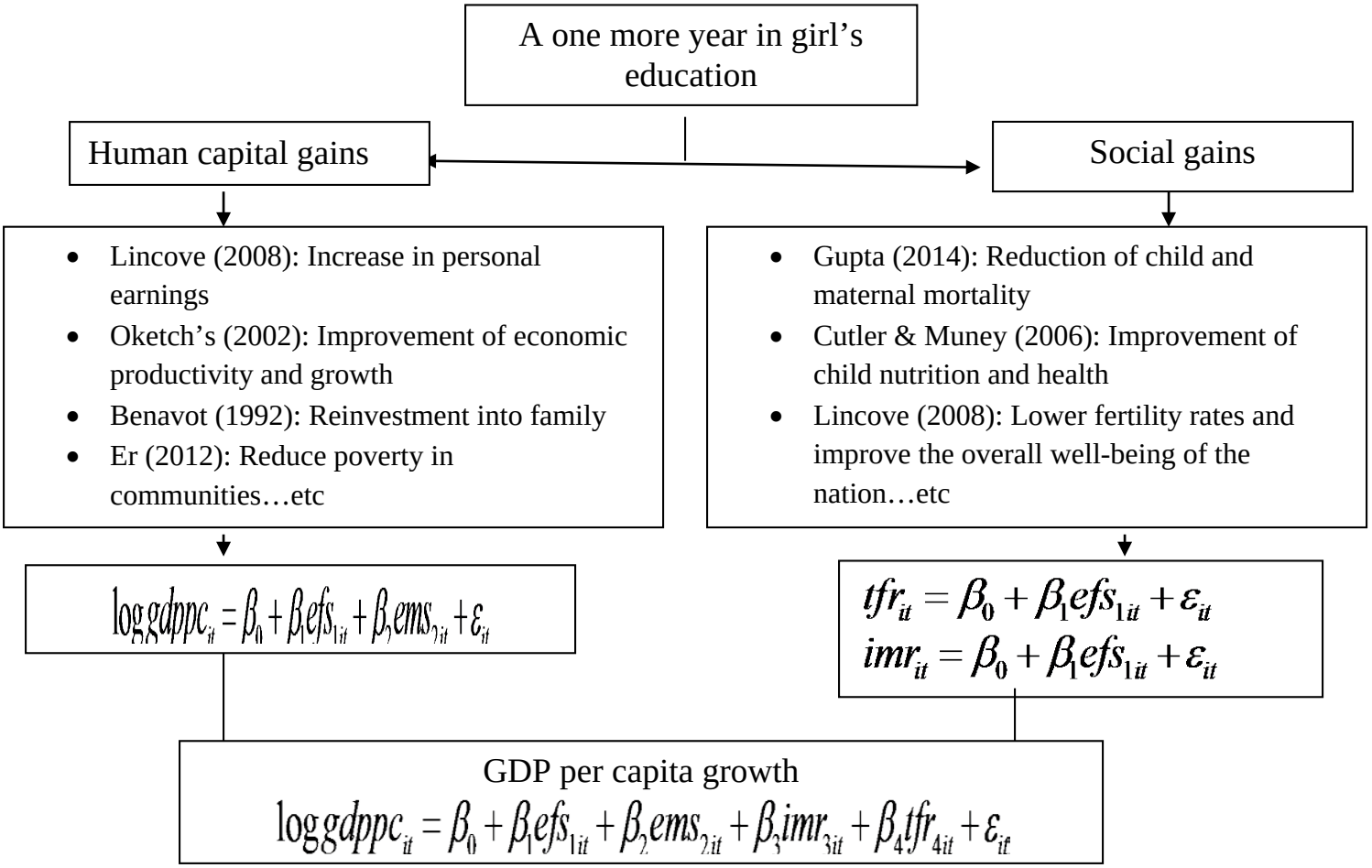
untapped resources of women, African governments and institutions should reinforce new reforms that empower them. Although policies have been implemented, institutions such as the World Bank and the United Nations have failed to look into the gender gaps in education, critically hindering economic growth and development in Africa.

The restrictions barring women in Africa from going to school are largely a result of cultural values and religious beliefs. Additionally, in most African countries, cultural and traditional norms play significant roles in constraining women from seeking education. Women and girls bear the burden of poverty the most. This is mainly due to limited access to education as well as restricted job opportunities, which make women economically dependent. Access to education for women is crucial to curing them from the vicious cycle of poverty. Women and girls need society's support in order to break through the cycle of generational poverty in Africa (National Human Services Assembly 2012). In most African countries, women often only participate in household productions that are not calculated into the Gross Domestic Product (GDP) (Negash 2006). Hence, the issue of gender gap and inequality in Africa is real and pervasive. It is important to educate girls, who are often stifled in Africa's economy, in order to achieve the targeted economic development and growth.

Furthermore, Dollar and Gatti (1999) highlight social identity factors such as spiritual views and the lack of civil freedom that continually limit development processes. For instance, some cultural beliefs restrict women from leaving their houses to go to school. Some religious beliefs assign specific roles for women, which force them to stay at home. Thus, these social identity factors are said to "pay a price for [underdevelopment] in terms of slower growth and reduced income," which is seen in many African countries (Dollar & Gatti 1999). Consequently, it is crucial to examine how educating women, improving health, and heightening literacy rates

are significantly influencing the economic growth and development in Africa. In order to empirically examine the economic gains (human capital and social) of educating women, the following chart below is a demonstration of the methodology of this paper in analyzing the research question empirically.

Gender, Education, and Development



IV. Human Capital Gains of Educating Girls

Several papers in economics and development have been dedicated to exploring a potential relationship between investment in women's education and economic success. As a result, there is an extensive literature that links education, particularly female education, with economic growth using the human capital theory. Human development researcher Jalilian (2012) emphasizes the idea that "education—especially girls' education—has a direct and proven impact on the goals related to child and reproductive health and social and gender sustainability". Additionally, education "promotes economic growth, national productivity and innovation, and values of democracy and social cohesion" (Jalilian 2012:52). Thus, educating girls has endless benefits that certainly stimulate Africa's economy.

The development of the human capital theory is derived from "the belief that people's learning capacities are of comparable value to other resources involved in the production of goods and services" (Nafukho et al., 2004). Therefore, according to several studies, investing in medical care and education will result in an improvement in health and income (Nafukho et al., 2004). Educational attainment also allows individuals to support themselves and their families. Accordingly, the human capital theory "seeks to explain the gains of education and training as a form of investment in human resources…. and the main proposition is that people are considered a form of capital for development" (Nafukho et al., 2004). Many studies argue that educating women will "increase the productivity by raising the level of cognitive skills and innovation" (Jalilian 2012:46), improving the conditions for achieving human development. Consequently, improving the human development of women who are deprived of their economic capabilities would create a bridge between achieving the Millennium Development Goals and economic growth in Africa (Jalilian 2012).

Various empirical studies have demonstrated a positive correlation between female education and economic growth via the human capital theory. The human capital theory explains that education is one of the most important sources of human capita since it improves the capabilities of the labor force and advances productivity. Consequently, several literatures argue that investing in education directly influences economic growth. Utilizing Adam Smith's classical explanation of the human capital theory, which is explained as "the acquired and useful abilities of all the inhabitants or members of the society," Jalilian presents a close correlation between education and its direct impact on the economy of a country (Jalilian 2012). Fitzsimons (1991) further describes the human capital theory as "any stock of knowledge or characteristics the worker has that contributes to his or her productivity" (1991). Likewise higher education significantly leads to economic growth by accumulating knowledge, which produces an economic value and improves the productivity of the labor force (Fitzimons 1991). Citing the endogenous growth theory, Jalilian (2012) urges developing countries to invest in women's education to gain the required skills and knowledge to make the transition from the agricultural sector into the industrial sector, which would consequently result in economic growth.

Moses O. Oketch's (2002) study entitled *Determinants of Human Capital Formation and Economic Growth of African Countries* presents empirical evidence that human capital can be a source of economic growth in Africa. Oketch write, "African nations should concentrate on investment in human resource development through education while also implementing reforms that are conducive to economic growth" (Oketch 2002:562). He recommends education, in the form of human capital, as an essential catalyst for boosting Africa's economy. Similarly, Sebnem Er's research (2012) demonstrates how empowering women through education has several positive effects on the economic growth of Africa. Er (2012) asserts that the human capital from female

education not only leads to employment, but it also improves the wellbeing of women and their families, which likely influences the economy positively. A few African nations such as Kenya have been fighting for equal education opportunities for women in order to economically empower them and the country. In 1985, Kenya organized a conference on women in Nairobi to support the neoliberal argument of education as a source of female empowerment (WCW 1985). Kenya's fight to include women in the economy not only diversified its economy, but women's participation in the economy allowed Kenya to increase its economic consumption, simulating its economic growth further.

Other economists such as Lincove (2008) strongly encourage investment in female education to improve women's labor participation rates as well as family production, adding economic value via the human capital theory. Lincove's (2008) study demonstrates that, controlling for various fixed-effects, there is a positive, robust, and significant relationship between years of female schooling and female labor force participation, which contributes to economic growth (Lincove 2008). This paper empirically tests the different indicators of economic growth in fifty-two randomly selected African countries, focusing on the social and human capital gains from educating women. Lincove (2008) stresses the notion that the increase in the female labor force participation rate is accompanied by economic growth, and several institutes claim that this growth is attributed to investment in female education. Instead of focusing on the female labor force participation rate, as Lincove's study does, this paper will emphasize the social and economic gains from educating women. Particularly, this study seeks to find a correlation between women's education, measured by female expected years of schooling, and gross domestic product per capita in Africa. This paper is a panel data analysis, covering the years 2005, 2007, 2009, 2011 and 2013.

This study will also provide policy recommendations for how to alleviate the poverty that has been deteriorating the African economy for the last four decades.

V. Social Gains of Educating Girls

Issues such as maternal and infant mortality rates and high fertility rates are among the indirect causes of Africa's underdevelopment. Educating females contributes not only increases human capital, but it also contributes to numerous social benefits that have significant impact on the economy. Jane Arnold Lincove (2008) argues that investment in female education controls the fertility rate and improves both the health of a mother as well as her child. Lowering fertility rates and infant mortality rates are among the many merits of educating females, particularly in developing countries. Cutler and Muney (2006) observe that "more educated mothers are less likely to have low or very low birth weight babies, and their babies are less likely to die within their first year of life." These findings are important since they demonstrate that education has a direct link to health-related indicators such as infant mortality rates. For instance, at *The 1985 World Conference on Women* in Nairobi, Kenya emphasized improving the health of women and their economic status in order to improve the nation's economic development. Such correlation between education and women's reproductive health is crucial as it impacts women's economic activity.

Although the impact of educating women on health is casual (indirect), it is still reasonable to say that education and health are directly correlated (Cutler & Muney 2006). Currently, a few African countries such as Tanzania are working to empower women and improve the wellbeing of the nation concurrently. For instance, in Westeneng and D'Exelle's quantitative study (2015), the authors provide evidence for why educating women is essential in Tanzania. They demonstrate that "women who are economically empowered through education are more likely to visit health

centers and, in the event of pregnancy, they are also ‘unlikely’ to deliver at home” (Westeneng & D’Exelle’s 2015). This means that educating women is a vital investment, as it saves the lives of many disadvantaged African women who live in impoverished conditions. Consequently, improving women’s health is a source of social empowerment, which is one of the most necessary elements in achieving some of the Millennium Development Goals (Westeneng & D’Exelle’s 2015). Accordingly, educating women is crucial and should be supported by all economic and development stakeholders in Africa and around the world.

In Africa, overpopulation often hinders the prospects for economic growth and development. Jalilian’s (2012) study posits that educating women is the primary solution for overpopulation issues. She argues that “if women and girls are educated they are more likely to be aware of family planning, and therefore can substantially reduce the fertility rate,” mitigating issues with overpopulation. The study states that, “countries that have made social investments in health, family planning, and education have slower population growth and faster economic growth than countries that have not made such investments” (Jalilian 2012). It is clear that one of the most important societal gains from educating women is the reduction of fertility rates. Similarly, Gupta (2014) argues that lower fertility rates are associated with women who have higher levels of education. In Africa, as women become more educated, they are likely to delay their marriage and their childbearing period. As a result, they are more likely to participate in the labor force (Gupta 2014). In Ethiopia, due to the recent rise in female enrollment in primary and secondary education, more women are delaying marriage. This has led to lower fertility rates across the nation (Gupta 2014). Through education, women are able to gain social and economic empowerment, providing the potential for economic growth and development. Supporting Gupta (2014), Behrman’s (2015) study states that, “increased schooling reduced women's ideal family size and very high desired

fertility" (Behrman 2015). Both studies show that educating women leads to a lower fertility rate, giving women a chance to support themselves as well as a chance to positively impact the African economy.

This study will empirically explore the relationship between women's education, infant mortality rate, and the fertility rate. Several studies examine the effects of female education as a source of human development and economic growth, providing an essential analysis of the role of female education in economic growth in developing countries, particularly in Africa. Jalilian's research paper (2012) empirically investigates the relationship between economic growth and its female education indicators. Similar to Lincove's (2008) research, Jalilian's study also connects education and economic growth in terms of GDP per capita, as well as education and the human development indicators such as life expectancy, infant mortality, and adult literacy (Jalilian 2012). She uses advanced statistics to demonstrate that the education of women improves child health and women's reproductive health. She states that there is a "clear positive effect of secondary and high level of female education on controlling the diseases, the child mortality as well as fertility rate" (Jalilian 2012:51). Consequently, the ability to reduce fertility rates and mortality rates would undoubtedly allow more women to be economically active.

Other studies on the topic of female education as the main source of social gains include a research paper by Subbarao and Raney (1995). Their study, entitled *Social Gains from female education: A cross-National Study*, explores social gains from female secondary education and compares the results with male secondary education via various statistical methods. By using total fertility rate and infant mortality rate as dependent variables, Subbarao and Raney (1995) were able to find correlations between female secondary education and total fertility rate and female secondary education and infant mortality rate. Consequently, their study concludes that female

education has a direct impact in lowering both fertility rate and infant mortality rate. It was further explained that the higher the level of female education, the higher the enrollment rates in school for children. The central argument of Subbarao and Raney's (1995) study is that although male secondary education is essential, the coefficients of female secondary education indicators are found to be more significant than male secondary education indicators.

Several economists, economic development practitioners, and sociologists have agreed that educating women not only improves the reproductive health of a woman and the health of her children, but that it also stimulates economic growth (Herz 2011). Dr. Barbara Herz (2011), who specializes in girls' education, mentions economists such as Lawrence Summers who have been advancing girls' education as one of the most influential economic development agents for less economically developed countries. According to Herz (2011), women's education holds a multiplier effect capability as it boosts the economy and improves the wellbeing of women, society, and the whole nation. Additionally, numerous economic studies claim that the process of poverty alleviation in Africa should start with empowering women economically via providing access to education. The classic book entitled *Development as Freedom* by Amartya Sen stresses that women in developing countries should find their "rightful places" in a society in order to support themselves and their families (Sen 2001). Amartya Sen emphasizes that the long-term effect of educating women is essential as it allows them to "gain voice and agency in their lives, giving them more economic opportunities, encouraging women's political participation, and transforming society for the better" (Sen 2001). Accordingly, women's education is one of the main ways to achieve sustainable development since it affects children and future generations.

Kevane's (2004) intensive research on issues in gender and development in Africa highlights that women's economic benefit of education is strong and should be supported by

governments and higher institutions. Kevane argues that, “relative to men, women prefer that social spending be higher and more oriented toward the well-being of children; more social spending on local infrastructure, schooling, and antipoverty programs is good for economic growth; thus, empowering women in the political process leads to larger allocations toward growth-enhancing government expenditure” (Kevane 2004:2). These economic benefits convey that African countries should re-shape their economic development goals towards gender equality in education and pay more attention to the economic gains from educating women. Kevane (2004) further demonstrates a link between female education and growth via explaining the concept of fertility rates and mortality rates. He describes how, in Africa, a lot of women tend to have many children, hoping that some will survive. Additionally, children are seen as an economic asset, making the fertility rate significantly high. However, what women fail to see is how the extra child added to society increases the total burden on the society (Kevane 2004). Supporting Kevane, Youssef (2011) discusses how “the fertility rate could be an obstacle for development”, deteriorating the standard of living. Therefore, Kevane asserts that, “empowering women seems to be associated with lower fertility rates. If lower fertility rates generate more rapid economic growth, then the syllogism is complete” (Kevane 2004:3). Consequently, Kevane further adds to literature concerning growth and development in Africa and demonstrates how educating women has a multiplier effect that leads to achieving many economic development goals.

Jalilian (2012) argues that, while general investment in education is fundamental, ‘who’ gets the education is a critical matter. She expresses the necessity of women’s education to eradicate poverty and create gender equality, which have been some of the United Nations’ (2015) Millennium Development Goals. The author calls for improvement in women’s roles and status of

education, since this is a vital ingredient in improving children's health and women's reproductive health, which has a positive impact on the well-being of Africa's economy.

This paper will show a few regressions to demonstrate how the human capital and the social gains of educating girls reviewed above directly impact the growth of GDP per capita in Africa. This empirical study estimates and simulates the effects of female education, particularly in allowing women to be economically active, in lowering fertility rate, and in averting child deaths. Using the findings, further investigation will be conducted to explore the relationship between education and the long-term economic growth in Africa in order to explain why closing the gender gap in education is a crucial matter in Africa.

VI. Methodology

Data and Variables

Examining the gender-separate effects of education on growth has been challenging. There are few papers that are dedicated to exploring the gender gap in education and its influences on growth. This study's main inspiration comes from Benavot's study (1989) that investigates "the impact of gender differences in education on development for a sample of 96 countries and found that both female and male primary enrolment rates have a positive and significant effect on growth" (Boopen 2006). Interestingly, the economic benefit of female education was found to be stronger than the male economic benefit of education. Similar to Benvot's research, this paper's objective is to empirically estimate and simulate the effects of female education. Unlike Benvot's study, this study will only focus on African countries, and contains a two-stage investigation. First, the study will explore issues concerning the gender gap in education and how that impacts growth. Furthermore, this paper will examine how education, fertility rate, and the infant mortality rate influence the well-being of women as well as Africa's economic performance. This paper explores

how educating women affects the fertility rate and the infant mortality rate and how these results connect with economic growth in Africa. Some of the indicators to be used in this study are male and female educational attainment, Gross Domestic Product per capita, total fertility rate, and infant mortality rate. The data used in this paper is comprised of years from 2005 to 2013. Most of the resources for collecting the data come from the World Bank (2014) report and the Human Development Program report (2014). This study is a panel data analysis of fifty-two randomly selected African countries, examining their economic growth and female related indicators. The paper will also use other, smaller organizations to find more data that can augment the study.

Although most of the data was not challenging to find in the reports of these organizations, getting some data for countries such as Sudan, Djibouti and Somalia was difficult since these countries are often in continuous conflict and civil unrest. GDP per capita (US $) (gdppc) in this paper is the dependent variable that measures the economic growth of a country (in Africa). The independent variables are female and male expected years of schooling (years), and the infant mortality rate (per 1,000 live births)(imr) as well as total fertility rate (tfr). Total fertility rate (tfr) is defined as "the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates" (World Bank 2016). Although the main goal is to find a potential relationship between female education and economic growth in Africa, the paper will further use the findings to compare the economic benefit of education between males and females. The major limitation of using this data arises from having only a few years to explore the variables. It would be challenging to predict the long-term impact of educating women in Africa using this data. However, the World Bank and UNDP are reliable institutions for collecting data. Another potential limitation with using the data is the fact that some countries such as Nigeria (with a population close to 180 million) and Ethiopia

(around 100 million) could create biased results. Since this study did not need to do any computation or alteration with the original data, the results are unaltered.

Below are estimate equations using fixed effect estimate, where *i* represents country, and *t* represents time.

1. $imr_{it} = \beta_0 + \beta_1 efs_{1it} + \varepsilon_{it}$
2. $tfr_{it} = \beta_0 + \beta_1 efs_{1it} + \varepsilon_{it}$
3. $\log gdppc_{it} = \beta_0 + \beta_1 efs_{1it} + \beta_2 ems_{2it} + \varepsilon_{it}$

For this study, economic growth is measured by the GDP per capita in US dollars, which is represented by $gdppc_i$ (Gross domestic product of the i^{th} country measured in current dollars). The following symbols are used to represent the independent variables.

- efs_i : i^{th} country education attainment (expected years of schooling, females (years)
- ems: i^{th} country education attainment (expected years of Schooling, males (years))
- imr_i: i^{th} country's infant mortality rate (per 1,000 live births)
- tfr_i :i^{th} country's female total fertility rate (births per women)
- GDP per capita (USD)

Since this paper intends to form a linear relationship with the dependent and independent variables, using a logarithm is necessary to attain the predicted model. Furthermore, using a logarithm minimizes the issues in the disparity in values of GDP per capita across the different African countries. This paper, instead of using time-series or cross-country data analysis, conducts a panel data analysis because it "control[s] for omitted variables" (Hurlin 2010). Additionally, using panel data analysis increases "degrees of freedom while reducing collinearity problems among explanatory variables" (Hurlin 2010). Therefore, the use of a panel data analysis for this

research paper is effective since it explores the relationship between the level of human capital and the social gains from educating girls in Africa, which impacts the economy positively.

Table 1 (under the List of Tables) shows means, variance, and the sample size of all the variables of all the linear models. The mean values for the total fertility rate, expected years of female schooling, and expected years of male schooling are 4.9, 8.7, and 9.8, respectively. This illustrates that the values of these variables are fairly evenly distributed. Other the other hand, the mean values for GDP per capita and the infant mortality rate are 2440 and 89. The remedy for high variation in values is the use of logarithms. After using logarithm, the mean value for GDP per capita changed into 7.1, which is more evenly distributed with the other variables. The standard deviation of GDP per capita is high, indicating that the data is spread out over a large range of values, potentially as a result of large variation in GDP per capita among the African countries. However, this problem is also solved using logarithms.

The Sample Regression

Several empirical studies have used various economic models to demonstrate the relationship between education and economic growth as well as education and health. There are three regressions conducted in this study and a final regression that combines the three models. Graph 1, 2, 3, and 4 (under the List of Graphs) demonstrate the various linear relationships between the dependent and the independent variables, illustrating the correlation among them. The first regression involves infant mortality rate as the dependent variable and female education as the independent variable. Table 2 (under the List of Tables) illustrates how the P value for the independent variable is significant at 1% level of significance. Additionally, r-squared is around 0.4, which is not too low, indicating that most of the variation in infant mortality rate is explained by the model.

The sample regression for model 1:

$$imr_{it} = 165.5 - 8.866 efs_{it}$$

The expected years of schooling for females is significant, indicating that there is a strong negative correlation between infant mortality rate and expected years of schooling for females. According to the fixed effect estimate, the infant mortality rate decreases by 9 deaths per 1000 live births when the expected years of schooling of females increases by one year, keeping all the other independent variables constant (see the results in table 2 under the List of Tables). This negative correlation between infant mortality rate and female education is important because it indicates that female education is one of the central means to achieve social gains by improving the health of children. If raising awareness through female education minimizes the infant mortality rate, this will gradually alleviate the pressure on women to have many children, reducing rapid population growth in Africa.

The sample regression for model 2:

$$tfr_{it} = 6.054 - 0.186 efs_{it}$$

The second regression involves fertility rate as the dependent variable and female education as the independent variable. A one-year increase in female education decreases the total fertility rate by 0.18 percentage points, holding other variables constant. This demonstrates that there is a strong negative correlation between fertility rate and female education. Although the independent variable is significant at 1% level of significance, r-squared is 0.08, which is low regardless of the large data set used. The low r-squared could be due to the large data variability among the various African countries who have different educational or economic policies. Overpopulation is one of the constraints in achieving the most potential economic growth in Africa. If an increase in female education has social gains such as the ability to influence fertility

rate, Africa would benefit greatly from female education by being able to control its rapid population growth and the availability of its scarce resources.

The sample regression for model 3:

$$\log gdp_{it} = 5.002 + .151efs_{it} + .0829ems_{it}$$

The last regression involves GDP per capita as the dependent variable and female and male education as the independent variables. Observing the P value, the coefficient for expected years of female schooling is significant at 1% level of significance, whereas the P value for the coefficient of expected years of male schooling is only significant at 10% level of significance (see table 2 under List of Tables). Furthermore, r-squared for the model is 0.370, which is lower than expected. However, according to the fixed effect estimate, there is a strong positive correlation between GDP per capita and female and male education. When expected years of school for females increases by one year, GDP per capita increases by 15%, whereas when expected years of schooling increases by one year for males, GDP per capita increases by only 8.2%, keeping all the other independent variables constant.

The results for the expected years of schooling of both females and males is significant, indicating that there is a strong positive correlation between economic growth, in terms of GDP per capita, and female and male expected years of schooling. This means education significantly raises human capital and productivity, leading to economic growth. Consequently, expected years of schooling is one of the most significant indicators for boosting Africa's economic growth. Furthermore, based on the sample used in the regression, economic benefit of education of females is stronger than males' economic benefit of education (see the fixed effect results in table 2 under the List of Tables). Therefore, it is reasonable to say that females have a higher impact on the

economic growth in Africa than males. This result is crucial in order to promote the concept of female education in Africa and the rest of the world.

There are various factors that can lead to economic growth in terms of an increase in GDP per capita, therefore, as a final model, I merged the three linear models discussed above into one model by forming GDP per capita as a function of female and male education attainment, infant mortality rate, and total fertility rate.

The final empirical model (**model 4**) is written as follows:

$$\log gdppc_{it} = \beta_0 + \beta_1 efs_{1it} + \beta_2 ems_{2it} + \beta_3 imr_{3it} + \beta_4 tfr_{4it} + \varepsilon_{it}$$

The final sample regression for the final model is below:

$$\log gdppc_{it} = 6.782 + 0.114 efs_{1it} + 0.0168 ems_{2it} - 0.00891 imr_{3it} - 0.0116 tfr_{4it}$$

Looking at the results (table 3 under the List of Tables), the only statistically significant variables are female education and infant mortality rate at all levels of significance. Female education has numerous human capital and social gains as explained earlier in this study. Therefore providing access to female education is crucial in raising GDP per capita in Africa. Consequently, this result conveys that educating girls and lowering infant mortality rates are some of the most significant components in stimulating Africa's economic growth.

VII. Discussion of Results

This paper empirically demonstrates that education is a source of human capital as well as a bridge for numerous social gains. However, access to education is still a problem in a lot of developing countries. Particularly in reference to Africa, some empirical and theoretical papers have discussed the ills of the gender gap in education that continues to exploit women's opportunities of empowerment. Education is a basic human right; irrespective of the economic benefit of a female's education, every woman should have access to education. This study, while

empirically demonstrating the human capital and social gains of educating girls, conveys that although educating males is as important as educating females, based on the sample used, the economic benefit of education of women is stronger and more beneficial in the long-run. The final regression also indicates that female education and the wellbeing of children are principal agents for economic growth in Africa. These results are vital, as they could be a benchmark for the World Bank as well as United Nations Development Program to develop policies that would empower women economically, socially, and politically in Africa and in other developing regions of the world.

Higher institutions should focus on minimizing the gender gap in education, as it continues to compromise Africa's economy. Several papers have proven that women in Africa are not only the 'untapped' resources, but they are also the ones who bear the burden of poverty the most. Societies, governments, and higher institutions should give girls and women the right to make use of their capabilities in order to help themselves and others. The dilemma is that it would be challenging to prioritize which of the various critical issues needs immediate attention from the African government as well as higher institutions. Another study should be dedicated to investigating the numerous sources of poverty and how to address these issues. Nevertheless, this study demonstrates that educating women is vital both for the long and short-term.

VIII. Conclusion and Policy Implications

The economic benefits of girls' education are infinite. What makes it even more invaluable is its ability to be the cheapest source of reducing fertility rates compared with family planning (Murphy 2012). Consequently, investing on girls' education unquestionably minimizes birth rates, giving women more time to be economically active. Policy makers should tackle the root causes of poverty in order to enhance the economy. Essentially, creating opportunities to educate women

should be the priority agenda in shaping the development strategies in the region (Youssef 2011). Oketch (2002), while addressing the on-going debate on higher institutions, stated that "economic policies advanced by international financial systems of World Bank and International Monetary Fund (IMF) have also been blamed for sometimes exacerbating the African economic crisis—and are said to undermine the ability of sub-Sahara African countries to participate effectively in the global economic set up" (Oketch 2002:562). Irrespective of various policies from the World Bank and the International Monetary Fund, the goals set by these institutions and the needs of many developing countries are not harmonized. According to Michael Wolcock and Deepa Narayan's (2000) study, one of the ways to mitigate the gap between higher institutions and various stakeholders is to foster social capital since it "helps to bridge orthodox divides among scholars, practitioners, and policymakers." Consequently, all targeted stakeholders will work collaboratively to exterminate the ills of poverty in Africa.

According to the empirical study, there is a strong negative correlation between female education and infant mortality rate as well as between female education and total fertility rate. Additionally, while comparing the economic benefits of education between females and males, the fixed effect estimate from one sample confirms that female education contributes more to GDP per capital than male education does. Consequently, while analyzing these results, it is crucial to start thinking about possible policy recommendations and ways of policy implementation in order to minimize the gender gap in education in Africa in order to stop the deterioration of its economy. There are millions of girls in Africa who are not receiving the basic human right of education. Several empirical studies serve as evidence for explaining the relevance of educating women both for improving children's and mother's health and for boosting Africa's economy. These human capital and social gains of education illustrate that educating girls is one of the main ways to

alleviate the ubiquitous issues of poverty in many developing countries. There are several micro or macro policy recommendations to solve issues concerning gender gaps in education in Africa.

The first and main action to take in order to alleviate problems regarding limited access of education to girls and women is to raise awareness about the direct and indirect benefits of education through informal education or dialogue through parents, religious leaders, teachers, and the whole community. Society needs to comprehend the importance of integrating issues of gender and development into various topics in education reform. Creating awareness will assist in developing a holistic approach that would include the voices of various stakeholders. For instance, the government of Mozambique has developed a fellowship program for students who are from impoverished backgrounds (World Bank Group 2015). The program, which predominantly targets girls, has been successful in raising enrollment rates since its launch a few years ago. For instance "providing $45-$60 for girls who are transitioning from primary to secondary school" created a 20% increase in enrollment rates as well as an increase in transition rates to secondary school (World Bank Group 2015). Other African countries should start similar programs to increase school enrollment, particularly in primary and secondary school.

The second and most important policy recommendation that could help overcome social norms and attitudes that block equality in education is to make education the driving force for a country's national and foreign goals. For instance, in a lot of African countries, mothers tend to only send their sons to school, keeping daughters at home for household production. Society and the government need to highlight the importance of sending girls to school. For instance, in order to incentivize mothers in rural areas to send their daughters to school, low income families should get tax benefits as a way of rewarding them for educating their children, particularly their

daughters. A few developing countries, such as Mexico, Brazil and Bangladesh, have developed "policy programs that pay mothers" who are educating their daughters. When the policy was implemented in 1992, "only 68 percent of boys and 76 percent of girls aged 14 to 16 were enrolled in school. By 2001, 90 percent of boys and 92 percent of girls were enrolled in school" (Arends-Kuenning et al., 2005). If more girls were being educated via such policies, countries in Africa would economically benefit in the long run. In Yemen, in order to enroll more girls in school, the *Basic Education Development Program* provides "conditional cash transfers to more than 30,000 girls" who are from the poorest and the most underprivileged rural households (World Bank Group 2015). This has caused "girls' school enrollment to increase from 49 % in 1999 to 78% in 2009" (World Bank Group 2015). Likewise, in Africa, it is vital to encourage more girls' school attendance through financing some of their cost of education.

Another possible policy recommendation is to find a way to overcome discriminatory practices in educational institutions. Girls should not face discrimination at home or at school. Some mothers keep their daughters at home in order to keep them away from the various harassments they could potentially face on the way to school or when at school. Thousands of African girls face emotional and sexual harassment while walking at least 5 kilometers to school every day. In Cambodia, in order to alleviate such fears, the government's Bank launched the *Cambodian Education Sector Project (CESSP)* in 2005 to deal with issues concerning "supply, demand and quality of education" (World Bank Group 2015). For instance, as a way of fostering gender equality in education, the Bank " encouraged girls' school enrollment and attendance by expanding school in poor areas, shortening travel distances" (World Bank Group 2015). Additionally, in countries such as Botswana, a government led program "organizes teacher training as an avenue to challenge gender serotypes". It was reported that these types of programs raise

awareness about the significance of equal access to education and other opportunities. Countries in Africa can raise girls' school enrollment by making education more accessible and safe.

Lastly, it is crucial to address the concept of education as a source of economic, social, and political empowerment. However, it is not enough to just convince parents of the necessity of sending girls to school; the government should also find a way to facilitate this process. The gender gap in education is real and pervasive and it is affecting Africa's economy negatively. In Pakistan, in order to mitigate issues concerning the gender gap in education, the *Punjab Education Sector Project (PESP)* aims "to increase school enrollment and completion rate and gender disparities in student learning" (World Bank Group 2015). Since the implementation of this policy, it was reported that, "400,000 girls were eligible and have increased enrollment" (World Bank Group 2015). Therefore, by encouraging girls to go to school, the African continent can potentially gain various economic benefits in the long run.

An additional policy recommendation is to encourage higher learning institutions and the government of each African country to find female role models in order to inspire young girls and possibly raise female enrollment rates. For instance, private and public institutions should develop a policy that fosters equal pay jobs, potentially encouraging parents to send their daughters to school. Among these policy recommendations, it is perhaps necessary to identify and analyze the priority of the policy recommendations. For instance, the most important policy implementation in the short term could be to address issues concerning the gender gap in education as well as finding ways to economically support mothers to send their daughters to school.

In conclusion, several studies illustrate that women bear the burden of poverty the most as poverty has gender separate discrimination effect. Although women do double work by being a

caregiver at home as well as working outside their home, their economic contribution is not valued. Consequently, women have always worked harder than men although their contribution is under appreciated and undervalued. Educating girls has recently been considered as a “smart economics” since girl’s education not only contributes to their family, but also to their villages, society, and the whole nation is positively impacted from female education (Roberts et al., 2012). Accordingly empowering women through education not only leads to a more inclusive and diversified economy, but educating girls is also more profitable. Consequently, closing the gender gap in education is a necessity and should be supported by all institutions. One of the numerous African proverbs concerning educating girls comes from Dr. James Emmanuel Kwegyir-Aggrey, who says that “if you educate a man you educate an individual, but if you educate a woman you educate a nation.”

I. List of Tables

Table 1: Descriptive statistics for the model

Variable	Obs	Mean	Std. Dev.	Min	Max
Year	260	2009	2.833882	2005	2013
Country	260	26.5	15.03728	1	52
gdppc	257	2439.743	3490.923	111.2	21963.4
efs	247	8.703644	3.245451	2	16.4
imr	260	88.59231	43.83061	4	216
ems	227	9.629956	2.982884	3.2	16
tfr	260	4.435769	2.045031	1.8	30

Table 2: Fixed effect estimates of for Model 1 (infant mortality rate), Model 2 (total fertility rates) and Model 3 (female education)

	(Model 1)	(Model 2)	(Model 3)
VARIABLES	imr	tfr	loggdp
efs	-8.866***	-0.186***	0.151***
	(0.856)	(0.0392)	(0.0360)
ems			0.0829*
Constant	165.5***	6.054***	0.151***
	(7.482)	(0.364)	(0.0360)
Constant			5.002***
Constant			(0.249)
Observations	247	247	213
Number of country	52	52	51
R-squared	0.356	0.084	0.370

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Fixed Effect Estimate of the Final Regression Model (model 4)

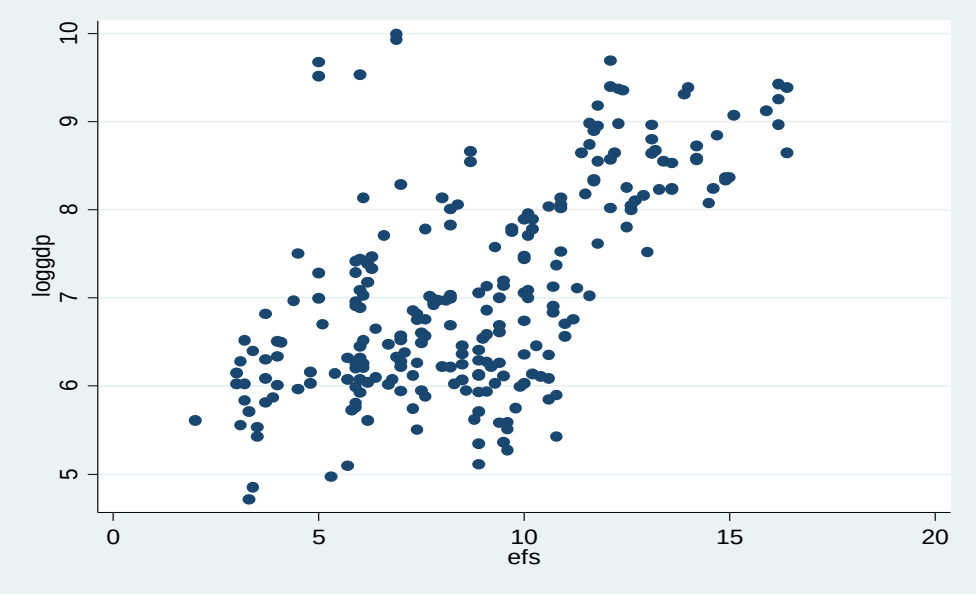
VARIABLES	loggdp
efs	0.114***
	(0.0344)
ems	0.0168
	(0.0417)
imr	-0.00891***
	(0.00181)
tfr	-0.0116
	(0.00918)
Constant	6.782***
	(0.422)
Observations	213
Number of country	51
R-squared	0.459

Standard errors in parentheses

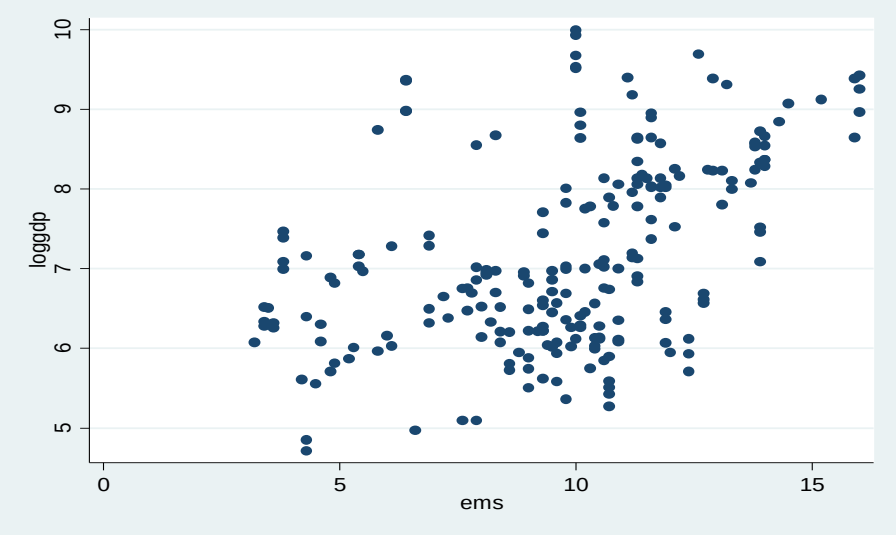
*** p<0.01, ** p<0.05, * p<0.1

II. List of Graphs

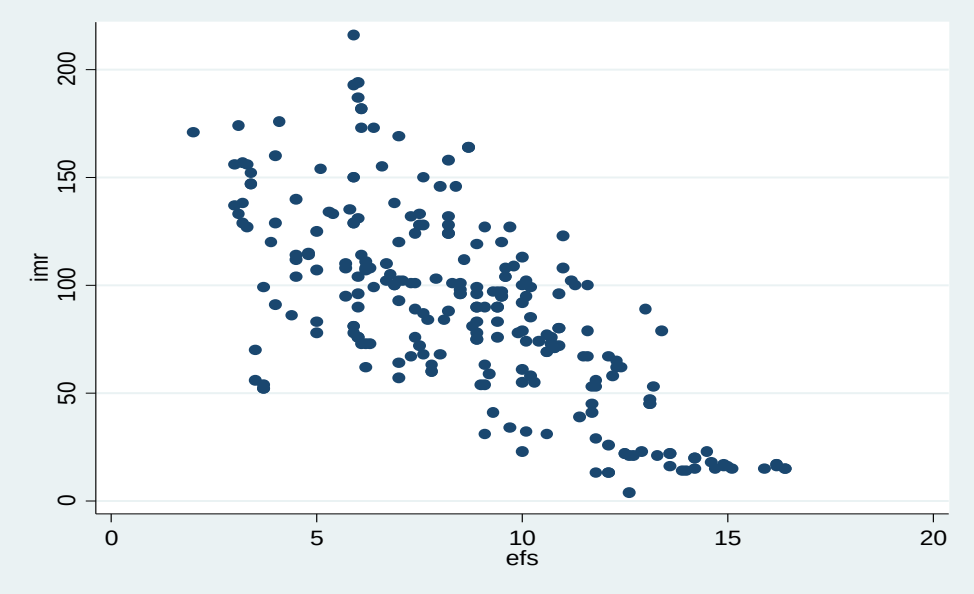
Graph 1: Linear predication of expected years of female schooling (efs) with GDP per capita (loggdp)



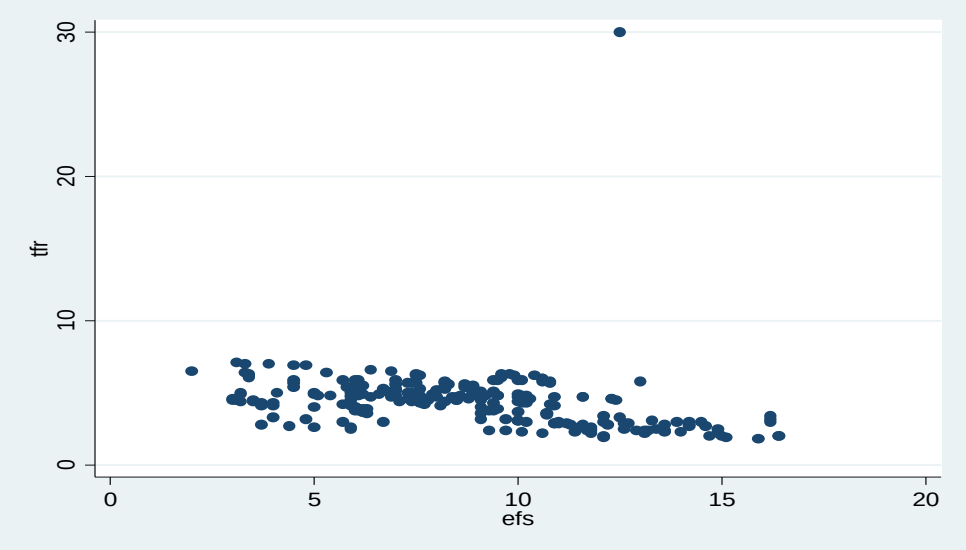
Graph 2: Linear predication of expected years of male schooling (efs) with GDP per capita (loggdp)



Graph 3: Linear predication of expected years of female schooling (efs) with infant mortality rate (imr)



Graph 4: Linear predication of expected years of female schooling (efs) with total fertility rate (tfr)



III. List of References

Albisetti, J. C. (2014). *Schooling German girls and women*. Princeton University Press.

Amartya Sen. 2000. *Development as Freedom*. New York: Anchor Books.

Anumna, ST. (1996): Education as a forward-looking strategy for the Nigerian women. *Journal of women in Colleges of Education* 1: 90-97.

Arends-Kuenning, M., Fava, A., Kassouf, A. L., & de Almeida, A. (2005). The impact of school quality and school incentive programs on childrens schooling and work in Brazil. In *American Agricultural Economics Association Annual Meetings, Providence, RI, July*.

Artadi, E. V., & Sala-i-Martin, X. (2003). *The economic tragedy of the XXth century: growth in Africa* (No. w9865). National Bureau of Economic Research.

Assié- Lumumba N'Dri Thérèse (1997) Educating Africa's Girls and Women: A Conceptual and Historical Analysis of Gender Inequality, in Ayesha M. Imam et al., *Engendering African Social Sciences*, Dakar: CODESRIA: 297–316.

Beaudoin, J. (1999). One Woman One Vote. *Scholastic Update*,*131*(9), 18-19.Boserup, E., & Kanji, N. (2007). *Woman's role in economic development* Earthscan.

Benavot, A. (1992). Curricular content, educational expansion, and economic growth. *Comparative education review*, *36*(2), 150-174.

Benhabib, J. and Spiegel, M.M., 1994. The role of human capital in economic development evidence from aggregate cross-country data. *Journal of Monetary economics*, *34*(2), pp.143-173.

Cutler, D. M., & Lleras-Muney, A. (2006). *Education and health: evaluating theories and evidence* (No. w12352). National Bureau of Economic Research.

Development Indicators 2004. Washington, D.C.: World Bank

Dibie, Josephine and Dibie, Robert. " Non-Governmental Organizations (NGOs) and the Empowerment of Women in Africa." *Journal of African and Asian Studies*, October 2012. 11(2), pp. *95-122.*

Dollar, D., & Gatti, R. (1999). *Gender inequality, income, and growth: are good times good for women?* (Vol. 1). Washington, DC: Development Research Group, The World Bank.

Dr. Vibha, Gupta (2014) Women Empowerment Though Education, *International Journal of Advanced Research in Management and Social Sciences,* 3(12): 231-238.

Er, Sebnem. "Women Indicators Of Economic Growth: A Panel Data Approach." *The Economic research Guardian,* January 2012, 2(1), pp.27-42.

Gupta, Vibha, (2014) Women Empowerment Though Education, *International Journal of Advanced Research in Management and Social Sciences,* 3(12): 231-238.

Herz and Sperling 2004. And: UNESCO. 2002. *EFA Global Monitoring Report: Is the World on Track?* Paris: UNESCO

Herz, B. K., & Sperling, G. B. (2004). *What works in girls' education: Evidence and policies from the developing world*. Council on foreign relations.

Judith, Westeneng & Ben, D'Exelle (2015) How Economic Empowerment Reduces Women's Reproductive Health Vulnerability in Tanzania, *The Journal of Development Studies,* 51(11): 1459-1474.

Julia, Behrman (2015) Does Schooling Affect Women's Desired Fertility? Evidence From Malawi, Uganda, and Ethiopia *Department of Sociology, New York University,* 52(3): 787-809.

Kevane, M. (2004). *Women and development in africa: How gender works* Lynne Rienner Publishers.

King, E. M., & Hill, M. A. (Eds.). (1997). *Women's education in developing countries: Barriers, benefits, and policies*. World Bank Publications.

Klasen, S. (2002). Low schooling for girls, slower growth for all? Cross- country evidence on the effect of gender inequality in education on economic development. *The World Bank Economic Review*, *16*(3), 345-373.

Licumba, E. A., Dzator, J., & Zhang, J. X. (2015). Gender equality in education and economic growth in selected Southern African countries. *The Journal of Developing Areas*, *49*(6), 349-360.

Lincove, Jane Arnold. 2008. Growth, girls' education, and female labor: A longitudinal analysis. *The Journal of Developing Areas* 41 (2): 45-68.

Lorber, J. (1994). Night to his day: The social construction of gender. The paradoxes of gender: 54-68. Yale University, New Haven, CT.

Murphy, M. (2012). The girl: Mergers of feminism and finance in neoliberal times. *The Scholar and Feminist Online, 11*(1-2).

Nafukho, F. M., Hairston, N., & Brooks, K. (2004). Human capital theory: Implications for human resource development. *Human Resource Development International, 7*(4), 545-551.

Oketch, M.O., 2006. Determinants of human capital formation and economic growth of African countries. *Economics of Education Review, 25*(5), pp.554-564.

Roberts, A., & Soederberg, S. (2012). Gender equality as smart economics? A critique of the 2012 World Development Report. *Third World Quarterly,33*(5), 949-968.

Sen, A. (2001). *Development as freedom*. Oxford Paperbacks.

Subbarao, K., & Raney, L. (1993). *Social gains from female education: A cross-national study.* Washington, D.C: The World Bank

The World Bank Group (2015). *Getting to Equal: How Educating Every Girl Can Help Break the Cycle of Poverty*. Education Human Development Network http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:23009825~menuPK:282424~pagePK:64020865~piPK:149114~theSitePK:282386,00.html (April 2, 2016).

Woolcock, M. and Narayan, D., 2000. Social capital: Implications for development theory, research, and policy. *The world bank research observer, 15*(2), pp.225-249.

Yibeltal Kiflie Alemayehu, Katherine Theall1 , Wuleta Lemma , Kifle Woldemichael Hajito1 , Kora Tushune (2015) The Role of Empowerment in the Association between a Woman's Educational Status and Infant Mortality in Ethiopia: Secondary Analysis of Demographic and Health Survey *Ethiopian Journal of Health Sciences,* 25(4): 353-362.

Youssef, Nadia H. "Women's Roles and Population Trends in the Third World." *International Labor Organization*, May 2011, 54(5), pp.111-173.

Appendix

1: Fixed effect estimates of infant mortality rate and female education (Model 1)

```
Fixed-effects (within) regression               Number of obs     =       247
Group variable: country                         Number of groups  =        52

R-sq:                                           Obs per group:
     within  = 0.3559                                         min =         3
     between = 0.5138                                         avg =       4.8
     overall = 0.5071                                         max =         5

                                                F(1,194)          =    107.20
corr(u_i, Xb)  = 0.0879                         Prob > F          =    0.0000
```

imr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
efs	-8.865506	.8562791	-10.35	0.000	-10.55432	-7.176695
_cons	165.4578	7.482361	22.11	0.000	150.7005	180.215
sigma_u	29.769503					
sigma_e	10.45192					
rho	.8902598	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(51, 194) = 38.45                     Prob > F = 0.0000

.
```

2: Estimates of total fertility rate and female education (Model 2)

```
. reg tfr efs
```

Source	SS	df	MS	Number of obs	=	247
				F(1, 245)	=	22.52
Model	89.6439695	1	89.6439695	Prob > F	=	0.0000
Residual	975.296598	245	3.98080244	R-squared	=	0.0842
				Adj R-squared	=	0.0804
Total	1064.94057	246	4.3290267	Root MSE	=	1.9952

tfr	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
efs	-.1860021	.0391961	-4.75	0.000	-.2632064	-.1087978
_cons	6.053714	.3640042	16.63	0.000	5.336737	6.770691

3: Fixed effect estimates of Log GDP per capita (loggdp), female education, and male education (Model 3)

```
Fixed-effects (within) regression               Number of obs      =       213
Group variable: country                         Number of groups   =        51

R-sq:                                           Obs per group:
     within  = 0.3703                                         min =         1
     between = 0.3483                                         avg =       4.2
     overall = 0.3444                                         max =         5

                                                F(2,160)           =     47.05
corr(u_i, Xb)  = 0.0012                         Prob > F           =    0.0000
```

loggdp	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ems	.0829124	.0423533	1.96	0.052	-.0007312	.1665559
efs	.1510972	.0359957	4.20	0.000	.0800092	.2221852
_cons	5.001681	.2493586	20.06	0.000	4.509223	5.49414
sigma_u	.92168331					
sigma_e	.22035228					
rho	.94593303	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(50, 160) = 75.31                     Prob > F = 0.0000

.
```

4: Fixed Effect Estimate of final regression model 4 (loggdp, female education, male education, infant mortality rate, and total fertility rate)

```
. xtreg loggdp efs ems imr tfr,fe

Fixed-effects (within) regression               Number of obs      =       213
Group variable: country                         Number of groups   =        51

R-sq:                                           Obs per group:
     within  = 0.4593                                         min =         1
     between = 0.3397                                         avg =       4.2
     overall = 0.3504                                         max =         5

                                                F(4,158)           =     33.55
corr(u_i, Xb)  = -0.0385                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      loggdp |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         efs |   .1141916    .034366     3.32   0.001     .0463157    .1820676
         ems |   .0168034   .0416734     0.40   0.687    -.0655054    .0991122
         imr |  -.0089119   .0018125    -4.92   0.000    -.0124918   -.0053319
         tfr |  -.0115798   .0091756    -1.26   0.209    -.0297025    .0065429
       _cons |    6.78212   .4216994    16.08   0.000     5.949225    7.615016
-------------+----------------------------------------------------------------
     sigma_u |  .92916967
     sigma_e |  .20547683
         rho |  .95337699   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(50, 158) = 82.12                     Prob > F = 0.0000
```

6: The following countries and their codes are used for this investigation on Stata

52 Country	Country code
Libya	1.
Mauritius	2.
Seychelles	3.
Tunisia	4.
Algeria	5.
Botswana	6.
Egypt	7.
Gabon	8.
South Africa	9.
Cape Verde	10.
Namibia	11.
Morocco	12.
Ghana	13.
Congo	14.
Zambia	15.
Equatorial Guinea	16.
Kenya	17.
Swaziland	18.
Angola	19.
Rwanda	20.
Nigeria	21.
Cameroon	22.
Madagascar	23.
Zimbabwe	24.
Tanzania	25.
Mauritania	26.

Lesotho	27.
Senegal	28.
Uganda	29.
Benin	30.
Togo	31.
Sudan	32.
Djibouti	33.
Cote d'Ivoire	34.
Gambia	35.
Ethiopia	36.
Malawi	37.
Liberia	38.
Mali	39.
Guinea-Bissau	40.
Mozambique	41.
Guinea	42.
Burundi	43.
Burkina Faso	44.
Eritrea	45.
Sierra Leon	46.
Chad	47.
Central African Republic	48.
Congo	49.
Niger	50.
South Sudan	51.
Somalia	52.