



**LUND UNIVERSITY**  
School of Economics and Management

# Determinants of Literacy in Africa

- A panel data study

Master Thesis  
Spring, 2012

Author: Martin Pehrsson  
Supervisor: Therese Nilsson

# Abstract

Adult literacy is often taken for granted in industrialized countries. Developing countries still struggles with a large portion of their population not being able to read or taking active part in the productive sector. The African continent have the highest numbers of illiteracy. The aim of this thesis is to look at the factors contributing to this fact and investigate which factors determinates adult literacy in Africa. Three economical theories provide a framework for the assignment: Human-capital theory, The New Institutional Economics and the Education production function, with a special emphasis on the colonial impact in Africa. Through the use of panel regressions is literacy explained by economic development, health status, quality of education and institutional variables. The estimated result shows that adult literacy is strongly affected by primary enrollment rates, government's expenditure on education and fertility rates.

*Keywords:* Adult literacy, Africa, panel data study, Colonial background, Human-capital theory

# Table of contents

<b>List of Abbreviations .....</b>	<b>5</b>
<b>1 Introduction.....</b>	<b>6</b>
1.1 Research question .....	8
1.2 Limitations.....	8
1.3 Disposition.....	8
<b>2 Literacy in an African context.....</b>	<b>9</b>
2.1 General overview of education in Africa .....	9
2.2 Special cases of educational history .....	11
2.2.1 Ethiopia .....	11
2.2.2 Liberia .....	12
2.2.3 South Africa .....	12
2.3 Educational policy's during the colonial rule.....	13
2.3.1 Portuguese colonies .....	14
2.3.2 German colonies .....	15
2.3.3 British colonies .....	15
2.3.4 French colonies .....	17
2.4 Post-colonial and contemporary educational challenges and problem.....	18
2.4.1 From promise to progress to crisis towards a new hope.....	18
<b>3 Theoretical framework.....</b>	<b>21</b>
3.1.1 Human-capital theory.....	21
3.1.2 Institutional approach.....	22
3.1.3 The education production function .....	22
3.1.4 Economic development and educational outcome.....	23
3.1.5 Health factors and educational outcome .....	24
3.1.6 Institutional factors and educational outcome .....	26
3.1.7 Education supplied and its effect on literacy .....	26
3.1.8 Education demanded and its effect on literacy .....	27
<b>4 Method .....</b>	<b>28</b>
4.1 The econometric specification.....	29
4.1.1 Panel data models .....	29
4.1.2 Fixed and random effects estimators .....	30
4.1.3 The Hausman test.....	31
<b>5 Empirical results .....</b>	<b>32</b>
5.1.1 Cross-section random effects models .....	32
5.1.2 Period-section fixed effects model.....	33
5.1.3 Missing observations, omitted variables and biases .....	34
<b>6 Conclusion .....</b>	<b>36</b>

<b>7</b>	<b>References</b> .....	<b>39</b>
	<b>Appendix A</b> .....	<b>42</b>
	<b>Appendix B</b> .....	<b>43</b>
	<b>Appendix C</b> .....	<b>44</b>

# List of Abbreviations

ADEA	Association for the Development of Education in Africa
AU	African Union
CASAS	The Centre for Advanced Studies of African Society
EFA	Education For All
EFA FTI	Education For All Fast Track Initiative
GDP	Gross Domestic Product
HL-effect	Heyneman-Loxley effect
MDG	Millennium Development Goals
NIE	New Institutional Economic
NGO	Non-governmental Organization
PPP	Purchasing Power Parity
SACMEQ	The Southern and Eastern Africa Consortium for Monitoring Educational Quality
SAP	Structural Adjustment Programme
SES	Socioeconomic Status
SSA	Sub-Saharan Africa
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization

# 1 Introduction

Literacy and education is among the most necessary elements for human development in today's knowledge world or as Nelson Mandela (2003) put it "*Education is the most powerful weapon, which we can use to change the world*". Adult literacy is often taken for granted in developed countries, but in developing countries year 2008 as many as 750 million adult men and women had no knowledge of how to read. About 75 million children of school age remained out of their countries educational system. Meanwhile millions of young students left school without the adequate level of literacy to be able to participate in the productive parts of their country's economy (Richmond et al 2008:10).

Every year the African workforce increase with 7-10 million young people searching for an occupation (UNIDO 2011:104). The cost of learning a job, have been of growing importance within economic research by economist's, such as Theodore Schultz, Gary S. Becker, Jacob Mincer and Eric Hanushek. The major alignment coming from the human-capital theory, which investigates whether income correlates to the amount of investment in education. A further assumption is that widespread investment in human capital creates a labour-force that is crucial for economic growth.

The educational development is moving in a positive direction when looking at the total number of illiterates but fast population growth in developing countries contributes to the disequilibrium between demand and supply on the education market. The year 2000 almost one billion people were illiterate, where of 2/3 were women. Their illiteracy will strongly affect the possibilities to get a wage job and affect other social and economic variables, such as health and possibility to run a company. Of the world's illiterate people 95% live in developing countries and 70% are women. The African continent have since measuring of illiteracy rates started, had higher values than the rest of the world. The worst number for illiteracy is found in desert countries like Niger, Mali and Burkina Faso, where more than 90 % of the adult female population were illiterate in 2005, as a result of high population growth, the low quality of schooling, low school enrolment rates and poverty (Verner, 2005:3).

Jointly with a lot of other indicators, the adult literacy rate can be used to measure a country's development level and as an output variable for the quality and the effectiveness of a country's school system. The African school system is affected by many indicators, the aim of this paper is to look at these indicators from a macro and institutional perspective. The institutional approach involves the legal system, religion, languages, culture and colonial rule. To understand how literacy and education has evolved and its contemporary state on the African continent, it is important to understand the countries colonial and post-colonial history since it contribute to the countries institutional foundation.

The most commonly used definition by countries to measure the literacy rate is the one used in Education for All (EFA) 2000 Assessment: *“Literacy is the ability to read and write with understanding a simple statement related to one’s daily life. It involves a continuum of the reading and writing skills, and often includes basic numeracy”*. An augmented definition was proposed during an international expert meeting in 2003 at UNESCO which added that: *“Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society”* (UNESCO 2004:13).

Since the 1990s literacy and better education have increased in importance among economists, development researchers and policy makers of how to reduce poverty, increase economic growth and human development. This can be seen by the launch of EFA in 1990 which set up six goals to improve education, the goals<sup>1</sup> was then reevaluated at the World Economic Forum in Dakar, Senegal 2000. The focus on low-income countries has then intensified by the eight United Nations (UN) Millennium Development Goals<sup>2</sup> (MDG) from 2000, the EFA Fast-track Initiative (EFA FTI) in 2002 and the launch of UN Literacy Decade 2003-2012. To provide a platform for achieving the six EFA goals and develop literate environments worldwide, as 2012 marks the final year of the decade a final evaluation will be submitted to the UN General Assembly in 2013.

---

<sup>1</sup> **EFA goals:** 1. Expand early childhood care and education. 2. Provide free and compulsory primary education for all. 3. Promote learning and life skills for young people and adults. **4. Increase literacy by 50 per cent.** 5. Achieve gender equality by 2015. 6. Improve the quality of education.

<sup>2</sup> **MDG** concerning literacy: Goal 2. Achieve universal primary education. Goal 3. Promoting gender equality and empowering women.

## 1.1 Research question

The purpose with this thesis is to investigate which factors determined the literacy rate in most African countries during the time period 1980-2010. The dependent variable adult literacy<sup>3</sup> will be measured against a set of different explanatory variables. The aim is to see which independent variables have the strongest affect on the literacy variable. A special focus will be on the countries colonial history, since that have submitted to the institutional framework for many of the countries.

## 1.2 Limitations

The largest limitation to this paper is the lack of available historical data on literacy rates. From the World Bank dataset 2008 is the only year which provided literacy data from all African countries. This will decrease the number of observations to be performed in the regressions. The limitation to only look at African countries is made to get a more precise and accurate numbers for the continent's literacy history and how the educational progress have developed in recent years.

## 1.3 Disposition

The disposition of this thesis is as follows. The next section (2) will give a background to the history of literacy on the African continent. Chapter 3 will present a theoretical framework to the field of determinants to school achievement as well as previous research and empirical studies within the subject. In Chapter 4 the aim is to discuss the econometric method and data in more detail. Chapter 5 presents the results of the regressions and discusses the estimations. Chapter 6 summarizes and concludes the study.

---

<sup>3</sup> Adult literacy refers to literacy among the population over 15 years old, while youth literacy refers to the literate population between ages 15-24.



## 2 Literacy in an African context

This section will give a background to the educational history on the African continent in order to understand the contemporary educational state. Mandatory schooling and widespread literacy is a relative recent phenomenon on the continent. This chapter aims at giving an insight to the educational framework at the African continent since the 1900s, educational development during different colonial powers and the post-colonial progress. The first section will give a general overview of education in Africa. The second sections bring up three countries, Ethiopia, Liberia and South-Africa, which educational history stands out on the continent. The third section takes up general educational policies for countries under the colonial powers: Portuguese, German, British and French. The final section takes up post-colonial and contemporary educational challenges and problem.

### 2.1 General overview of education in Africa

Before the nineteenth century public schools did not exist and education was for a long time reserved for the elites, this was also the case for Africa. Formal education in Africa was introduced in the seventeenth century and was mainly part of missionary and colonial interest on the continent. The content of the education were usually Western-oriented and generally given to a few selected individuals, to support the colonial administrations. This created small number of elites with educated people, which even after the independence during the late 1950s and early 1960s lived on, and the privileged groups used their advantages to gain political power in the newly independent African states. The colonial education and the following post-colonial era had similar goals regardless of colonial power and state ideology (Ntiri 1993:360).

This picture is confirmed by Omolewa (2008:699) which states that the attitude of the colonial administrators towards literacy was at best ambivalent. Where literacy was promoted, the aim was usually to sustain the colonial rule. Education was seen as a way to promote norms and value of the colonial power and to create a small educated group of Africans to serve the colonists. The colonialists were not willing to provide mass education, since the colonialist were afraid that it would encourage the people to revolutionize against the

colonial rulers. In addition, the fact that the colonial powers were unwilling to allocate substantial economic funding to the educational sector of Africa had a significant role on the low literacy rates during the colonial period.

Ntiri (1993:361) points out two divergent approaches on education on the African continent, which both aimed to remain political and economic control for the governing groups. The first education strategy focused on a quantitatively masses, but qualitatively limited education, for the creation of a settled and thriving industrial labor force to assist the contemporary state without making a political threat. The second education strategy aimed to educate a limited number of individuals well, in order to create small groups of elites to reproduce the existing social order. Ntiri (1993:361) concludes that most African states have created education and mass literacy programs for political purposes rather than for political liberation and autonomy for individuals and groups.

The educational environment in Africa has also been strongly affected by the linguistic framework. Lecture instructions has often been given in a language (often colonial) that was not normally used in the students' home, a language that neither the learner nor the teacher fully understood. Brock-Utne (2005:549) suggests that the attention of African policy makers and aid to the education sector should be dedicated to support the African languages as languages of instruction, especially in primary school. Omolewa (2008:706) brings up that making written material accessible in indigenous languages pays enormous dividends in terms of stimulating literacy.

The fact that there are many languages on the continent and within a country affect educational planning, Bholá (1990:8) writes that multiple literacy should be encouraged through literacy in: the mother tongue, the regional lingua franca and in the metropolitan language and that three-language formulas have become standard practice in many school system in the developing world. Brock-Utne (2005:551) also mentions that the myth about a wide linguistic diversity<sup>4</sup> on the continent is false since about 85% of Africans speak no more the 12-15 core languages, which often is more similar to each other than to the colonial languages. The Centre for Advanced Studies of African Society (CASAS) are working to

---

<sup>4</sup> Numbers between 1400 and 1995 spoken languages in Africa has been mentioned, according to Brock-Utne 2005:551

organize a harmonization of orthography and developing a common spelling system for African languages. The director of CASAS named Kwesi Kwaa Prah wrote (2002:15) that *“it is the empowerment of Africans with the use of their native languages, which would make the difference between whether Africa develops, or not”*.

## 2.2 Special cases of educational history

The three countries Ethiopia, Liberia and South Africa distinguish from other African countries in their educational history. The two former since they early on gained independence and the latter because it for a long time was governed by a white minority government.

### 2.2.1 Ethiopia

Ethiopia stands out from other African countries since the country as early as in the 4<sup>th</sup> century recognized Christianity. For the next 1500 years all education was controlled and related to the church, except in the eastern part where the Islamic population kept their Qur’anic schools. The transformation of the educational system started in 1908 when the Emperor Menilek II initiated government schools modeled by the European schools. However, the real development of education came after World War II managed by Emperor Haile Selassie, but despite his efforts to increase the general educational level; by 1969 less than 10 percent of the children between seven and 12 were in school. During the 1960s and the early 1970s the secondary education level benefited from more than 400 American Peace Corp teachers being in the school system.

In 1974 the military took control over the political power, and declared the country as socialist. The new government changed the educational direction and stated that their aims were: education for production, education for scientific consciousness and education for social consciousness. A political alliance with Soviet Union was introduced and the focus from Soviet educational advisers was on polytechnical education and a number of Ethiopian students were sent to Soviet Union, Cuba or other socialist countries for higher education. (Britannica)

### 2.2.2 Liberia

Liberia is another example of distinctly different educational history. Since the country was founded in 1847 by freed slaves from United States, its educational system was modeled on the American school system. The first public primary and secondary schools were introduced during the second half of the 19<sup>th</sup> century, but was mainly established in the cities. The Western-style schools educated the Liberians mostly for office occupations. A government controlled school system was introduced in 1912, but the real expansion of education for indigenous Liberians came in the 1950s by the President William V.S Tubman. However, despite a well organized school structure, this educational extension only reached a small fraction of the population (Britannica).

### 2.2.3 South Africa

The educational history of South Africa is more documented than many other African countries. The ambition here is to give an overview of the country's education development, which is characterized by separation of races, apartheid and different provincial conditions.

When the first white settlements came to South Africa during the 18<sup>th</sup> century, the Protestants focused on Bible reading at home as an instrument to ensure basic literacy. The first church mission schools was established in 1789 and focused on converting the indigenous population to Christianity. During the late 19<sup>th</sup> century some provinces introduced educational policy's and free schools, but the time period was inhibited by political and linguistic problems.

The South African war/The Boer war, lasting 1899-1902 cancelled all educational activity. When the Union of South Africa was created in 1910 it introduced a bilingual state, but the English- and Afrikaans-speaking school were mainly established for white Europeans and excluded nonwhites from the political and cultural life. The policy with separate schools came into practice in most parts of South Africa. The control of primary and secondary education was decentralized to the provinces, while higher education was controlled by the union government.

The concern over African education in the 1940s led to the initiation of the Eiselen Commission, which report in 1951 confirmed that the separate racial school was the most appropriate strategy for South Africa. This laid the ground for apartheid (apartness) legislation, which was later enhance by legislation acts in 1953, 1967, 1982 and 1983 before being resolved in the early 1990s.

The implementation of the apartheid system resulted in a near-total separation of educational facilities between four population groups: White, black, colored (mixed-race) and Indian (Asian). The result of this sectioning led to extreme inequality in educational learning. Among the black schools were the illiteracy rate and dropout rates high and many pupils were educated in factories, mines or farm schools, with a less structured student environment. Along with lower teacher qualifications, crowded schools and shortage of educational materials in black schools resulted in few black pupils attending secondary schools.

In the 1970s attempts were made to reduce the educational gap between black and white students, through increased educational budget for black schools, the creation of experimental integrated school and white universities opened for black students. The results were, however, that black schools continued to be inadequate. Black activist student organizations demanded better educational conditions which ended with strikes, boycotts and violence.

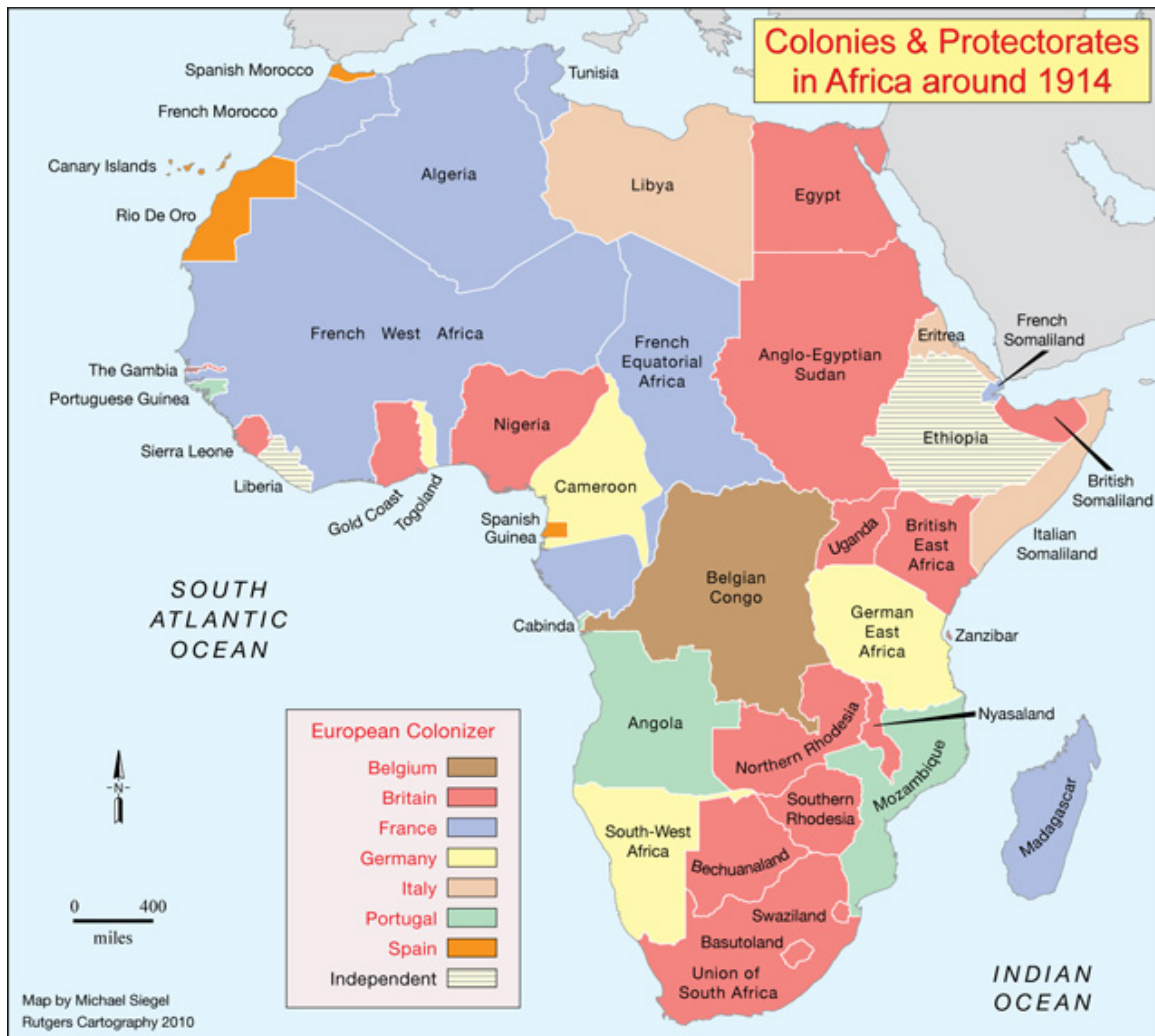
When the apartheid era resolved in the early 1990s, a single national Ministry of Education was established, but the necessary school reform confronted severe challenges. The major problem was the limited amount of resources available for expenditure on education. The vast differences between white and black schools had to be faced, but many teachers from white areas were reluctant to move to rural school. At the same time did many rural schools lack heat, plumbing, electricity and basic classroom supplies.

During the educational reforms in the post-apartheid era, a shift was made to a more Afrocentric curriculum, where racial stereotypes were eliminated, larger emphasize on the African perspective in history classes and Afrikaans was replaced as a language of instruction for black student by English and African languages (Britannica).

## 2.3 Educational policy's during the colonial rule

This section provides a background to the differences and similarities between the colonial powers regarding educational policy and their post-colonial impact. The main difference lies within the language policy. British and German colonial rulers executed a language policy which promoted local African languages while Portuguese and French colonies educational policy endorsed their own language within the school system.

**Figure 1. Colonies in Africa 1914**



Source: <http://exhibitions.nypl.org/africanaage/maps/african-col-1914.jpg>

### 2.3.1 Portuguese colonies

**Including countries:** Angola, Mozambique, São Tomé and Príncipe, Cape Verde, Guinea-Bissau (total 5 countries)

**Educational policy:** Education was mainly conducted to integrate Africans into the Portuguese culture. From 1940s were Roman Catholic mission groups the official educators. In the 1960s was primary education only available to a few Africans outside the urban areas.

**Language policy:** Portuguese was the official language for instructions. African languages were forbidden in schools from 1921.

**Post-colonial impact:** After independence in 1975 were both Angola and Mozambique ruled by Marxist governments, but long and bloody civil wars had a very negative effect on the educational systems. The impact of the Portuguese after independence was mainly the shortage of educated teachers in Mozambique since many educators were Portuguese and left the country after independence. In both Angola and Mozambique did Portuguese remain the official language, since none of the different cultural groups dominated the political power. The decision to make Portuguese the official language made the connection between Portugal and its colonies relatively strong, which is the case even today (Britannica).

### 2.3.2 German colonies

**Including countries:** German East Africa (Tanzania, Rwanda and Burundi) Cameroon, Togo and Namibia all before World War I (total 6 countries)

**Educational policy:** More than 95 percent of the schools in German East Africa were operated by religious groups just before World War I. In Namibia the government did not establish any schools at all since they relied completely on missionary activities. The governmental officials pushed for an educational policy which promoted vocational education and practical work, while religious educators were more interested in general academic education.

**Language policy:** Instructions was conducted in the local languages, such as Swahili in eastern Africa and Douala in Cameroon.

**Post-colonial impact:** After the end of World War I, 1918 Germany lost all their colonies, but there policy to keep the Swahili as the language of instruction left their colonies more unified linguistically then most other African countries (Britannica).

### 2.3.3 British colonies

**Including countries:** Botswana, Egypt, Ghana, Kenya, Lesotho, Libya, Malawi, Mauritius, Nigeria, Seychelles, Sierra Leone, Somalia, South Africa (before 1910), Sudan, Swaziland, Tanzania (after World War I), The Gambia, Uganda, Zambia and Zimbabwe (total 20 countries)

**Background:** Religious missions were essential in introducing the Western-oriented style education. Generally the British preferred to leave education to missions before the 1920s.

Only a small percentage of the schools in Ghana and Nigeria were government-run and in Kenya and Uganda all schools were conducted by missions.

**Educational policy:** During the 1920s the British authorities decided to impose a more precise policy on education and formed an advisory committee on Education in the Colonies. The committee led by William Ormsby-Gore promoted: private institutions to control schools, cooperation between the governmental authorities with these institutions and an adaption of education to the traditions of the African people. Special importance was given to: religious and moral instruction, the organization and the status of education services, subsidies to private schools, instruction in the African languages, training of native teachers, regular inspection of schools and upgrading the teacher's professional training and technique, together with education of young girls and women.

Depending on the large variation the colonies put on the importance of the education were these recommendations seldom in practice. The colonial governments instead made efforts on school that trained students for administration and commerce. When the Committee reported in the 1930s and 1940s were the conclusion that the government had an insufficient role within the educational sector, and that educational development was largely a result of efforts of the missions, several private local or foreign institutions and local indigenous authorities. After the World War II was the British colonial educational policy changed to let the countries have a higher degree of autonomy and the creation of educational development plans, resulting in a growing African participation and the improvement of higher education.

**Language policy:** Instruction in the local African language was preferred.

**Post-colonial impact:** When most British colonies achieved independence, was the educational system still a cause for concern, though better than most other ex-colonies. Except for Ghana, Kenya and Malawi, in most states had less than 40 percent of the population passed the primary education. Barriers for educational development were the diversity of organizations and institutions responsible for education and the complexity of legislation in force. However, most countries set out to improve education, through subsidies to private schools, extended supervision over school and regulation of tuition. The educational systems from the colonial rule were racially integrated and based on "Africanization". The rate of real educational growth was not stunning, and English seemed to have eclipsed the African languages in primary education (Britannica).



### 2.3.4 French colonies

**Including countries:** Algeria, Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Comoros, Congo-Brazzaville, Côte d'Ivoire, Djibouti, Gabon, Madagascar, Mali, Mauritania, Morocco, Niger, Senegal, Togo, Tunisia (total 19 countries)

**Background:** Following the pattern of other colonies, mission schools were the first educational institutions of French colonies. The first public schools started in 1847, but were first widespread to the rest of the French colonies from 1896. The first common French colonial policy on education was created in 1900. The school system was organized of a primary school, upper primary, professional and a normal school. After reorganization the educational system between 1924 and 1947 consisted of a primary school for six years, intermediate-higher education given in upper schools and in professional schools and top federal school. The top federal schools were usually reserved for Europeans and Africans having a French citizenship.

**Educational policy:** Stated by governor's the purpose of education was to expand the influence of the French language, to establish the French nationality and culture in Africa. The officials instructed that colony duty enacts a double task on education, one side involving training of indigenous personal destined to become assistants and assuring the ascension of wisely select elite. The other side included education to the mass population, in order, to bring them nearer to colonialist and change their way of life.

After World War II and the creation of the French Union, the educational policy became even more assimilative to the French school system. A special investment fund provided financial aid to education which led to higher primary enrollment rates, scholarships given to governments which enabled African students to finish higher education in France. In Senegal 1950 was the first French West African University founded. It was followed by universities in Abidjan, Côte d'Ivoire and Brazzaville, Republic of Congo.

When the African states achieved more autonomy, under a kind of commonwealth status, in 1958 education began a more intensive period, with more primary and secondary schools opened, teacher's training was emphasized and more scholarship students went to France.

**Post-colonial impact:** In the beginning of the 1960s when most French colonies had gained independence the focus on education accelerated, premier examples being the introduction of

Africanization in history and geography and the ruralization of primary education. Despite this the French system sustained and courses were still taught in French.

Between 1955 and 1965 the rise of enrollment in primary school was at first spectacular. The percentage of primary-age children enrolled in school increased in Guinea from 5 to 31, in Senegal from 14 to 40 and in Chad from 5 to 30, however this progress required employment of unqualified teachers. Since the French African colonies included a larger number of countries, the post-colonial progress is fragmented, some countries continued programs of rapid educational expansion and in some areas enrollment even declined. Within the former French areas the number of students reaching higher education remained among the lowest in Africa (Britannica). This confirms by Verner (2005:7) that states that literacy rates, enrollment rates and pupil-teacher ratio levels in 1995 were lower in French-speaking countries than English-speaking countries. Brown (2000:21) writes that the initial enrollment differences between former French and British colonies have increased over time.

## 2.4 Post-colonial and contemporary educational challenges and problem

The aim of this section is to review the educational development in Africa from the time of independence to the contemporary school conditions. The rich diversity of African countries makes it difficult to generalize the development of education and literacy on the continent. Hence, to understand similarities and common patterns this overview will sketchy draw the picture of education in Africa from independence to 2010.

### 2.4.1 From promise to progress to crisis towards a new hope

As described in earlier chapter the educational starting point for many African countries after independence were a school system which excluded the majority of the population. The main educational focus for many of the new national leader was to *promise* expanded access to primary school and improve quality of education. Samoff (1999:3) described the expanded access as a dramatic and rapid *progress*. However, the dramatic expansion in enrollment led in many cases to overcrowded classrooms, where teachers could stand in front of 80-100 pupils without textbooks and teaching guides.

**Table 1. Primary enrollment and Literacy in Sub-Saharan Africa**

	1970	1980	1990	1995	2000	2005	2010
<b>Primary enrollment</b>	46,3	77,5	68,3	83,2	83	96	101
<b>Adult literacy</b>	22,6	40,2	47,3	56,8	58,7	64,5	69,4

Sources: Primary enrollment; Sarnoff (1999:5) for the years 1970-1990, 1995 own calculation, 2000, 2005 and 2010 UNESCO. Adult literacy: Sarnoff (1999:4) for the years 1970-1995, 2000-2005 own calculations based on average values for 2000-2004, 2005-2009, 2010 based on World Bank and UNESCO

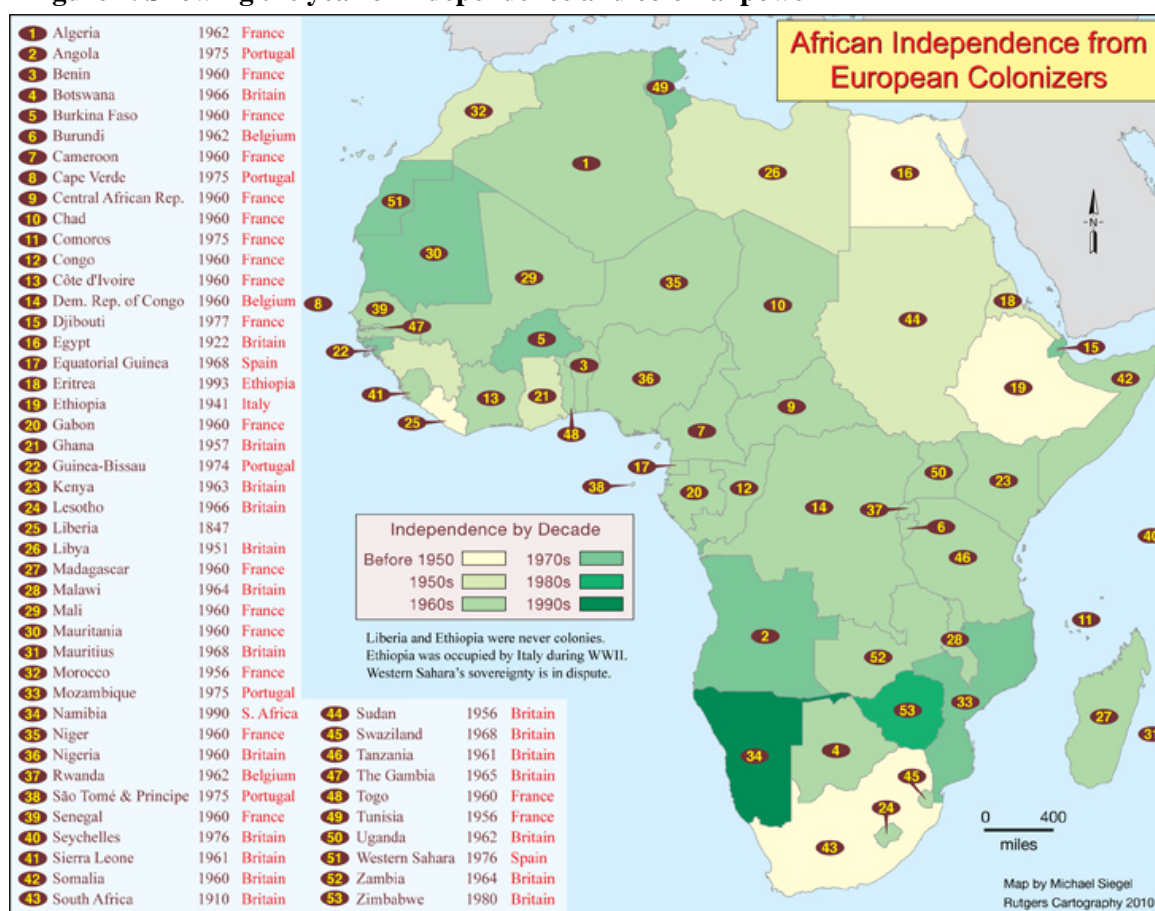
The early post-colonial leadership within the educational sector was focused on three commitments which involved: *expanded access, desegregate schools and curriculum* and *address inequality*. While the number of pupils rose dramatically during 1970s and 1980s, did the educational spending not do the same. The economic decline during the 1980s and 1990s negatively affected the countries schools. Which during the 1990s led to what many authors would characterize as a *crisis* in the African schools (Samoff 1999; Brown 2000; Winthrop 2011). Winthrop (2011:192) takes up the facts that especially poor girls in rural area lacked and still lack access to proper learning opportunities, those who were in school did not acquire foundational literacy and numeracy, and that many students did not learn the skills they needed to their future livelihoods.

For many countries has the governments' educational budget been correlated with the nation's economic conditions. Following the time of independence in the 1970s, many African countries borrowed capital to invest in a form of industrialization. This meant increased educational budget for many countries. However, the oil shocks and debt problem during the late 1970s together with the fragmentation of the continent made it clear that industrialization was not sustainable. This led to the introduction of the structural adjustment programmes (SAP) during the 1980s, which focused on market liberalization and privatizations (UNIDO 2011:10). Nearly everywhere on the continent this meant new or increased school fees, and this affected the enrollment ratio negatively. Still many African governments sustained their basis assurance of funding education, but unfortunately was the total governmental budget not growing (Samoff 1999:5).

The tough situations for many African schools led to the UNESCO initiative EFA in 1990 which most African nations have committed to. The economic policy has since the late 1990s and 2000s been focused on strategies to reduce poverty and debt relief.

The economic upswing for many African countries, with high economic growth rates since 2000, has further emphasized the importance of a well-educated work force. At the same time, poverty and other multiple high priority development goals make it difficult to fund education expansion and improvement that are demanded. Though, the focus from UNESCO<sup>5</sup>, UNDP, continent organizations like African Union (AU), The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), Association for the Development of Education in Africa (ADEA) and the countries increased education expenditure<sup>6</sup> during the last ten years, marks a *new hope* for the educational environment in the continent.

**Figure 2. Showing the year of independence and colonial power**



Source: <http://exhibitions.nypl.org/africanaage/maps/african-indep.jpg>

A majority of the colonies gained independence during the 1960s, exceptions being the Portuguese colonies during 1970s, Zimbabwe 1980, Namibia 1990 and Eritrea 1993.

<sup>5</sup> Specifically their EFA Global Monitoring Report that every publish report on educational progress with different themes, for example had the 2006 edition the theme *Literacy for Life*

<sup>6</sup> The real expenditure on education has increased by 6% yearly across SSA-countries in the last ten years (UNESCO 2011)

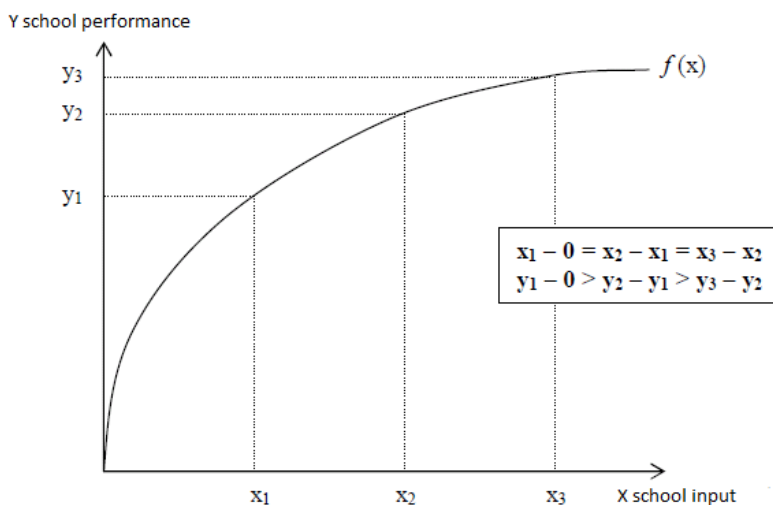
# 3 Theoretical framework

The theoretical background for this thesis originates from three economic theories, the human capital theory, the institutional approach and the education production function. Short descriptions of these theories will be presented below. This chapter will also discuss the connection between literacy/educational outcome and the explanatory variables that is economic development, health status, the education demanded and supplied as well the institutional context for the African countries.

## 3.1.1 Human-capital theory

The human capital theory suggest that education raises the productivity of workers by teaching useful knowledge and skills, hence raising workers' future income by increasing their lifetime earnings. For developed countries a large number of studies have been published which estimate rates of return to education. Most studies found that formal schooling is a decisive factor in explaining the variations in wages (Cohn and Addison 1998). The educational studies conducted in developing countries have focused on investment in formal education, and initiates that primary education is the investment prioritized over secondary and tertiary. Educating females is marginally more profitable than educating males and returns to education follow the same rules as investment in capital, i.e. it decline as investment expand (Psacharopoulos 1994:1335). This can be seen in the figure below.

**Figure 3. Investment in schooling, showing a diminishing rate of return**



Source: Zumbach 2010, p 8

### 3.1.2 Institutional approach

The institutional approach used in this paper relies on the foundation of the New Institutional Economics (NIE), which states the institutions are the rules of the game, consisting of both formal legal rules and the informal social norms that govern individual behavior and structure social interactions.

Williamson (2000:596) created a four level structure; where the top level is the social embeddedness that includes informal institutions such as customs, norms, religion, languages etc. Institutions at this level change very slowly. The second level is referred to as the institutional environment and embraces formal rules such as constitutions, laws, property rights and bureaucracy. At this level can the colonial background be incorporated as it has affected the African countries legal system and political structure. Massive discontent with a country's formal rules could lead to civil war, occupations, military coup or breakdowns. Such events could mean rare windows of opportunity to change the rules of the game. The third level is where the institutions of governance are located. It is formalized as play of the game, especially the contract to adjust governance structures with transactions and governance effort to craft order to alleviate conflicts and realize mutual gains. The fourth level handles resource allocation, employment and market functions such as prices and quantities that change on a daily or monthly basis (Williamson 2000:600).

### 3.1.3 The education production function

The education production function is an application of the economic concept production function to the field of education. It takes into account various input variables that affect a student's learning, such as school quality, family background, friends, living area etc. to measure output variables such as literacy rate, standardized test scores, graduation rate, labor market success etc.

The research concerning which factors determine school achievement, started with a study from Coleman et al (1966) in the USA which came to the conclusion that school factors had a minor effect on academic achievement after taking into account the family background of the students, such as parents' education, income, occupation and family size. The debate surrounding determinants to school achievement was for a long time

limited to industrialized countries until Heyneman (1976) published the study “Coleman Report for a developing country”. In which he found that school factors were more important than family background for academic achievement in Uganda. This study was followed up by Heyneman and Loxley (1983:1180) in which they concluded “*the poorer the country, the greater the impact of school and teacher quality on achievement*”. This conclusion is commonly referred to as the “Heyneman-Loxley effect” or “HL-effect” and is considered influential since it links educational achievement and national economic development.

### 3.1.4 Economic development and educational outcome

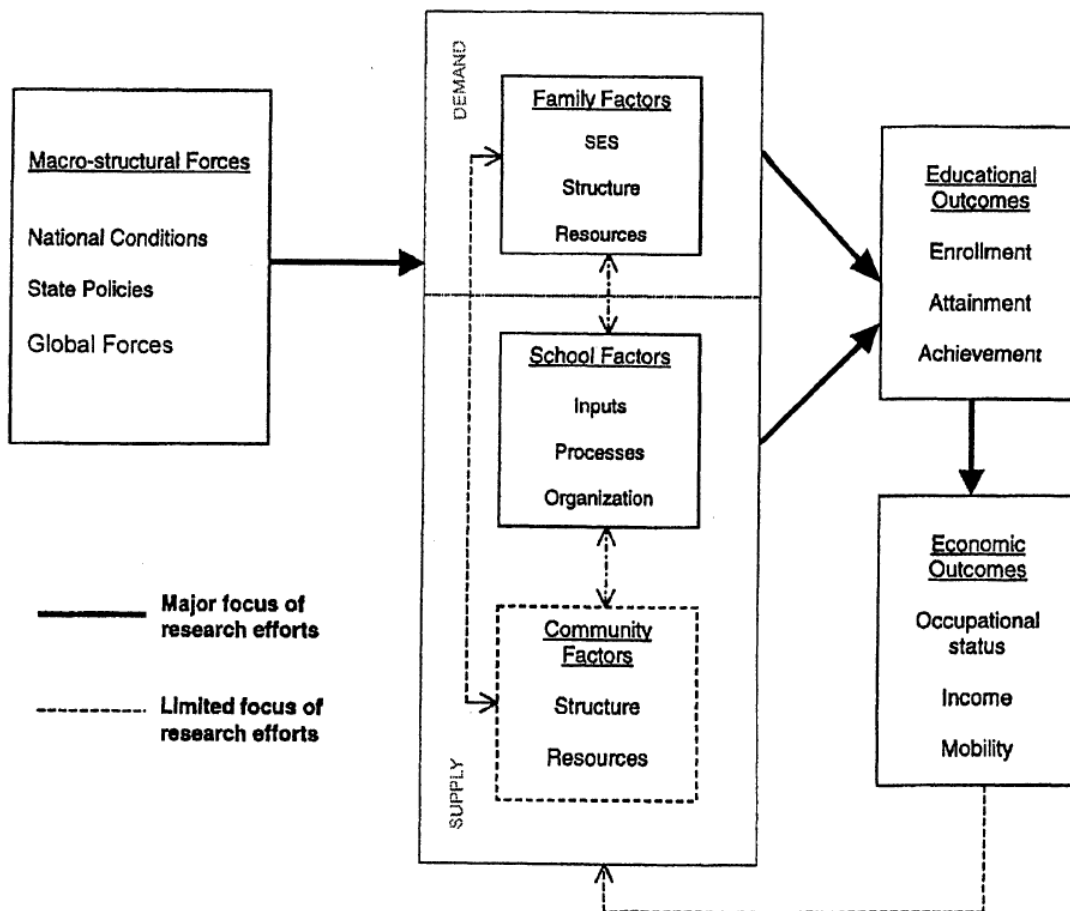
Studies like Fuller (1987) and Fuller and Clarke (1994) have supported the HL-effect and conclude that improving school quality, with factors like school resources, class size, teachers’ qualifications and available textbook, in developing countries increases students’ achievement. Gamoran and Long (2006) came to the conclusion that the HL-effect was valid and suggested that there is a clear threshold in national income, and over this threshold variations in school factors matters less. This threshold is confirmed by Verner (2006:16) which states that at very low income level, income and literacy are negatively correlated, but once per capita income reaches about \$2200 a year, the income affect literacy positive.

The HL-effect on Sub-Saharan Africa (SSA) were tested by Zumbach (2010), and found that in 14 SSA-countries the original type of HL-effect did not exist, instead school characteristic became even more important when national economic development increases. He suggested more direct investment and earmarked aid to the field of education, in order to take advantage of the untapped potential in Africa. In a study by Hungi and Thuku (2010:91) that investigated which factors mattered in reading achievement in 14 Southern African countries, they found that the most important factors affecting student achievement was the level of grade repetition, socioeconomic status (SES), speaking the language of instruction at home, pupil age and meals per week. This indicates that for the tested countries family factors had a stronger impact on student achievement the school factors.

Studies in developing countries have found that basic material inputs such as textbooks, libraries and teacher training strongly determine achievement. While more advanced inputs such as science laboratories, increased teachers' salaries and reduced class size have a small effect. Research on family factors has found that in some African countries female headship appears to be correlated with greater educational opportunities for children (Buchmann and Hannum, 2001:86).

The economic variables used in the regressions are all some how connected to family factors, with GDP per capita relating to income per person/parent. While the portion of urban population and value added to GDP from agriculture concerns the families living conditions.

**Figure 5. Research on educational outcomes in developing countries**



Source: Buchmann and Hannum (2001) p. 79

### 3.1.5 Health factors and educational outcome

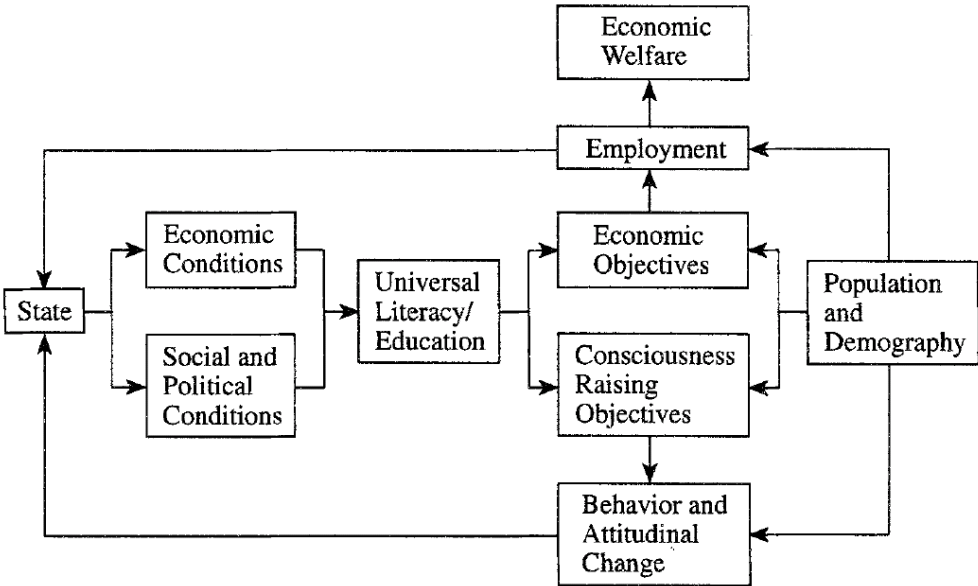
The majority of research regarding health and its affect on educational outcome has concluded that better health and nutrition are positively related with gains in schooling,



such as enrollment at younger ages, less grade repetition, less absenteeism and better performance on test scores. For developing countries evidence propose that better health may pay off in terms of economic growth as well as improved school performance (Behrman 1996:23;33).

The most common indicator for health is life expectancy at birth, which has been lower in Africa than elsewhere depending on conflicts, HIV/AIDS, malaria and poverty. However since the 1950s the life expectancy has increased in developing countries with four years per decade. The differences between countries in life expectancy are dominated by rates of infant and child survival; in turn these alterations can be trace to income per capita, expected years of schooling for women and urbanization or rural dependence (Schultz 1999:67). The direction of causality between literacy and health is hard to determine, Grosse and Aufrey (1989:287) suggest that it might run either way or that a third factor have influenced changes. However, literacy has been revealed to be complementary to health services and studies have noted that literate mothers utilize health service more than illiterate mothers. Most of the studies regarding educational outcome and fertility rate have found a negative correlation i.e. lower birth rate means improved school achievement. This has been credited to improve access to information, family planning, a more egalitarian relationship between spouses and increased age of marriage (Grosse and Aufrey 1989:292).

**Figure 6. Conditions affecting literacy and outcome of higher education**



Source: Ntiri 1993, p 369

### 3.1.6 Institutional factors and educational outcome

The institutional factors brought up in this section includes the variables democracy, level of conflicts, number of language within in a country, the major religions on the African continent and the colonial background. All are connected to the first two levels within the NIE and linked with the national governments’.

Most research concerning education and literacy acknowledge the central role for the government on educational development. The state may determine the educational structure and opportunities through its educational policies. It can also improve demand for education by improving school quality, passing laws on compulsory schooling or emphasize the benefits of education. Strong authoritarian states like apartheid South Africa dramatically changed the educational opportunities through policies, to block the social mobility of the black majority (Buchmann and Hannum 2001:80).

Usually governments in developing countries’ face barriers in educational development like limited economic and organizational resources, lack of legitimacy and peripheral status in the world, regional disparities and poor school quality. Some studies suggest that in the absence of a strong state, non-state actors such as local community actors, national and international nongovernmental organizations (NGOs) can provide to the expansion of education (Buchmann and Hannum 2001:81).

### 3.1.7 Education supplied and its effect on literacy

Governments can be seen as producers, involved in the production of different outputs by combining labor with other inputs. For example governments finance teachers and books to reduce illiteracy through expenditure on education. States that produce more educational outputs while spending less on inputs can be viewed as more efficient than other states. Studies shows that African governments are relatively inefficient in provision of education compared to countries in Asia. Furthermore, improvement in educational outcome in African countries requires more than higher economic allocations (Gupta and Verhoeven 2001:434).

The output of the education production function is usually measured by test scores and literacy rate, while input variables include pupil-teacher ratio, teacher education, teacher experience, teacher salary together with other indicators. Most studies of developing

countries found that teacher education and teacher experience had a significant impact on education output. Meanwhile pupil-teacher ratio and teacher salary had no evident impact (Gupta and Verhoeven 2001:436). Still, the number and distribution of teachers are important policy parameters to determine the quality of education. It should be mentioned that pupil-teacher ratio is not a measure of class size or the number of pupils a teacher faces in the classroom. However, high pupil-teacher ratios can indicate an overstretched teaching staff, while low ratios could represent additional capacity. The largest ratios in Africa can be found in the central and eastern part, with some countries<sup>7</sup> exceeding 60:1, while the lowest ratios can be found on the island states and northern Africa with ratios around 25:1. UNESCO (2006:3) estimates that for SSA, the region will need to raise its current stock of teachers from 2.4 million to 4.0 million by 2015 in order to meet the education demanded.

### 3.1.8 Education demanded and its effect on literacy

During the 1970s and 1980s most policy makers regarding education in developing countries limited their attention to enrollment rates. Since the 1990s it became clear that access to school was not adequate to ensure quality in education. Gains in enrollment has increase in all parts of Africa, but low quality of education and high drop-out rates contribute to low literacy rates on parts of the continent (Michaelowa 2001:3).

Studies have found that low primary enrollment rates are caused by a number of school factors, such as availability, quality, efficiency as well as direct and opportunity costs. Verner (2005:15) found that a 10%-point increase in primary school enrollment is related with a 2.6%-point increase in literacy rate. While years of schooling appeared to have an even greater impact, a 10%-point rise in years of schooling is connected with a 3.7%-point increase in literacy rate.

---

<sup>7</sup> Chad, Ethiopia, Malawi, Mozambique and Rwanda all exceed the ratio 60:1

## 4 Method

To analyse literacy rates for specific countries and over time, panel regressions is used with data from 50 African countries<sup>8</sup> over the last 30 years, i.e. from 1980-2010. The full set of countries and key values for the variables can be seen in Appendix A and B. The econometric model is similar to the one used by Verner (2005:10). The model has literacy as a dependent variable, six explanatory variables and an error term. The model is slightly adjusted to suit the African context. The dependent variable literacy rate is measured by the adult literacy rate for every country and year available. Since the data from some selected years is not available for a number of countries, an unbalanced panel data model is used. The explanatory variables are organized into six groups: E, economic development, S, quality of education supplied, H, health status, Q quality of education demanded, C, colonial variable and I, institutional variables. The initial model will be based on the following equation:

$$y_{it} = \Sigma \beta E_{it} + \Sigma \delta S_{it} + \Sigma \varphi H_{it} + \Sigma \eta Q_{it} + \Sigma \rho C_{it} + \Sigma \mu I_{it} + e_{it}$$

**The economic development** variable is measured with the help of three variables, Gross Domestic Product (GDP) per capita, the share of agriculture value added in GDP, the share of urban population. **The quality of education supplied** is measured with public expenditure on education as percentage of GDP and the ratio of pupils to teacher in primary school. **The health status** for every country is a combination of the fertility rate and life expectancy age at birth. **The quality of education demanded** is represented by primary school enrollment rate and average years of schooling for adults. **The colonial variable** is used to measure differences depending on colonial power. **The institutional variable** is a combined measure of conflicts, level of democracy and number of spoken languages. The parameters for the vectors reveal the marginal impact each explanatory variable have on literacy.

The data material will mainly use four different sources: The World bank's African Development Indicators, The Penn-World Tables (GDP per capita), UNESCO Institute for Statistics and Polity IV-dataset. Natural logarithms and five-year lagged data is used for the data series except the urban population share. To tackle the problem with causality is the literacy rate regressed against lagged average values of the regressors. This indicates that the

---

<sup>8</sup> Africa consists of 54 countries, but literacy data for Djibouti, Republic of Congo and Somali was not available, while South Sudan was still a part of Sudan until 2011.

causality goes from the right- hand side to the left hand side, i.e. public education expenditure 1980-1984 will be measures against literacy rate 1985-1989 and so on. The problem that measurement errors may bias coefficients, through country size, economic structure or school organization, is dealt with by establishing that omitted observations and variables do not affect the final result.

## 4.1 The econometric specification

The choice to use a panel data model is made since it gives a more detailed, descriptive and dynamic overview at the same time as it follow the historical pattern of literacy for different countries. One of the disadvantages with using a panel dataset is in general that it is no longer reasonable to assume that the different observations are independent. Along with the case that panel datasets often suffer from missing observations which has the consequence that standard analysis has to be adjusted (Verbeek, 2008:355).

### 4.1.1 Panel data models

A panel dataset involves repeated observations over the same units, in this paper 50 countries. Collected over a number of periods, in this paper seven time periods with the average values for 1980-1984, 1985-1989, 1990-1994, 1995-1999, 2000-2004, 2005-2009 and the absolute value for 2010 when it is observed. The setting allows specifying and estimating more complicated and realistic models than is the case with single cross-section or time-series. As well as it allows for more specific identification of certain parameters, without the need to make restrictive assumptions. This makes it possible to analyze changes on a country level over time (Verbeek 2008:357).

A panel data model is also of practical matter since it allows for cross-sectional heterogeneity<sup>9</sup> in the data. In cross-section data there can be unmeasured explanatory variables that effect the behavior of the countries, omitting these variables can cause bias in the estimation, the same can be the case for time-series data, panel data enables correction of this problem (Kennedy 2008:281). Country specific heterogeneity can be accounted for, and unobservable characteristics affecting the relationship between literacy and its explanatory variables can be captured in the estimation of the specific model. If country heterogeneities

---

<sup>9</sup> Heterogeneity = differences across the units studied

are excluded from the estimation with fixed effects or random effects, the risk of endogeneity<sup>10</sup> bias and omitted variables are reduced (Verbeek, 2008:355ff).

#### 4.1.2 Fixed and random effects estimators

Fixed and random effects are two estimating methods to handle country heterogeneity within a data sample. If we start with the random effect estimator, given by equation (1):

$$y_{it} = \beta_0 + \beta_1 x'_{it} + \varepsilon_{it} \text{ and define the error term as } \varepsilon_{it} = \alpha_i + u_{it}$$

where  $\alpha_i$  is time-invariant and homoskedastic across individuals and  $u_{it}$  is homoskedastic and not correlated over time with  $x'_{it}$ . We can assume that:  $E(x'_{it}\varepsilon_{it}) = 0$ , thus the observable regressors in  $x'_{it}$  are uncorrelated (have no connection) with the unobservable characteristics in both  $\alpha_i$  and  $u_{it}$ . But since there are reasons to believe that  $E(x'_{it}\alpha_{it}) \neq 0$ , this would mean that the unobserved heterogeneity in  $\alpha_{it}$  is correlated (have a connection) with one or more of the explanatory variables. In a cross-sectional model this problem would be solved by an adding an instrumental variable, but in the panel data setting is it possible to exploit this particular phenomenon since the availability of repeated observations on the same country. (Verbeek, 2008:356)

In the fixed effects model, also called the within-estimator, the unobservable characteristics are isolated from the error term through the inclusion of an individual-specific intercept term, given by equation (2):  $y_{it} = \alpha_i + \beta x'_{it} + u_{it}$  where  $\alpha_i$  are fixed unknown constants and  $u_{it}$  is assumed to be i.i.d<sup>11</sup> over countries and time.

But there is no guarantee that all explanatory variables are uncorrelated with the unobservable heterogeneities in the sample (Verbeek, 2008:356). Kennedy (2008:283) explains the fixed-effect by putting a dummy for each country and allowing for different intercept reduces the biasness of an OLS-estimation. The drawbacks with this transformation are that we lose degrees of freedom and that time-invariant (or dummy) variables, such a colonial power and religion disappears in a model which is specified with cross-section fixed effects.

The random effect model, also called the between-estimator, is similar to the fixed-effect model since it assumes different intercept for each country, but infers the intercept with a

---

<sup>10</sup> Endogeneity occurs when the explanatory variables is correlated with the error term.

<sup>11</sup> i.i.d = independent and identical distributed

different method. The random effect model views the different intercepts as having been drawn from a bowl of possible intercepts, so they may be interpreted as random and treated as they are part of the error term. Hence we get a specification in which there is an overall intercept,  $\beta_0$ , a set of explanatory variables with coefficients,  $\beta_1 x'_{it}$  and a composite error term  $\varepsilon_{it} = \alpha_i + u_{it}$ , which has two parts. For a specific country, the first part is the random intercept term, measuring the extent to which this country's intercept differs from the overall intercept. The second part is the traditional random error term which indicates the random deviation. The random-effect estimator seems to be a better choice since it allows for time-invariant variables and doesn't lose degrees of freedom, giving more efficient estimates. But the random-effect estimator should only be used when we are confident that its composite error term is uncorrelated with the explanatory variables, i.e.  $E(x'_{it}\varepsilon_{it}) = 0$  (Kennedy 2008:284ff).

In the random effect estimator are all country specific characteristics assumed to uncorrelated with the explanatory variables and can be captured by the error term. This is not the case with the fixed effects model as seen above. To summarize, panel data can exhibit to two types of variation which can affect the estimates; variation from observations within a time-series and variation in observation between cross-sections. An ordinary OLS-estimator on pooled data is unweighted average of the within and between estimators while the random-effect estimator is a weighted average of the within and between estimator.

#### 4.1.3 The Hausman test

A Hausman test compares the estimators and should be used when deciding which model to use. The test checks if the random effect estimates is insignificantly different from the unbiased fixed effects estimates. Estimation with panel data begins by testing the null that the intercepts are equal. If the null is not rejected the data are pooled and we can use the OLS estimator. If we reject null, a Hausman test is used to test if the random effects estimator is unbiased. The null is specified as random effect is unbiased and should be used. If we reject  $H_0$  the random effects estimator is biased and we should use the fixed effect estimator (Kennedy, 2008: 284).

## 5 Empirical results

The multivariate regression techniques that are used to recognize the determinants of literacy rates are unbalanced panel data with the random and fixed effect specifications. The result of the literacy equation is presented in table 2, with alternative specifications. The number of observations and cross-sections (countries) used is constant when changing the number of explanatory variables, both are reported at the end of the table. Adjusted R-square is above average and high and the p-values of the F-statistics are low despite most of the variables being insignificant. The high adjusted R-square value is higher in the fixed effects model, indicating that it's able to capture a large deal of the variance between the countries.

The standard errors are reported in parenthesis under the coefficients. The asterisks (\*) point to significance, one asterisk indicating a result significant at the 10%-level, two the 5%-level and three the 1%-level.

### 5.1.1 Cross-section random effects models

The first four models are specified with cross-section random effects which means that the model adjust for the variation in observation between cross-sections. In Model 1 which include eleven explanatory variables are six significant different from zero, with enrollment rate, fertility rate and education expenditure being the most important explanatory variables. That enrollment rate would be among the most significant variables were no surprise, according to theory and previous studies such as Verner 2005. The fact that fertility rate have a negative relationship with literacy is neither a revelation, since many African countries in 1980 had high fertility rates which has decreased over time and literacy rate as increased. The fact that it would be three-star significant was however a surprise when comparing with Verner 2005. Education expenditure also shows a negative correlation to literacy, which can be explained by the increased literacy rates and the decreased amount governments spend on education based on their GDP. The models explains 67,7% of the variation in literacy on the continent.

The next step is to add the colonial background dummies. This model (2) enhance the significance for enrollment, fertility rate and enrollment, but decrease it for agriculture value added to GDP, years of schooling and level of conflicts. As stated in the part on



French colonies (p 17), we get a negative relationship between former French colonies and literacy rates. The explanation level slightly increases to 70,4%.

The third model includes religion dummies. As expected are the variables education expenditure, fertility rate and enrollment still significant. Years of schooling shows an equal coefficient value as enrollment but a weaker significance. The variable conflict indicates a positive link to literacy rates even though the coefficient value is small. This is of course not expected, but could also point to the fact that countries after the conflict have promoted adult literacy campaign due to change of governments or political leaders. The negative relationship between former French colonies and literacy rates is in this model removed and changed by a negative association between Muslim countries and literacy rates. When adding the number of languages spoken in the countries in Model 4 does the coefficient values hardly change and the adjust R-square is set to 0,745.

### 5.1.2 Period-section fixed effects model

The fifth model estimates the equation with period-section fixed effects, i.e. the specification takes into account variation from observations within the time-series. The estimation output differs to some extent from the random effects specifications. In Model 5 is education expenditure and fertility rate no longer significant, while pupils per teacher indicate a negative correlation with literacy rates. In this specification enrollment have a coefficient value of 0,775 which could mean that a 10%-point increase in primary school enrollment rate is interrelated with a 7,7%-point increase in the literacy rate. In this specification is both indigenous and Muslim religious countries negatively correlated with literacy rates. The specified model explains 85,5% of the variation in literacy.

The sixth model removes the religion dummies, resulting in a specification where the enrollment significance is improved and fertility rate show interdependence with literacy. French colonial background again shows a significant negative correlation with literacy. This is interesting since there seem to be some kind of relation between countries having Islam as the majority religion and being a former French colony. It could also be explained by the fact that specific countries like Burkina Faso, Chad, Mali

and Niger which are both former French colonies and have Islam as their majority religion points toward a negative relationship since the all have literacy rates below 40% of the adult population for all observed years.

### 5.1.3 Missing observations, omitted variables and biases

When estimating models with unbalanced panel data, one has to remember that missing observations and variables could affect the final result. The choice to use a macro and institutional perspective excludes micro and household variables. That includes school variables such as available textbook, teachers' education and salaries and family variables such as family size, parents' education and occupation, which all have shown to have a larger impact on students' achievement according to earlier research. Since the final model only includes 97 observations, with a complete data set the number of observations would be 300 observations (6 time periods and 50 countries), the information within the more than 200 observation would probably have changed the result. However, the quite have adjusted R-square in model 5, that explain 85,5% of the variation in adult literacy reveals that the model is well specified.

**Table 2. Regression Results for Literacy**

Variable	Model 1 <sup>12</sup>	Model 2	Model 3	Model 4	Model 5 <sup>13</sup>	Model 6
GDP/capita	-0.048 (0.046)	-0.035 (0.044)	-0.052 (0.046)	-0.047 (0.048)	-0.061 (0.052)	-0.030 (0.054)
Agriculture value added to GDP	-0.068** (0.043)	-0.051 (0.043)	-0.047 (0.043)	-0.047 (0.047)	-0.057 (0.047)	-0.089 (0.054)
Urban population	-0.003 (0.002)	-0.001 (0.002)	-0.000 (0.002)	-0.000 (0.002)	-0.002 (0.002)	-0.003 (0.002)
Education expenditure	-0.092*** (0.033)	-0.095*** (0.037)	-0.085** (0.033)	-0.087*** (0.033)	-0.038 (0.042)	-0.048 (0.047)
Pupils/teacher	0.014 (0.069)	0.054 (0.070)	0.004 (0.071)	0.026 (0.075)	-0.207** (0.097)	-0.038 (0.103)
Fertility rate	-0.410*** (0.078)	-0.378*** (0.077)	-0.367*** (0.077)	-0.361*** (0.078)	-0.113 (0.113)	-0.216* (0.123)
Life expectancy	0.137 (0.139)	0.145 (0.137)	0.185 (0.142)	0.178 (0.143)	0.171 (0.207)	0.183 (0.214)
Enrollment	0.312** (0.121)	0.347*** (0.125)	0.253** (0.127)	0.247* (0.127)	0.775*** (0.193)	1.076*** (0.201)
Years of school.	0.249* (0.138)	0.194 (0.140)	0.250* (0.141)	0.248* (0.141)	-0.065 (0.208)	-0.284 (0.222)
Conflict	0.014* (0.008)	0.012 (0.007)	0.015** (0.007)	0.016** (0.007)	0.000 (0.011)	-0.011 (0.012)
Democracy	0.006 (0.006)	0.005 (0.006)	0.002 (0.005)	0.003 (0.006)	-0.007 (0.059)	-0.001 (0.005)
British		-0.036 (0.083)	-0.046 (0.082)	-0.341 (0.086)	-0.011 (0.059)	-0.019 (0.066)
French		-0.263*** (0.084)	-0.049 (0.096)	-0.041 (0.099)	-0.036 (0.069)	-0.256*** (0.065)
Portuguese		-0.040 (0.118)	0.033 (0.131)	0.020 (0.134)	0.116 (0.102)	-0.113 (0.099)
Christian			-0.034 (0.081)	-0.060 (0.089)	-0.033 (0.007)	
Indigenous			-0.183* (0.081)	-0.179 (0.110)	-0.314*** (0.081)	
Muslim			-0.386*** (0.095)	-0.398*** (0.098)	-0.329*** (0.071)	
Languages				-0.025 (0.030)	-0.009 (0.022)	-0.016 (0.022)
Constant	2.997*** (0.779)	2.614*** (0.788)	3.103*** (0.798)	3.119*** (0.802)	1.999* (1.192)	0.464 (1.299)
Adjusted R-square	0.677	0.704	0.747	0.745	0.855	0.805
No. of observations	97	97	97	97	97	97
Countries include	43	43	43	43	43	43
F-statistic	19.815***	17.302***	17.697***	16.611***	25.637***	20.935***
Chi-square for Hausman test	48.498***	49.273***	34.307***	32.913***		
Chi-square for Redundant test					25.489***	14.548***

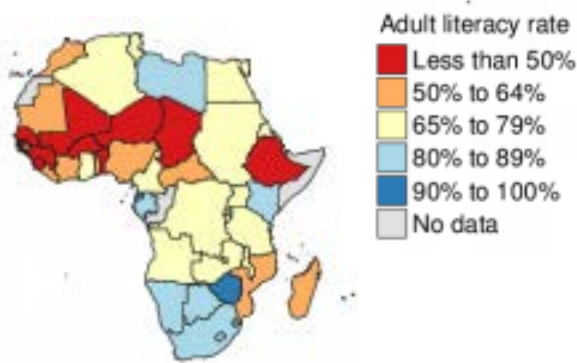
<sup>12</sup> Panel data estimated with cross-section random effects, which is also the case in Model 2, 3 and 4<sup>13</sup> Panel data estimated with period-section fixed effects, which is also the case in Model 6

## 6 Conclusion

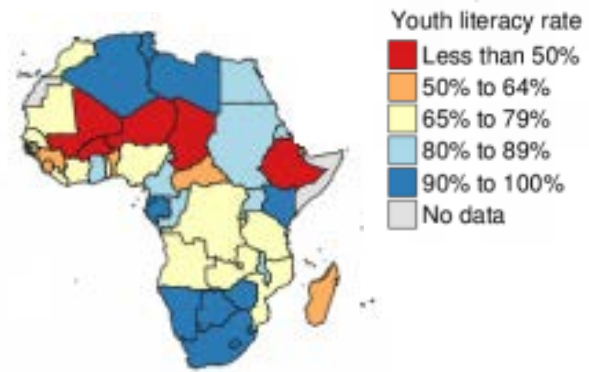
The educational, economic and human development in the African countries since independence varied. The new political leaders in the 1950s and 1960s were eager to build nations that would converge with their former colonial countries. The educational focus to expand access was at first rapid and intense, however at the time were the institutional frame-work not established to handle this expansion of education. Through external factors such as trade deficits, debt problem and economic policies - during the 1970s import-substitution-industrialization and during the 1980s privatization and market liberalization. Many African countries faced and still face problems with internal factors such as corruption, fast population growth, armed conflicts and income inequality. These have had a major negative impact on education and literacy on the continent, which are significantly lower than industrialized countries. Low levels of health and education are two striking factors correlated with low productivity and slow economic growth. If the progress develops in a positive direction with opening African economies to international trade, reducing internal economic distortions, attaining greater peace and connecting the countries in regional and pan-African organizations. Health and education will become even more salient elements to economic progress.

Since the late 1990s have economic policies focused on poverty reduction strategies and debt relief, this have meant targeted investment for education and health together with improved economic conditions for the majority of the countries on the continent. Still, the continent faces many educational challenges such as high illiteracy rate in the desert countries, the lack of educated teachers and improper school facilities. However, all African countries show increased literacy rates since the 1990s and 14 countries had an adult literacy rate above 80% in 2010 while 26 African countries had a youth literacy rate above 80% in 2010 according to UNESCO, see figure 7 and 8.

**Figure 7.** Adult literacy rate in Africa 2009



**Figure 8.** Youth literacy rate in Africa 2009



Source: <http://www.uis.unesco.org/FactSheets/Documents/FS16-2011-Literacy-EN.pdf>

The panel data study conducted in this thesis reveals that the primary enrollment rates have the strongest positive impact, while years of schooling have a minor positive impact on literacy rates. This is according to earlier studies which have shown that formal education and school factors have a clear correlation to educational outcome. This is also in line with the HL-effect for developing countries. The case that a family factor, such as fertility rate, similarly has an impact on literacy rates is divergent to resembling multivariate studies. The fact the ratio of urban population, life expectancy rate and pupils per teacher didn't revealed a stronger impact on literacy was surprising according to expectations and expected given recent studies.

For institutional variables, the colonial background provided much of the historical academic foundation. The models estimated showed a negative impact on literacy from former French colonies, which was in line with current research. That fact that the correlation vanished when the religious variables was removed, was unexpected. The two other colonial powers didn't show a significant impact on literacy, but the fact that many African countries kept the colonial language as the language of instruction has formed the countries school system. Recent research points out that effective literacy and formal education should originate from the mother tongue language and progress to the second and third national language. As mentioned by a number of literacy researchers such Birgit Brock-Utne, Michael Omolewa, H.S Bhola and Daphne Ntiri, the use of African indigenous languages has to be improved, especially in the first years of schooling. Local-language literacy programs have presented to lead to a widespread range of development benefits, since they are able to reach the population in most need

of those benefits: the rural, the poor, women and those who struggle within the formal education system.

Omolewa (2008) identified a number of factors affecting literacy on the continent, which includes colonial legacy, sidelining adult education by politicians, shortage of resources as well as lack of coordinated and systemic planning. He also mentions that the wish to promote literacy to Africans through development agencies, multinational corporations and non-governmental organizations (NGO), often means including their own notions on Africa and thereby ignoring African conditions. A positive way forward for mass adult literacy involves better funding, more trained teachers and better learning material which include information and communication technologies, such as Internet and mobile networks.

This thesis have highlighted many of the problems facing adult literacy and education on the African continent. The most prominent variables being the governments' economic condition, its **expenditure on education** and its possibility to deliverer essential social service to urban and rural communities. The message is that reallocations on public expenditures are not sufficient. The challenge for the political leaders is to construct educational policies, based on a sound understanding of the factors that determinates households' decisions concerning schooling. Equal education opportunities must be created by the ministers of education whether the student: lives in a urban or rural area, is a man or woman, speaks the majority or the minority language, belongs to the most or least common religion. Funding agencies such as ministers of finance, aid organizations, NGOs and other actors are encouraged to share the economic burden. The enormous economic investment that need to be made, especially in higher teacher salaries, better school facilities and more control organ for schools could lead to the conclusion that no African government can afford the expenditure. However, they cannot afford, not to do it.

## 7 References

- Behrman, Jere R. 1996. "The impact of health and nutrition on education". *The World Bank Research Observer*. Vol. 11, No 1, pp 23-37
- Bhola, H.S. 1990. "An Overview of Literacy in Sub-Sahara Africa – Images in the Making". *African Studies Review* Vol. 33, No 3, pp 5-20.
- Britannica. <http://www.britannica.com/EBchecked/topic/179408/education> Visited 9 may 2012
- Brock-Utne, Birgit. 2005. "Language in education policies and practices in Africa with a special focus on Tanzania and South Africa – Insights from research in progress". *International Handbook on Globalisation, Education and Policy Research* Part 2, pp 549-565
- Brown. David S. 2000. "Democracy, Colonization and Human Capital in Sub-Saharan Africa". *Studies in Comparative International Development* Vol. 35, No 1, pp 20-40
- Buchmann, Claudia and Hannum, Emily. 2001. "Education and Stratification in Developing countries: A Review of Theories and Research". *Annual Review of Sociology* Vol. 27, pp 77-102
- Cohn, Elchanan and Addison, John T. 1998. "The Economic returns to lifelong learning in OECD Countries". *Education Economics* Vol. 6, No 3, pp 253-307
- Coleman, James S., Campbell, Ernest Q., Hobson, Carol J., McPartland, James, Mood, Alexander M., Weinfeld, Frederic D. and York, Robert L. 1966. "Equality of Educational Opportunity". Washington, DC: *National Center for Educational Statistics*.
- Fuller, Bruce. 1987. "What School Factors Raise Achievement in the Third World". *Review of Educational Research* Vol. 57, No. 3, pp 255-292
- Fuller, Bruce., and Clarke, Prema. 1994. "Raising School Effects While Ignoring Culture? Local Conditions, and the Influence of Classroom Tools, Rules, and Pedagogy". *Review of Educational Research* Vol. 64, No.1, pp 119–157.
- Gamoran, Adam., and Long, Daniel A. 2006. Equality of Educational Opportunity: A 40-year retrospective (WCER Working Paper No. 2006-9). Madison: University of Wisconsin. <http://www.wcer.wisc.edu/publications/workingPapers/papers.php> Retrieved 23 August 2012
- Grosse, Robert N and Auffrey, Christopher. 1989. "Literacy and health status in developing countries". *Annual Review of Public Health* Vol. 10, pp 281-297

- Gupta, Sanjeev. and Verhoeven, Marijn. 2001. "The efficiency of government expenditure –Experiences from Africa". *Journal of Policy Modeling* Vol. 23, pp 433-467
- Heyneman, Stephen P. and Loxley, William A. 1983. "The effect of primary school quality on academic achievement across twenty-nine high and low-income countries". *American Journal of Sociology* Vol. 88, pp 1162-1194.
- Hungi, Njora and Thuku, Florence W. 2010. "Variations in reading achievement across 14 Southern African School Systems: Which Factors Matter?". *International Review of Education* Vol. 56, No. 1, pp 63-101
- Mandela, Nelson. 2003. "Lighting your way to a better future". [http://db.nelsonmandela.org/speeches/pub\\_view.asp?pg=item&ItemID=NMS909&txtstr=education%20is%20the%20most%20powerful](http://db.nelsonmandela.org/speeches/pub_view.asp?pg=item&ItemID=NMS909&txtstr=education%20is%20the%20most%20powerful). Visited 17 august 2012
- Michaelowa, Katharina. 2001. "Primary Education Quality in Francophone Sub-Saharan Africa: Determinants of Learning Achievement and Efficiency Considerations". *World Development* Vol. 29 No. 10, pp 1-34
- Ntriri, Daphne. 1993. "Africa's educational dilemma: Roadblocks to universal literacy for social integration and Change". *International Review of Education* Vol. 39, No. 5, pp 357-372
- Omolewa, Micheal. 2008. "Adult literacy in Africa: Push and pull factors". *International Review of Education* Vol. 54 No 5-6, pp 697-711
- Prah, Kwesi Kwaa. 2002. *Rehabilitating African Languages. CASAS Book Series no.18.* Cape Town: The Centre for Advanced Studies of African Society (CASAS).
- Psacharopoulos, George. 1994. "Return to investment in education: A global update". *World Development* Vol. 22 No 9, pp 1325-1343
- Richmond, Mark, Robinson, Clinton, Sachs-Israel, Margarete. 2008. "The Global Literacy challenge. A profile of youth and adult literacy at the mid-point of the United Nations Literacy decade 2003-2012". UNESCO
- Samoff, Joel. 1999. "No Teacher Guide, No Textbooks, No Chairs: Contending with Crisis in African Education". In Robert F. Arnove and Carlos Alberto Torres *Comparative Education: The Dialectic of the Global and the Local*. Boulder, USA. Rowman & Littlefield, Second Edition, 2003. pp 409-445
- Schultz, Paul T. 1999. "Health and Schooling Investments in Africa". *Journal of Economic Perspective* Vol. 13, No 3, pp 67-88
- Verbeek, Marno. 2008. "A Guide to Modern Econometrics". Third edition, John Wiley& Sons Ltd: West Sussex.



Verner, Dorte. 2005. "What Factors Influence World Literacy? Is Africa Different?". *World Bank Policy Research Working Paper 3498*.

UNESCO <http://www.unesco.org/new/en/education/themes/education-building-blocks/literacy/un-literacy-decade/> Visited 25 July 2012

UNESCO. 2004. "The plurality of literacy and its implications for policies and programmes". UNESCO Education Sector: Paris

UNESCO. 2006. "Teachers and educational quality: Monitoring Global Needs for 2015". UNESCO Institute for Statistics: Montreal

UNESCO Institute for Statistics <http://www.uis.unesco.org/Pages/default.aspx>. Visited 25 may 2012.

UNIDO. 2011, "Economic development in Africa – Report 2011 Fostering industrial development in Africa in the new global environment"

Williamson, Oliver E. 2000. "The New Institutional Economics: Taking Stock, Looking Ahead". *Journal of Economic Literature* Vol. 38, No 3, pp 595-613

Winthrop, Rebecca. 2011. "Education in Africa – The story isn't over". *Current History* Vol. 110, pp 191-195

World Development Indicators. <http://databank.worldbank.org/ddp/home.do>. Visited 25 may 2012

Zumbach, David. 2010. "The Heyneman-Loxley effect in Sub-Saharan Africa: School Quality, Socioeconomic Status and National Economic Development". University of Zürich. <http://ssrn.com/abstract=1815463> Retrived 15 August 2012

# Appendix A

List of countries used in the regressions

---

Algeria <sup>FM</sup>	Gabon <sup>FC</sup>	Niger <sup>FM</sup>
Angola <sup>PI</sup>	Gambia, The <sup>BM</sup>	Nigeria <sup>BO</sup>
Benin <sup>FI</sup>	Ghana <sup>BO</sup>	Rwanda <sup>OC</sup>
Botswana <sup>BC</sup>	Guinea <sup>FM</sup>	São Tomé&Príncipe <sup>PC</sup>
Burkina Faso <sup>FM</sup>	Guinea-Bissau <sup>PI</sup>	Senegal <sup>FM</sup>
Burundi <sup>OC</sup>	Kenya <sup>BO</sup>	Seychelles <sup>BC</sup>
Cameroon <sup>FI</sup>	Lesotho <sup>BC</sup>	Sierra Leone <sup>BI</sup>
Cape Verde <sup>PM</sup>	Liberia <sup>OI</sup>	South Africa <sup>BC</sup>
Central African Rep <sup>FC</sup>	Libya <sup>BM</sup>	Sudan <sup>BM</sup>
Chad <sup>FM</sup>	Madagascar <sup>FI</sup>	Swaziland <sup>BC</sup>
Comoros <sup>FM</sup>	Malawi <sup>BC</sup>	Tanzania <sup>BO</sup>
Congo, Dem. Rep <sup>OC</sup>	Mali <sup>FM</sup>	Togo <sup>FI</sup>
Côte d'Ivoire <sup>FM</sup>	Mauritania <sup>FM</sup>	Tunisia <sup>FM</sup>
Egypt <sup>BM</sup>	Mauritius <sup>BO</sup>	Uganda <sup>BC</sup>
Equatorial Guinea <sup>OC</sup>	Morocco <sup>FM</sup>	Zambia <sup>BO</sup>
Eritrea <sup>OO</sup>	Mozambique <sup>PI</sup>	Zimbabwe <sup>BO</sup>
Ethiopia <sup>OM</sup>	Namibia <sup>OC</sup>	

---

First raised letter refers to the colonial power: B, British (19); F, French (18); P, Portuguese (5); O, Other (8)

Second raised letter refers to majority religion: C, Christian (18); I, Indigenous (9); M, Muslim; (16) O, Other or mix of several religions (7)

---

# Appendix B

## Key values for the variables

Covering 1980-2010	Average	Lowest	Highest
Literacy (% of adult population)	61,5	9,4 Niger, 2000	93,9 Equatorial Guinea, 2010
GDP per capita (PPP, US\$)	2555,4	117,2 Congo, Dem. Rep, 2000	23802 Seychelles, 2010
Agriculture, value added to GDP	27,8	1,8 Botswana, 2005	81,8 Liberia, 1995
Urban population (% of total population)	34,6	4,3 Burundi 1980	86 Gabon 2010
Expenditure education (% of total of GDP)	4,6	0,6 Equatorial Guinea 2005	41,8 Sudan 1980
Pupils per teacher ratio	41,2	13,1 Seychelles 2005	91. 5 Central African Rep. 2005
Fertility rate	5,4	1,5 Mauritius, 2010	8,3 Rwanda, 1980
Life expectancy	53,7	30,5 Rwanda, 1995	74,5 Tunisia, 2010
Enrollment ratio (gross)	88,1	16,8 Burkina Faso, 1980	211,2 Equatorial Guinea, 1985
Years of schooling	7,7	1,4 Burkina Faso, 1980	16,6 Libya, 2000

# Appendix C

## Variable Definitions and Descriptions of Sample

---

### **Data from African Development Indicators, World Bank and UIS, UNESCO Institute of Statistics**

**Literacy:** Adult (population of the age 15 and above) literacy rate measures the percentage of the adult population that can understand, read and write a short, simple statement on their everyday life.

### **Data from African Development Indicators, World Bank**

**Agriculture,** value added % of GDP. Agriculture includes forestry, hunting, fishing, cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs.

**Urban/total population:** Urban population is calculated as the share of the total population living in urban areas defined by national statistical offices; cross-country comparison should therefore be made with caution.

**Education expenditure/GDP:** Average total public expenditure on education expressed as a percentage of the GDP in a given year. This measure includes government spending on educational institutions (both public and private), education administration and transfers/subsidies for students

**Pupils/teacher:** Average number of pupils enrolled in primary school divided by the number of primary teachers.

**Fertility rate:** represents the number of children that would be born to a woman if she were to live to the end of her childbearing age (15-49) and bear children in accordance with current age-specific fertility rates.

**Life expectancy:** indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

**School enrollment, primary (% gross):** is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown. For some countries with universal primary education, gross enrollment ratios may exceed 100 percent because pupils are younger or older than the countries' standard primary school age.

*Years of school:* Average years of schooling for adults.

### **Data from Penn-World Tables**

*GDP/capita:* Gross Domestic Product per capita in Purchasing power parity (PPP) converted (Chain Series), at 2005 constant prices

**Data from <http://exhibitions.nypl.org/africanaage/index2.html>**

### ***Colonial Dummies***

The colonial power at the time of independence.

British: 1 for British, 0 otherwise

French: 1 for French, 0 otherwise

Portuguese: 1 for Portuguese, 0 otherwise

Other: 1 for Other, 0 otherwise

**Data from <http://www.vaughns-1-pagers.com/geography/african-countries.htm>**

### ***Religion Dummies***

The majority religion within the countries.

Indigenous: 1 for Indigenous, 0 otherwise

Muslim: 1 for Muslim, 0 otherwise

Christian: 1 for Christian, 0 otherwise

Mix/Other: 1 for Mix/Other, 0 otherwise

### **Data from Polity IV**

**<http://www.systemicpeace.org/inscr/inscr.htm>**

*Conflict:* A combined measured named ACTOTAL which summed total magnitude of all societal and interstate major episodes of political violence, such as national and international (that includes the country): warfare and civil and/or ethnic violence.

Scale: 0 (no conflict) to 10 (full warfare)

*Democracy:* Democracy is conceived as three essential elements:

1. Presence of institutions and procedures through which citizens can express effective preferences about alternative policies and leaders.
2. Existence of institutionalized constraints on the exercise of power by the executive.
3. Guarantee of civil liberties to all citizens in their daily lives and in acts of political participation.

The democracy indicator is an additive scale with: 0 (no level of democracy) to 10 (complete level of democracy)

### **Data from Ethnologue**

**[http://www.ethnologue.com/ethno\\_docs/distribution.asp?by=country](http://www.ethnologue.com/ethno_docs/distribution.asp?by=country)**

*Number of languages:* The number of total living languages within the country.