

THE EFFECT OF FEMALE EDUCATION ON CHILDHOOD MALNUTRITION IN AFRICA:  
A STUDY OF THE EDUCATIONAL SYSTEMS IN MALI AND CONGO

by

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(Under the direction of Jeffrey Berejikian)

ABSTRACT

The importance of female education in decreasing childhood malnutrition has been widely accepted by international organizations seeking to promote education and health in developing countries. Many of the goals created to increase the quality and access of education in developing nations, however, have repeatedly not been met, particularly in sub-Saharan Africa where average enrollment rates remain low and childhood malnutrition has failed to significantly decline. This paper seeks to explain why two African countries with low economic resources, Congo and Mali, show variations in their level of childhood malnutrition. The most important factors determining childhood malnutrition in Mali and Congo appear to be the amount of public expenditures on education and whether or not the educational system requires school fees.

INDEX WORDS: Childhood malnutrition, Congo (Brazzaville), Mali, Literacy rates, Enrollment rates, sub-Saharan Africa

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## CHAPTER 1

### INTRODUCTION

Childhood malnutrition is loosely defined as the number of children under the age of five that do not have adequate access to the supply of nutrients and protein necessary to ensure proper growth and functioning. There are three main indicators of malnutrition: underweight, stunting and wasting. Underweight is defined by UNICEF as the “proportion of under-fives falling below minus 2 standard deviations (moderate underweight) and minus 3 standard deviations (severe underweight) from the median weight-for-age of the reference population.” Stunting is the “proportion of under-fives falling below minus 2 and minus 3 standard deviations from the median height-for-age of the reference population.” Wasting is the “proportion of under-fives falling below minus 2 and minus 3 standard deviations from the median weight-for-height of the reference population.” Even the most developed countries have some level of childhood malnutrition, but the vast majority of malnourished children live in the developing world. It is estimated that between 150 and 174 million children in developing countries are suffering from malnutrition today.<sup>1</sup>

Not only is malnutrition the cause of significant human suffering – some have even argued that this is a violation of a child’s human rights (see Smith & Haddad, 2000a) – it takes a toll on the development of a country. Malnutrition results in lower resistance to illness, which is significant when paired with the common living conditions of children in developing countries, including a lack of access to clean water and a high number of diseases. Furthermore, malnutrition represents an important loss of human potential, due to its lasting impact on the

physical and cognitive development of a child. Malnourished children that survive their first five years often grow into adults whose children are also malnourished, as poverty, malnutrition, and lack of education interact together in an enduring cycle that is difficult to break (Mukudi, 2003).

How, then, can developing African countries decrease their levels of childhood malnutrition? Intuitively, one would think that economic growth would have the strongest impact on decreasing malnutrition in a country, but many past studies have shown that increasing female education has the strongest impact on decreasing childhood malnutrition. There is both an indirect and direct causal link between female education and childhood malnutrition. Female education impacts childhood malnutrition because the more educated the mother, the more likely she is to undertake appropriate actions to ensure hygienic conditions and the health of her family (Mukudi, 2003). Moreover, women who are better educated increase their ability to earn higher wages, which allows for greater food security, thus decreasing the chances of malnutrition. Additionally, studies have shown that educated women tend to wait longer to have children, and have fewer children when they do, thus decreasing the size of the households and thereby increasing food intake per person (Mukudi, 2003). It is important to note that this study (like many previous studies) will use female literacy rates as a measure of education, as literacy can be achieved from primary education.

### Purpose of the Study

Between 1990 and 2000, the developing world overall achieved a decline in underweight prevalence from 32 percent to 28 percent (a 12 percent decrease). Sub-Saharan African countries, however, have been unable to decrease malnutrition at the same rate as countries in other developing regions.

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<sup>1</sup> WHO and UNICEF.

- East Asia and the Pacific achieved the greatest decline – from 24 percent to 16 percent (a 33 percent decrease).
- Latin America declined from 11 percent to 8 percent (a 27 percent decrease).
- South Asia declined from 55 percent to 48 percent (a 13 percent decrease).
- Sub-Saharan Africa (SSA) has experienced little to no change – estimates conclude malnutrition in SSA went from 32 percent to 31 percent (less than a 3 percent decrease).<sup>2</sup>

While a greater percentage of children (nearly half) in South Asia remain malnourished, they have been able to achieve a decline at just above the average developing country rate of decline. It is puzzling that sub-Saharan Africa, on the other hand, has failed to achieve a significant decrease in malnutrition. This study will, controlling for economic development, attempt to explain child malnutrition in Africa in general, and in Mali and Congo in particular. More specifically, I seek to determine how education leads to a lower level of malnutrition in Mali and Congo by studying different educational system variables and determining which have the strongest impact on decreasing malnutrition.

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<sup>2</sup> All malnutrition data are from UNICEF End Decade Databases which can be accessed at [www.childinfo.org/eddb/malnutrition](http://www.childinfo.org/eddb/malnutrition). Literacy and GNI p/c data are from the World Development Indicators from the World Bank.

## CHAPTER 2

### PAST STUDIES

#### Background

The statistics on childhood malnutrition speak for themselves. The number of malnourished children in the world stood at approximately 150 million in 2000, with more than one-fifth of these children living in sub-Saharan Africa.<sup>3</sup> Approximately 54 percent of under-five child mortality in the developing world is caused by malnutrition.<sup>4</sup> In the years 1970 through 1995, sub-Saharan Africa experienced a four percent decline in childhood malnutrition, but due to the rapidly expanding population, the number of malnourished children actually increased by seventy percent (Smith & Haddad, 2000b). Today, about one in three children in sub-Saharan Africa is suffering from malnutrition.

The importance in all of these statistics is the premise that education, particularly female education, has been shown to be the most important factor in decreasing childhood malnutrition in developing countries. If this is indeed the case, then improving a country's educational system will help to repair both human rights issues – the right to nutrition and the right to education – at the same time and with less effort and expense than attempting to address and correct these issues separately.

The statistics on education in the developing world, however, are equally dire. In 2000, more than 130 million children (of which more than 73 million were girls) did not have access to

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<sup>3</sup> UNICEF

<sup>4</sup> WHO

primary education.<sup>5</sup> Additionally, in 1990 two-thirds of the 960 million illiterate adults globally were women (UNESCO, 1990). Only one child in three in sub-Saharan Africa completes primary school (UNDP, 2003).

In March of 1990, 155 governments met in Jomtien, Thailand to take part in the World Conference on Education for All. The goal of the Jomtien Conference, convened by key UN agencies and the World Bank, was to reiterate the countries' commitments to education as a fundamental human right (Watkins, 1999). The 1980s are often referred to as the "lost decade" in development, as increased debt and structural adjustment created setbacks in education. This conference was an attempt to reverse recent negative trends in education.

The Jomtien Conference culminated in the *World Declaration on Education for All: Meeting Basic Learning Needs*, which set forth guidelines for the participants to follow in order to meet their goals on improving educational access and quality. These goals included universal primary education and a halving of the 1990 adult illiteracy rates by the year 2000, while placing emphasis on encouraging female literacy. Unfortunately for many developing nations, particularly those in Africa, little progress was made in the decade that followed the Jomtien Conference, and many countries failed to achieve the goals set forth at this and subsequent educational conferences. The Millennium Development Goals have renewed the drive for improved education in the developing world, this time calling for universal primary education by 2015, and eliminating the gender gap in primary and secondary education enrollment "preferably by 2005, and in all levels no later than 2015" (UNDP, 2003).

#### Impact of Education on Malnutrition

Smith and Haddad (2000a) undertook a study of 63 developing countries from different regions in the world (South Asia, East Asia, sub-Saharan Africa, the Near East and North Africa,

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<sup>5</sup> UNICEF

and Latin America and the Caribbean) to determine which factors have the greatest impact on childhood malnutrition. They note that sub-Saharan Africa had the lowest rate of female enrollment in secondary education of any of the regions at around 16 percent for the years 1970 through 2000 (South Asia was also low at 23.8 percent, while the three other regions were at 45 percent or above). Additionally, sub-Saharan Africa had the lowest per capita dietary energy supply (DES) and per capital national income of any of the regions.

Through multivariate analysis of national level data, Smith and Haddad determined that in order to decrease childhood malnutrition by 1 percent, female secondary education enrollment must increase by 4.6 percent. In contrast, for the same 1 percent decrease in childhood malnutrition, it would require a 13.1 percent increase in population with access to safe water, a 4.9 percent increase in DES, or a 9.3 percent increase in the female-to-male life expectancy ratio. If correct, this study has interesting policy implications, particularly because increasing female enrollment and educational reform may be less expensive and more feasible than improving access to safe water and increasing the food supply (though both of these are undoubtedly important undertakings as well).

In his study on the contribution of educational exposure to decreasing childhood malnutrition, E. Mukudi (2003) utilized national level data and performed a regression analysis of specifically forty-two African countries. Mukudi asserts that parental education has both direct and indirect effects on the nutritional levels of children. Directly, increasing educational exposure increases sanitary practices and encourages better decision-making with regards to nutritional well-being. Indirectly, education increases income and decreases fertility rates. Increased income has the obvious effect of allowing the family greater food security and the ability to provide higher caloric intake per family member. Decreased fertility rates decrease the

average household size, which aids in promoting nutritional well-being simply because there are fewer mouths to feed in smaller families, indirectly increasing caloric intake per person.

Mukudi found that decreased household size had the strongest impact on decreasing underweight prevalence, and educational exposure (measured by literacy rates) was the strongest predictor of wasting prevalence. He also found that income is the best predictor of household size, and adult literacy was the best indicator of income. Therefore, it becomes evident that increasing a population's exposure to education (and thus literacy) leads to increased income, which in turn leads to decreased household size. All of these factors contribute to increasing nutritional well-being of children in Africa. Mukudi concludes that overall (both male and female) literacy has an important effect on nutritional status.

In a study by Rikimaru et al. (1998), individual level data analysis of 170 children in Accra, Ghana (an African country), ages 8 to 36 months, was performed to determine the risk factors leading to childhood malnutrition. Their study observes children considered normal, those who are underweight, and those suffering from severe malnutrition (61, 49, and 160 children respectively). It focuses on the risk factors for urban African children, though one may be able to generalize the results of their findings to rural children in Africa as well.

They observed the following variables: parental education and occupation, whether or not the child was a low birth-weight baby, the mother's age, length of breastfeeding, and the primary caretaker of each child. The authors determined that the mother's education and low birth-weight variables are the strongest predictors of childhood malnutrition in Accra. They additionally observed a strong correlation between mother's educational level and the prevalence of low birth-weight children, demonstrating that a lack of female education puts children at risk for being born at a low weight and subsequently suffering from childhood malnutrition. They

determine that governments therefore must undertake efforts to expand female education while also promoting activities aimed at decreasing the prevalence of low birth-weight babies.

Tucker and Young (1989) took a different approach to measuring the relationship between child nutrition and maternal education. In order to more accurately explain the relationship between maternal decision-making and education, and the effects this has on children's nutritional status, they created an index called "maternal differentiation." They determined that this measure, which included indicators such as frequency of reading, years of formal education, and use of sewing or other craft, had a greater ability to predict childhood nutrition than maternal education alone and income.

In another Smith and Haddad study (2000), OLS regression and an error components model are used to study 63 developing countries from 1975 through 1996. They determined that for all countries in the sample, women's education alone explains 43 percent of the overall decline in childhood malnutrition experienced by these countries during the years of the study. Between 1990-1995, female education contributed 84 percent of the total reduction in childhood malnutrition. Additionally, Smith and Haddad determined that for developing countries as a whole, national income also played an important role in decreasing malnutrition, however they posit that this relationship was not observed in sub-Saharan Africa because from 1970 to 1995 there was an overall decline in income for the region.

For sub-Saharan Africa, they determine that 61.5 percent of the decline in malnutrition during the study years can be explained by female education, followed by improvements in health environments, which contributed 37.6 percent of the decline. They observe that women's relative status to men (the ratio of female life expectancy to male life expectancy) has declined over the study period, and as a result, has had a negative impact on malnutrition.

One possible alternative explanation for the link between childhood malnutrition and female education is that because the most widely available data are national literacy rates, it is difficult to determine if individual socioeconomic status (income) is instead the true explanatory variable. In other words, parents who send their children to school may be better off economically relative to those who cannot afford to send their children to school because they need them to work. Therefore, regardless of whether the educational system is free (does not require school fees, book fees, or uniforms), the parents may still not be able to afford to send their children to school because they need their help at home. However, there is hope that in spite of widespread poverty, malnutrition can be decreased through government expenditures on education.

Sandiford et al (1995) address this issue by comparing the health of the children of women made literate through an adult education program in Nicaragua with women of similar economic status who remained illiterate. They found that in spite of controlling for socioeconomic status, child-mortality indicators were 60 percent higher in children of illiterate mothers than of women in the adult literacy program. Based on the weight-for-age indicator, children of illiterate mothers were three times more likely to be malnourished than the children of mothers in the adult education group. Children of the adult education group were also 34 percent less likely to suffer from stunting than the children of illiterate mothers.<sup>6</sup> Based on these results, therefore, it appears that the important explanatory variable is education, not socioeconomic status.

Another interesting finding in this study is that before the adult education program, the infant mortality rates were similar in the group of women who would later participate in the adult

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<sup>6</sup> Children of mothers who became literate through primary schooling performed better on all three indicators (mortality, stunting, and weight-for-age).

education group and the women who remained illiterate. However, once the program began, the illiterate group's child mortality rates remained the same, while there was a sharp decline in child mortality rates corresponding to the women in the adult education group in the years following the program. The child mortality rates corresponding to the adult education group fell to a level similar to that of women educated through formal schooling. This not only reiterates the importance of female education in decreasing childhood malnutrition, but it also shows that without a change in socioeconomic status, women can improve the survival chances of their children by becoming literate, even later in life. Further findings show that controlling for access and availability of health care facilities has no impact on the observed link between childhood malnutrition and female education, therefore it may be possible that funding female education would have a greater impact on malnutrition than funding health care facilities.

Heltberg (2002) also addresses the issue of the impact of income on malnutrition in the developing world. Heltberg uses 166 “spells” of malnutrition, defined as the “change between any two years for which a given country has observations on both malnutrition and GNI,” in an OLS regression analysis to determine if economic growth reduces childhood malnutrition. He finds strong evidence that positive growth does decrease malnutrition in the developing world, but not by very much, and not in sub-Saharan Africa. He finds that in order to reduce stunting by half through economic growth alone in the developing world, there would have to be a 250 percent increase in GNI (which translates to a 3.7 percent per capita growth increase per year for 25 years). He posits that even this amount of growth, however, would not significantly decrease childhood malnutrition in SSA, as it may in other developing regions. Heltberg does not attempt much explanation of this puzzling speculation. He hypothesizes briefly that it could be that the mechanisms linking childhood malnutrition and income in other regions simply work differently

in Africa. It is possible, however, that this lack of correlation can be attributed to the fact that between 1970 and 1995, there was an overall decline in income in SSA, as pointed out by Smith and Haddad (2000).

This finding leads one to conclude that governments in the developing world, and particularly in Africa, must utilize their small amount of resources wisely and in a targeted approach that will more effectively address the issue of malnutrition. Education has many additional positive effects on the development of a country, including decreasing poverty and fertility rates, while increasing income, worker productivity, and innovation. Developing nations' money would therefore be well spent on increasing the effectiveness of the country's educational system and thereby investing in the future productivity and well-being of its children.

#### Other important impacts of education

Education has many observed effects on reproductive patterns in developing nations. The higher a woman's education, the more likely she is to delay both marriage and childbirth, and the more likely she is to use contraception. These factors contribute to fewer teenage pregnancies and in turn increase the likelihood that babies will be born healthier. Additionally, when more educated women do have babies, they tend to have fewer, creating smaller families which can help ensure better nutrition. For example, one study found that women with some secondary education have on average two to four fewer children than women with no schooling (Population Action International, 2003). Another study that observed survey data from 57 developing countries also found that women with no schooling have higher fertility rates than women with primary education, and women with primary education in turn have higher fertility rates than women with secondary education and above (Bongaarts, 2003). Thus, universal

primary education is at least a step in the direction of decreasing the high fertility rates in African countries.

Without educating the masses, it is not possible to fully address the issue of poverty, which is a contributing factor to malnutrition. Education is the key to reducing individual poverty and ending the cycle of illiteracy, poor health, and underemployment, as well as malnutrition. Education leads to higher wages and increased opportunities. It helps to empower women, and helps them to raise healthy children. In addition, education can lead to increased economic growth, as it enables more of the masses to contribute to the development of their country through greater labor productivity and innovation. Also, women's education contributes to their increased participation in the formal sectors of the economy, which can also contribute to economic growth. These relationships, however, are outside the scope of this paper. The purpose here is simply to demonstrate that education not only has positive impacts on decreasing childhood malnutrition, but it may additionally contribute to many other positive outcomes, making it a worthwhile endeavor for governments of developing countries to pursue.

## CHAPTER 3

## CASE SELECTION AND METHODOLOGY

Overall, it appears that improved economic growth may help decrease childhood malnutrition. However, according to previous studies, this variable is less important than female education, particularly in sub-Saharan Africa. As shown in Table 1, for sub-Saharan Africa as a region, Gross National Income (GNI) per capita increased during the decade 1990-2000, and female illiteracy decreased, while malnutrition also decreased slightly.

	<b>Female Illiteracy %</b>	<b>GNI per capita</b>	<b>Childhood Malnutrition %</b>
<b>SSA Average 1990:</b>	59.37	1743.41	32
<b>SSA Average 2000:</b>	48.33	2205.95	31

*Table 1: Sub-Saharan Literacy, GNI, and Malnutrition*

Without doing an advanced level of quantitative analysis, it is admittedly difficult to determine the relative impact of each variable on childhood malnutrition. However, in order to control for the effects of GNI and focus on the impacts of education on malnutrition, this paper will conduct a case study analysis and select two countries (Mali and Congo) that have similar GNI per capita for the decade 1990-2000, but have differing levels of malnutrition (see Table 2).

	<b>GNI per capita, Average 1990-2000</b>	<b>Childhood Malnutrition – Underweight, 2000</b>
<b>Congo, Rep.</b>	651.82	13.9
<b>Mali</b>	641.82	43.3

*Table 2: GNI per capita and childhood malnutrition*

Mali and the Republic of Congo have very similar average GNI per capita during the 1990s. In spite of this, Congo has performed significantly better than Mali at decreasing

malnutrition (measured as underweight prevalence). In this paper, I will attempt to explain why Congo has performed better at decreasing malnutrition than Mali by studying each country's educational policies. The assumption is that Congo's educational policies have led to better overall education as well as better female education, and female education decreases childhood malnutrition. As shown in Table 3, Congo has a significantly lower level of female illiteracy than Mali, which corresponds to our expectations that Congo performs well in terms of educating their females.

**Illiteracy rates (% of females ages 15 and up)**

	1990	2000
<b>Congo, Rep.</b>	42.09	25.57
<b>Mali</b>	89.63	84.04

***Table 3: Illiteracy rates***

In determining the effectiveness of an educational system, four variables will be observed. First, does the system require school fees? The effects of school fees in impoverished countries is evident: low enrollment because of class-based, urban-rural, and gender-based inequalities. Second, what is the language of instruction? Teaching in a colonial language is common in Africa. I contend, however, that a colonial language is detrimental to the educational system if it is not widely spoken by the people. Third, are there access differences? This is measured in terms of both urban-rural and male-female enrollment gaps. The larger the differences in these groups in terms of enrollment rates, the less inclusive the educational system. If the system is not inclusive, literacy rates and education levels of the masses will remain low. Finally, and perhaps most importantly, what portion of the Gross Domestic Product (GDP) is spent on education? The connection between public expenditure on education and the effectiveness of the educational system appears to be clear: the higher the amount spent on education, the more effective it may be. This may not always be the case, particularly if the

money is spent unwisely or if there is a great deal of governmental corruption. I hypothesize, however, that higher spending on education will lead to greater effectiveness of the system, because without adequate spending, it would be nearly impossible to build the infrastructure necessary to undertake the important and difficult task of educating an entire population.

I hypothesize that the most important variables that would predict the effectiveness of a country's school system are the education budget and whether or not education is free to its users. Together, these variables affect both access to and the quality of the educational system, which undoubtedly play an important role in decreasing childhood malnutrition as they improve female education.

Alternatively, it is possible that Congo's educational system is not significantly more effective than Mali's, but rather that there may be additional explanatory variables influencing childhood malnutrition levels in these countries. I will therefore attempt to determine if there are other intervening variables, such as level of democracy and presence of prolonged periods of violent conflict, that affect the link between malnutrition and female education by negating the positive effects of the educational system in Mali.

## CHAPTER 4

### INTERACTIONS

#### Educational System Variables

Because this study measures educational system effectiveness using four different variables, it is necessary to discuss each of the sixteen possible scenarios to determine what combinations of the variables lead to effective versus ineffective educational systems. Below is a table with the sixteen possible combinations and their hypothesized outcomes in developing countries. It should be noted that the outcomes were predicted based solely on logic and an understanding of the effects of each of the variables according to the literature and how they would effect impoverished countries. Under the table is the logic used to justify the hypothesized outcomes of each combination.

#	Fees	Language	Gaps	Budget	Outcome
1.	No	Native	Low	High	<b>MOST EFFECTIVE</b>
2.	No	Foreign	Low	High	<b>EFFECTIVE</b>
3.	No	Native	High	High	<b>EFFECTIVE</b>
4.	No	Native	Low	Low	<b>Moderately Effective</b>
5.	No	Foreign	High	High	<b>Moderately Effective</b>
6.	Yes	Native	Low	High	<b>Moderately Effective</b>
7.	No	Foreign	Low	Low	<b>Moderately Effective</b>
8.	No	Native	High	Low	<b>Moderately Effective</b>
9.	Yes	Foreign	Low	High	<b>INEFFECTIVE</b>
10.	No	Foreign	High	Low	<b>INEFFECTIVE</b>
11.	Yes	Native	Low	Low	<b>INEFFECTIVE</b>
12.	Yes	Native	High	High	<b>INEFFECTIVE</b>
13.	Yes	Native	High	Low	<b>INEFFECTIVE</b>
14.	Yes	Foreign	High	High	<b>INEFFECTIVE</b>
15.	Yes	Foreign	Low	Low	<b>INEFFECTIVE</b>
16.	Yes	Foreign	High	Low	<b>MOST INEFFECTIVE</b>

*Table 4: Hypothesized interactions*

1. Everything in this scenario agrees with what I suggest are the keys to an effective school system.
2. A country with a high budget, no school fees, and low enrollment gaps would have an effective educational system because greater percentages of the population are being reached by education. They may experience problems with retention due to the foreign language instruction, but this would have to be observed on a country-by-country basis since some countries are much more fluent in the foreign language than other countries.
3. Again, in this situation, the governmental policies are on target for effective education by providing greater resources for their educational system, improving retention by keeping the language of instruction native, and by not imposing school fees. If large enrollment gaps remain, these will likely disappear with time as more schools are built in rural areas. Additionally, the government may decrease these gaps through incentives that encourage less advantaged groups and females to attend school.
4. With a low budget devoted to education, it would be difficult for a country to supply adequate educational facilities, books, and qualified teachers. The other three variables, however, are indicators of an effective educational system. With low enrollment gaps, there is an indication that more of the country's children are able to receive an education, maybe partially due to the absence of school fees. Additionally, retention rates may be higher if the language of curriculum is native. This system would therefore be moderately effective, and could improve greatly simply by devoting a greater portion of the governmental budget to education.
5. A high budget and no school fees will at least allow the educational system the capability of educating its children by allowing it to build enough classrooms, hire enough teachers,

and supply enough books, as well as not hindering poorer children from attending school. The problems in this type of system would be retention (if children are frustrated by learning in a foreign language) and reaching all different parts of society. These problems would hamper the effectiveness of the school system, though at the very least the government would have been implementing two important policies to help encourage educational effectiveness. Literacy rates would likely be moderate.

6. Even though there are school fees in place, this scenario suggests that children are learning in their native languages, there is a small gap between urban and rural areas and girls and boys, and there are high educational expenditures by the government. This would likely lead to an effective school system, and we would expect to see moderate to high levels of literacy.
7. As has been seen in other scenarios, low educational budgets make it difficult for school systems to be effective in educating their children. Even if there are no school fees and low enrollment gaps, there may be a lack of educational quality due to the low budget and foreign instruction. This type of school system would be only moderately effective.
8. Even if there are no school fees hampering enrollment, if the budget is low there may be difficulties in providing adequate schooling facilities and educational materials, which would lead to less effective education. Additionally, with large enrollment gaps, it is evident that large portions of the population remain uneducated. It is likely, then, that in a country with these indicators, we would see low literacy rates, and thus only a relatively effective educational system.
9. This would also be an ineffective educational system, and it is probably an unlikely scenario. It is unlikely that gender and urban-rural enrollment gaps would be low if

school fees were in place, because as I've argued above, school fees likely interact negatively with enrollment gaps. Even if this was possible, I believe that if people cannot access education due to their lack of ability to pay, overall educational effectiveness will be low.

10. Even with the absence of school fees, this educational system would be highly ineffective because not enough resources are being devoted to improving the system's quality and availability to all the country's children.
11. Language alone is not an important enough factor to lead to an effective school system. If the other three variables do not indicate an effective system, this cannot simply be overcome by language of instruction, because if educational resources (school buildings, book, and teachers) are low and costs to the parents are high, enrollment will be low and literacy will thus be low as well.
12. There are both school fees and large enrollment gaps in place, leading one to expect that in spite of language of instruction and public spending on education, there are likely fewer children being educated, leading to less effective education and lower literacy rates.
13. Language is not as important a factor as school fees. Even if once children are in school they can better understand their education, if they have to pay school fees they may not ever make it to school. The quality would also likely be low, due to low public spending on education.
14. I believe this would also be an ineffective school system. The country with this type of school system would have three factors against them: the presence of school fees, foreign language of instruction, and high enrollment gaps. Even if the government spends a large

amount on education, if the people cannot attend school due to fees and if fewer females and fewer rural children are being educated, there would be lower literacy rates. Additionally, for those who are being educated, they are receiving instruction in a foreign language, which would decrease retention rates.

15. The amount being spent on education by the government is low, meaning schools have inadequate resources, which leads to less effective schooling. In addition, if there are fees present, the educational system will be ineffective at reaching the poorer elements of their society, leading to low overall literacy rates and thus low educational effectiveness.

16. All of the variables in this scenario are indicators of an ineffective school system.

With these different predictions in mind, it is now possible to determine the effectiveness of the school systems in Congo and Mali and determine what changes could be made in each to lead to a more effective educational system.

#### Interactions between Educational System and Alternative Hypotheses

Violent conflict and enrollment would likely interact to influence childhood malnutrition. As violent conflict increases in number of incidences or endures for longer periods of time, there would likely be a decrease in school enrollment rates, which would then have a negative impact on literacy. This may be due to the fear of attending school in zones of conflict, schools being damaged in the conflict, and people being displaced as they flee conflict areas. In the cases of Mali and Congo, we see that this interaction has had little influence on enrollment: Congo has experienced much more prolonged and intense conflict than Mali, and continues to achieve significantly higher enrollment rates throughout the 1990s. Though Congo's enrollment began to decrease, UNESCO has determined that this is at least in part due to the increased number of students attending private schools (though some decrease was undoubtedly due to prolonged

conflict). Therefore, though violent conflict and enrollment certainly interact to decrease literacy rates and increase malnutrition, this does not appear to be as important an explanatory interaction as the overall effectiveness of the school system on determining the level of malnutrition.

It further seems likely that violent conflict would interact with educational budget to influence literacy rates and thus the level of malnutrition in a country. One would surmise that violent conflict leads to higher spending in other areas (such as the military), which might decrease the amount spent towards education. It is reasonable to think that national security often takes precedence over domestic issues such as education. Here again, however, Congo and Mali go against these expectations. Congo's instability and violence leading up to and during the 1990s did not lead the government to devote only a small amount of their budget towards education, as will be shown in Chapter 6.

### Conclusions

Based on the hypothesized interactions between the variables, it is now possible to study each case and determine the effectiveness of the school systems in each country. This will additionally allow a degree of predictive capability when determining the level of childhood malnutrition in a country.

## CHAPTER 5

### CASES

#### Mali: Historical Background

Beginning in AD 700, the area now known as Mali was the site of three flourishing empires – the Ghana (700 to 1076), the Malinké (1076 to 1464), and the Songhai (1464 to 1590) (Brook, 1999). The Mali Empire was an important commercial center in medieval times. Trade routes flowed through this area from Marakesh and Cairo in the north southward across the Sahara, which led to the creation of important markets where over the years the Malians sold their abundant gold and salt. During the Ghana Empire, Timbuktu became a renowned educational center with the founding of the University of Timbuktu. The Malinké kingdom was marked by the introduction and spread of Islam throughout the region while remaining the educational center of Africa. The 1591 Moroccan invasion marked an end of the area's prosperity, making it vulnerable to French invasion in 1880.

Soudan, as the French called the area, was largely ignored during colonialism, as it signified little more than a territory with strategic positioning. As a result, little investment was made to build up the infrastructure, leaving it further behind other French colonies at independence. Soudan gained increased autonomy in 1956 when France passed the Loi Cadre, which allowed its colonies greater management over internal affairs. In 1959, Soudan joined Senegal in the creation of the Mali Federation, which only lasted a year until Senegal seceded. On September 22, 1960, Soudan officially became independent from the French Community and was renamed the Republic of Mali (CIA World Factbook, 2003b).

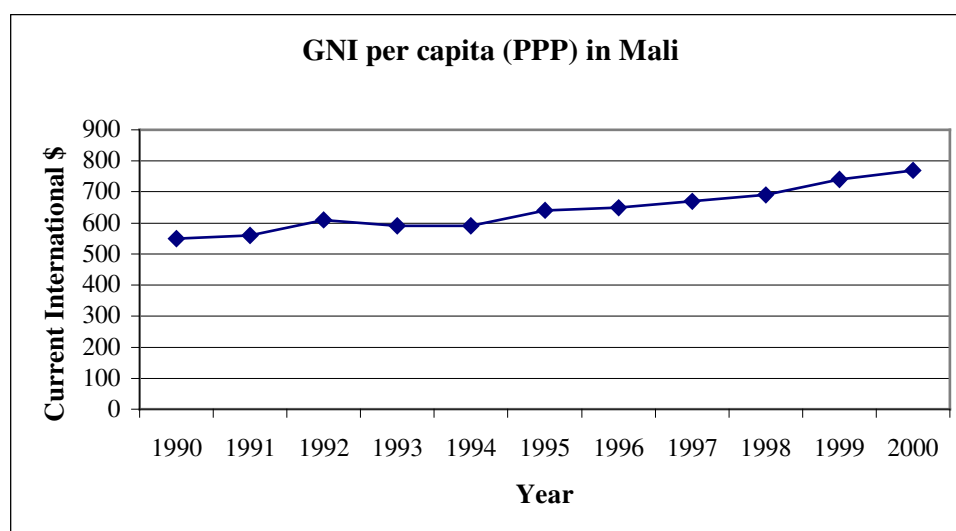
There were three forms of education in Mali at independence: traditional, French, and Islamic. Traditional education emphasizes local community values and history, as well as traditional ceremonies and medicine. Islamic education is taught primarily in local languages and mainly focuses on learning the alphabet and memorizing the Qur'an (Tamari, 2002). Finally, Mali inherited a colonial educational system that, as in many French colonies, focused heavily on France's culture and history, while largely ignoring Mali's own culture, history, and values. Additionally, the curriculum is taught solely in French, with the result that many failed to grasp the importance of sending their children to school.

Mali's first president, Modibo Keita, pursued one-party socialist governance. The first government at independence recognized the importance of education in improving economic development and the health of the people. They even believed ethnic tensions could be lessened through mass education. The first constitution included the right to an education, and universal primary education was an important governmental goal. Keita's reign lasted only until 1968, when a bloodless coup replaced him with a military dictator, Lt. Moussa Traoré.

During Traoré's reign, the government adopted the International Monetary Fund's (IMF) Structural Adjustment Program (SAP), which had disastrous consequences for the poor in Mali. The SAP consists of 'conditionalities' placed on loans to developing countries, which entail currency devaluation, less state involvement in the economy, subsidy elimination, and trade liberalization (Riddell, 1992). The aim of these conditional loans was to correct balance of payment deficits and open the developing nation up to world competition. Largely driven by Western economists who draw on the success achieved under capitalist systems in the U.S. and Western Europe, the belief is that achieving such structural adjustment is what the developing world needs in order to save their failing economies. Due to extensive cuts in social spending,

however, the health and educational systems of Mali (and other countries that adopted such reforms) experienced painful setbacks.

Mali is today one of the poorest countries in the world (see Figure 1). Although it is attempting to diversify its economy, Mali remains heavily reliant on cotton exports. World cotton prices are highly unstable, making economic growth uncertain. In 2003, the United Nations Development Programme (UNDP) ranked Mali as 172 out of 175 nations in terms of the Human Development Index (HDI) (UNDP, 2003). The HDI is an index capturing development by measuring a country's life expectancy, literacy rates and gross enrollment, and GDP per capita (Purchasing Power Parity, or PPP).



**Figure 1:** Mali experienced positive GNI per capita growth during the 1990s, though it remains very low and poverty is widespread.

Under Traoré's leadership, the government placed greater emphasis on secondary and higher education to the detriment of primary education. As a result, the primary education system crumbled due to a significant budgetary decrease, which led to lower enrollment rates and decreased efficiency (Marlow-Ferguson, 2002).

Following 23 years of corruption and decay, punctuated by extensive periods of drought, Traoré was removed from office and arrested in 1991. Lieutenant-Colonel Amadou Toumani

Touré created a transitional committee that drafted a new constitution which included the freedom of speech, press, and assembly, as well as a multi-party government. The transitional committee oversaw the country's first democratic presidential elections in 1992, which brought President Alpha Oumar Konaré to power. Since Konaré came to office, Mali undertook the IMF Enhanced Structural Adjustment Facility (ESAF), which places a greater emphasis on poverty reduction than its predecessor (SAP). The ESAF is the IMF's attempt to correct the inefficiencies of the economy while taking into consideration the need for government social spending in developing countries. In the period 1995-2000, Mali began demonstrating much stronger and more hopeful economic indicators, though it remains highly indebted.

Similarly, there was significant educational reform once Konaré took office in the early 1990s. In 1998, the Ten Year Program for Educational Development (Programme Décennal de Développement de l'Education, or PRODEC) was implemented. The goals of PRODEC are to

- Raise the enrollment rate to 75% by the year 2008
- Build more classrooms and improve those already built
- Increase the number of teachers
- Use only the local language in teaching for the first year of education, introducing French in the second year as a subject, and using French only in instruction starting in the fifth year (though local languages will still be taught as subjects)
- Increase the literacy rate to 50% total by 2008, with 40% literacy among women
- Increase government expenditures on education to 27% of the annual budget by 2008.

These reforms should significantly improve the educational system in Mali, and as a result, the outlook for Mali's social and economic development. In the meantime, however, the education indicators in Mali remain dire, as does the level of childhood malnutrition. A 1995/96 Demographic and Health Survey showed that more than half of the deaths of children under five

in Mali are attributable to malnutrition – fifteen percent to severe malnutrition and forty-two percent to mild to moderate malnutrition (World Bank Operations Evaluation Department, 1999). Also, a 1996 study showed that 84 percent of mothers in Mali with children three years of age and younger have never attended school, only 12 percent have attended primary school, and 5 percent attended secondary or higher education. This is cause for concern when stunting has been shown to be two times higher among children of mothers with no education compared to children with mothers who have secondary or higher education. Malnutrition is one-third higher in children with mothers who have no education compared to children with mothers who have primary education (Africa Nutrition Chartbooks, 1996). Improvements in the educational system will hopefully provide the impetus necessary to decrease childhood malnutrition in Mali.

#### The Republic of Congo: Historical Background

There is not much knowledge of the early history of Congo, unlike Mali. It is certain, however, that there were no empires that matched the extent and prosperity of the Malian empires noted above. More recently, in 1849 the French founded Libreville in Gabon as a city for freed slaves, allowing for exploration into equatorial Africa. Between 1906 and 1910, France reorganized its territorial holdings into the French Equatorial African Federation (FEA), which was comprised of what is now Congo, Central African Republic, Gabon, and Chad. Brazzaville, Congo's current capital, was also the capital of the FEA, which gave Congo great advantages over the other French colonies (including Mali, which, as stated above, was largely ignored by the French). As a result, the schools and medical services in Brazzaville became the best in the region (Decalo, 1996).

There were, however, several negative aspects to the attention that Congo received from the French. First, the better living conditions in Brazzaville created a massive rural-urban

migration that continues to put strains on the city's infrastructure today. Further, France created a concessionary system, under which approximately forty companies were allowed monopolies to exploit the resources of the FEA in return for helping France to administer some of the less populated regions of the colonies. This system had a negative impact not only on the natural resources of the area (ivory and rubber had virtually disappeared by the time the system ended in the 1930s), but it also took a toll on the natives, who were brutalized, forced to work, and were decimated by disease (Decalo, 1996).

As with Mali, France's 1956 Loi Cadre gave Congo much more autonomy, and Congo officially gained independence in August of 1960, a month before Mali. Since that time, Congo has struggled through unrelenting political and economic instability. In its first decade of independence, Congo experienced two coups and three different presidents, each regime being replaced by an even more Marxist government. Congo's president at independence, Father Fulbert Youlou, was strongly pro-Western and was forced to resign in 1963. His successor, Alphonse Massamba-Débat, was the first Marxist president, and he forged strong ties with Communist countries and imposed state controls over labor, trade, transport, and natural resources. He was replaced in 1968 by Marien Ngouabi, a self-proclaimed Marxist-Leninist, who continued Massamba's efforts at massive nationalization (Thompson & Adloff, 1996). Ngouabi held power until his assassination in 1977, but Congo remained an official Marxist state from 1970 through 1991.

In addition to political instability, ethnic rivalries have led to violent riots, and there was not a single smooth transition of power from one regime to the next until the first democratic elections in 1992 in which Pascal Lissouba was elected. Throughout the 1990s, however, there were multiple internal violent conflicts that led to a great deal of damage and destruction of

Brazzaville and have complicated the process of democratic transitioning. The current president, Denis Sassou-Nguesso, was reinstated in 1997 after six years out of power, and has only a tentative hold on the country. Although rebel groups signed a peace accord in 2003, the democratic future of Congo remains less than certain.

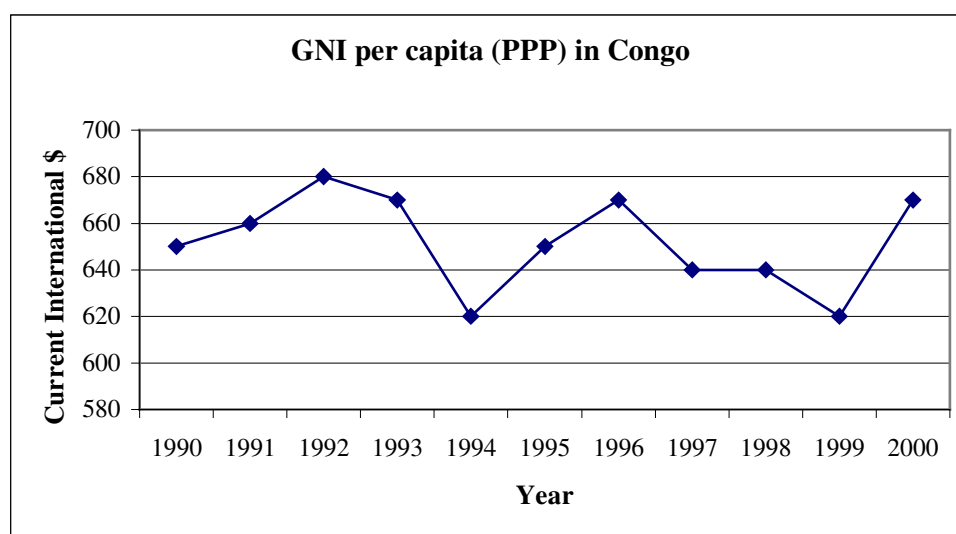
Despite the instability and corruption, however, education was always one of the government's top priorities, with primary education considered to be the foundation of the educational system and its number one goal (UNESCO, 2000a). In an assessment by the United Nations Education Science and Culture Organization (UNESCO, 2000a), in spite of the armed conflict, instability, and destruction Congo has faced since independence, the government remains capable of educating all of its school age children. One possible explanation for Congo's advanced educational system and astonishingly high literacy rates could be that because Congo was led by Marxist governments, they were committed to high social expenditures for health and education. Sassou-Nguesso held out against World Bank Structural Adjustment Programs (SAP) for as long as he could, attempting instead to implement domestic structural adjustment. Falling world oil prices and high debts left him little alternative but to adopt an SAP in 1986, though only half-heartedly. The conditionalities imposed by the program were never fully implemented. By the time the government became committed to market liberalization in the 1990s, the IMF had already realized its prior error in failing to implement a social safety net, and had created the Enhanced Structural Adjustment Facility (ESAF). As stated above, the ESAF actually considers poverty-alleviation as an important goal of government, a consideration that was largely ignored during the 1980s SAPs. In other words, in spite of half-hearted SAP adoption, Congo maintained relatively high social spending.

Another possible reason for Congo's success in achieving such widespread literacy and education is the unusually high level of urbanization. Nearly eighty percent of Congo's total population lives in the southern region of the country, with approximately forty percent of the population living in Brazzaville alone (Decalo, 1996). As a result, in 1995, 50 percent of the population lived in urban areas (United Nations Population Division, 2001). These high levels of urbanization and the relative geographic proximity of the majority of its population allow greater access to schools and health services. In Mali, only 27 percent of the population lived in urban areas in 1995 (United Nations Population Division, 2001).

There are, however, negative aspects to high levels of urbanization, which can negatively affect the health of the people. For example, declining agricultural output as a result of rural-urban migration has created food shortages, forcing Congo to import the foods necessary to sustain its population. One can assume that food shortages would have a negative effect on nutritional status, and importing food has a negative impact on the economy. Additionally, this urbanization has placed too much pressure on the infrastructure, already stressed by civil conflict. Unemployment and a strain on educational and social services are a negative result of rapid urbanization.

Congo's economy relies mainly on petroleum exports, though it also has a relatively strong timber industry. These industries, however, remained largely in foreign hands throughout the 1980s and early 1990s. For example, the Franco-Belge company Total operates two-thirds of Congo's total oil output, while Agip, an Italian company, operates another 30 percent (Energy Information Administration, 2003). Attempts in the early 1990s at economic liberalization and reform were slowed in 1997 and again in 1998 due to armed conflict. Additionally, the drop in world oil prices in 1998 severely damaged Congo's economy. Congo is ranked 140 out of 175 in

terms of the Human Development Index, just within the “medium human development” range. There remains, however, widespread poverty. Its high literacy and enrollment rates undoubtedly play a large role in increasing its ranking when compared to Mali, since they have virtually the same life expectancies and GDP per capita (PPP).<sup>7</sup>



*Figure 2: Congo's GNI per capita stayed within the \$620-680 range throughout the 1990s*

### Summary

Though Congo and Mali were both French colonies, they had very different colonial experiences. Congo received more direct intervention from France, including the greater development of its infrastructure, while Mali was largely ignored. Since independence, Congo's political development has been much more tumultuous, and violent conflict continues to erupt periodically. Mali has had a much smoother transition towards democracy than Congo.

Both countries displayed a commitment to educating their people since independence. A large difference emerged when Mali's government shifted emphasis away from universal primary education to secondary and higher education. This shift occurred at the expense of its

<sup>7</sup> Mali's 2001 life expectancy is 48.4 years and its GDP per capita (PPP) is \$810. Congo's life expectancy is 48.5 years and its GDP per capita (PPP) is \$970.

primary school system, as will be seen below. Congo, on the other hand, has maintained its commitment to primary education and high social spending.

## CHAPTER 6

### ANALYSIS

#### Educational System Indicators

This chapter will discuss the educational indicators that I believe are important in determining the effectiveness of an educational system, which I assume is responsible in predicting the level of malnutrition a country will experience. The educational system indicators include education fees, language of instruction, enrollment gap, and education budget.

#### *Education fees*

School fees will result in less effective education, as poorer families will be unable to afford to send their children to school. With widespread poverty in developing countries, school fees would discourage enrollment of a large portion of the population, thus decreasing national literacy rates. School fees may also increase the gender disparities in school enrollment, as many families may find it more pertinent to send their sons to school if they cannot afford to send all of their children. As a result, lower enrollment due to the presence of school fees would maintain higher female illiteracy rates. This in turn would lead to a higher level of childhood malnutrition than in countries where there are no school fees.

For the decade in question, Mali did require school fees for primary education (On the Line, 2000). According to a United Nations publication, private household spending accounted for more than two-thirds of total education spending in Mali (Watkins, 1999). This is undoubtedly one of the major causes of low enrollment rates. When Malawi, for example, removed its school fees in 1994, primary school enrollment increased by fifty percent, “almost

overnight” (50 Years is Enough Network, 2004). Congo, on the other hand, does not use school fees to fund education (Microsoft Encarta Online, 2004).

Studies have shown that in addition to making school free for all, governments should include incentives for attending school, such as providing free meals for all students and providing free boarding or free transport for students who have to travel to school (see Bissell & Schiefelbein, 2003). Through encouraging education in this way, governments would also be contributing to a decrease in childhood malnutrition.

### *Language of Instruction*

I hypothesize that if primary school is taught foremost in a colonial language that is not widely spoken in all regions of the country, fewer children will attend school and fewer will become literate because of the difficulties involved in learning the language. If regional native language is used foremost, particularly in the first few years of education, greater success may be achieved; an official language can then slowly be added in. Both Congo and Mali have multiple languages spoken within their borders. In Mali, the official language is French, but only the very educated elite uses French extensively. Eighty percent of the population speaks Bambara, the other twenty percent speak any of a number of African languages. In Congo, the official language is also French, but other languages used are Lingala, Monokutuba, and Kikongo, among others.

During the decade in question, Malian schools used French as the language of instruction, beginning in primary school. As indicated above, they have since noted the negative effect this has had on student enrollment rates. As a result, PRODEC has introduced a “pédagogie convergente,” in which the children are taught for the first year in their maternal language, while French is slowly added in beginning in their second year. This results in bilingual education that

favors the native tongue for the first four years, shifting to favoring French starting in year five (Marlowe-Ferguson, 2002).

An interesting UNICEF study in 2000, however, showed that parents in Mali actually prefer that their children to be taught in French. This is in direct opposition to my hypothesis that learning in French in countries where the language is not widely spoken will lead to parental and student frustration. There appears to be a view among parents in Mali that because French is the official language, if their children speak French it will open up more opportunities for them. There has been dissatisfaction from parents who think their children are learning the language too slowly (UNICEF, 2000). It is appropriate for the schools to carry out their plan of bilingual education, because it is likely a more effective way of teaching students French while not neglecting local languages.

Congo, too, uses French as its primary language of instruction. As in Mali, Congo's current educational plan has a goal of teaching primary education in native languages while slowly introducing French (Republic of Congo, 2002). There remains an important difference, however, in the everyday usage of French in Congo and Mali. The Congolese tend to use French much more commonly; it is not just a language reserved for the educated elite, though most everyday speech is done in a native language. According to the World Education Encyclopedia, "Congolese society seems to have reconciled itself to becoming at least a trilingual society in French, Kituba, and Lingala." As it now stands, the Congolese must by necessity be quadrilingual, speaking Kituba, Lingala, a Kikongo dialect, and French (Marlowe-Ferguson, 2002). The typical Malian uses French less frequently in his or her everyday life, and it is seen much more as an imposition in Mali than in Congo, as Congo celebrates its French heritage. In Mali, only 9,000 people out of the total population of 10.8 million speak French (Ethnologue,

2004). As a result, for Congolese children, learning in French may be less difficult, as they are more exposed to the language in their everyday lives than Malian children.

Both countries used French as the official instructional language for the years 1990 to 2000, but because French is much more widely spoken in Congo than in Mali, we would expect that this variable would have less of a negative impact on the educational system in Congo than in Mali. This variable likely has less of an impact on literacy rates than the other variables. Language of instruction therefore probably only has a small impact on the level of malnutrition in a country.

### *Enrollment Gap*

There are often large enrollment gaps in African nations, both between urban and rural areas, and between males and females. These gaps demonstrate governmental ineffectiveness in creating policies that enable the country to successfully achieve universal primary education and advances in producing more literate populations.

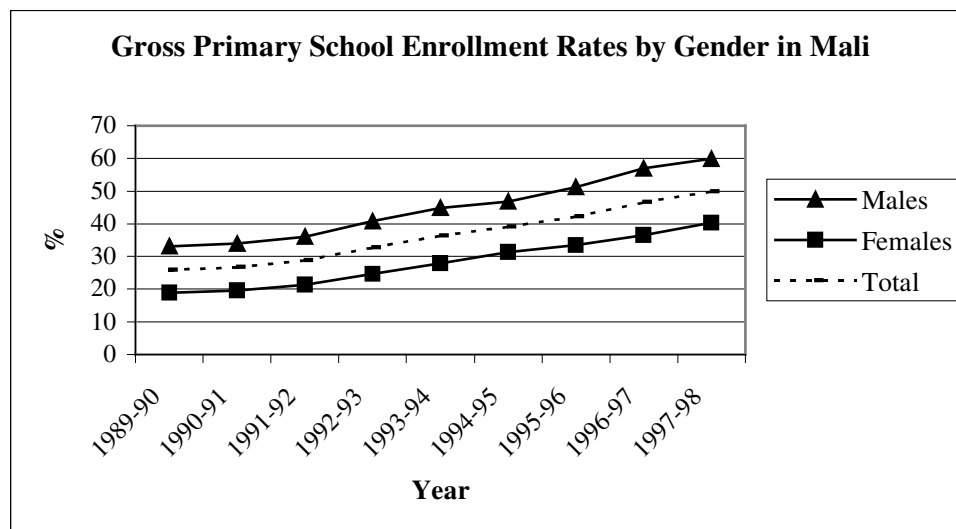
A large urban-rural gap in terms of enrollment means less success for the educational system in improving national literacy rates. Such a gap would indicate that great inequities remain in the educational system in terms of access. Those living in rural areas are likely forced to travel further to attend school, which is difficult since oftentimes rural areas are also the poorer areas in African countries. Transportation may be difficult to obtain and expensive, and the quality of the schools in rural areas may not be as high as those in more urban areas (for example, they may lack indoor plumbing or access to clean water, and may have less qualified teachers).

Similarly, there are often large gaps between male and female enrollment rates. These gaps demonstrate a larger societal inequity that puts women at a disadvantage. According to this

paper's hypothesis, the lower the female enrollment rates, the lower the female literacy rates, and thus, the higher the childhood malnutrition within that country. The lack of inclusive governmental policies aimed at increasing female enrollment in education points to great ineffectiveness of an educational system. At the Jomtien conference in 1990, the need to reduce this gap was underscored by the world leaders in attendance: "The most urgent priority is to ensure access to, and improve the quality of, education for girls and women, and to remove every obstacle that hampers their active participation" (UNESCO, 1990).

Mali has large gaps between urban and rural enrollment. For example, in 1997-1998, 49 percent of school-age children were enrolled in school. Not only is this one of the lowest rates in the world, but the enrollment rates in rural areas was even lower, at around 30 percent (25 percent females) (Marlow-Ferguson, 2002).

In addition, Mali has shown grave differences in enrollment rates according to gender. As seen in Figure 3, the percentage of girls enrolled in primary education is on average seventeen percent lower than the percentage of boys enrolled (in 1996 through 1998, this gap widened to approximately a twenty percent difference).



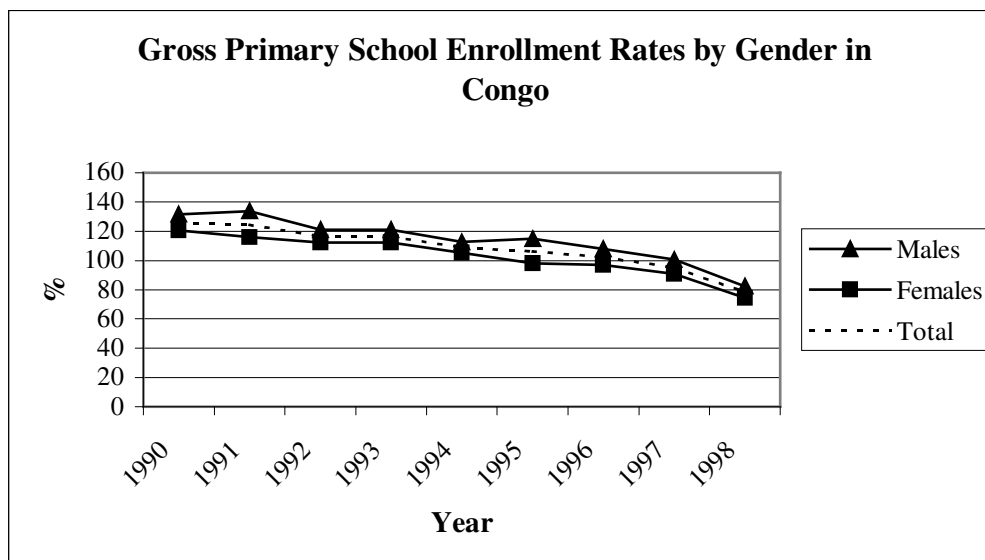
**Figure 3:** Enrollment rates increased in Mali from 1990-1998, but there remains an important gap between male and female enrollment.

It is common in many African societies to rely heavily on the work of females in household duties, including agriculture, food preparation, and other chores, making parents reluctant to send female children to school when they are needed at home (UNESCO, 2001). Additionally, ninety percent of Mali's population is Muslim, which may explain why there is such a large gender gap in enrollment (CIA World Factbook, 2003b). Muslim law has many unequal provisions for women, as is evidenced by the following quote from the Quran: "Men are those who support women, since God has given some persons advantages over others, and because they expend their wealth on them. Men have authority over women because Allah has made the one superior to the other and because they spend their wealth to maintain them" (Callaway & Creevey, 1994). This sense of inequality is manifested in several ways in Muslim law, particularly in inheritance, marriage, and divorce provisions. Traditional Muslim practice results in little to no education for women, because their role is in the domestic sphere, and therefore education would be both unnecessary and a sign that the woman is not accepting her role. Women are expected to marry young and stay married throughout their lives, because men support them and they are unable to control wealth.

Congo's enrollment data shows a decline in overall enrollment figures (see Figure 4). According to UNESCO, this is likely due to the recent liberalization of private education and the resultant shift of a large number of children from public to private education (UNESCO, 2000a). These figures do not include private school enrollment. It should also be noted that for the first few years in the series, gross enrollment exceeds one hundred percent. This is due to the fact that gross enrollment rates are comprised of the ratio of the number of children enrolled in primary education over the number of primary school age children. In other words, some children who are not of official primary school age (6 years to 11 years) are enrolled in primary education, making the numbers exceed one hundred percent.

Data on the urban-rural divide in Congo is not available. It may be hypothesized, however, that due to the high degree of urbanization in Congo discussed earlier, there is a smaller urban-rural divide in Congo than in Mali.

By comparing the graphs of gross enrollment by gender in both countries, it is evident that Congo has a more egalitarian educational system than Mali. For the years 1990 through 1998, there is on average an eleven percent difference between male and female educational enrollment. While this is still not as equal as it should be in order to be considered ideal, it is not as wide a gap as is found in many SSA countries. We would predict that a country with large gender enrollment gaps would have a higher level of childhood malnutrition than a country with small enrollment gaps because the aforementioned studies have shown that female education is the most important factor in influencing the levels of childhood malnutrition in a country. A large gap between male and female enrollment would indicate that women are not being adequately encouraged to attend school, or are not given adequate access. Thus, women's educational levels, as measured by literacy rates, would likely remain low.



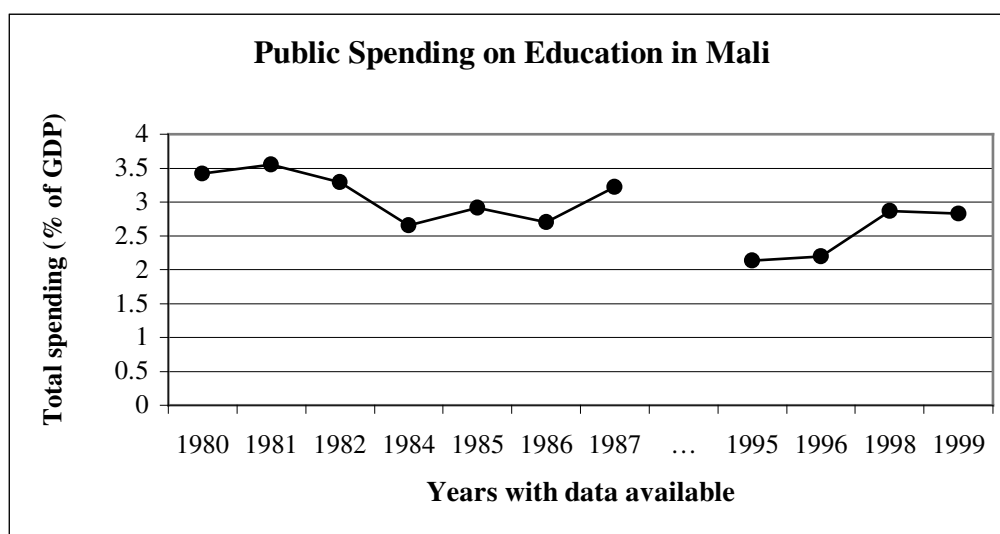
**Figure 4:** *The gender gap in Congo between 1990-1998 was approximately 11%.*

Perhaps governments should undertake some actions in order to correct the pervasive gender gap in education. According to the World Bank, there are several ways governments can increase female attendance at minimal cost. One helpful reform is to increase the number of female teachers, since in some cultures parents prefer that their daughters be taught by women (Kowsar, 1993). This may be the case in Mali, in which the majority of the population is Muslim (Okijie, 2001). There also tend to be fewer women teachers in rural areas, where girl students are already disadvantaged by long commutes to school and inadequate facilities. A second helpful reform that governments can make to improve female enrollment is to provide separate sanitary facilities for girls, or even providing all-girl schools. Finally, school feeding programs can not only provide an incentive to poor parents to send their children to school, but it also increases the performance of children while they are at school, because malnourished children have a more difficult time concentrating and learning. This can help to decrease dropout rates (Chowdury, 1993).

### *Education Budget*

It would seem that higher public expenditures on education would result in a more effective school system, and thus, higher literacy rates and lower malnutrition. Additionally, the greater the percentage of the education budget devoted to primary education, the more effective the school system will be at achieving universal primary education and a higher level of national literacy. Here again, the disparities between Mali and Congo are evident.

For Mali, data for the decade in question is only available from 1995-1999. The graph below (Figure 5) shows data for some years in the 1980s to demonstrate the relative consistency in the amount of public spending on education. For the years 1995-1999, the average public expenditure on education as a percent of GDP was 2.5 percent (see Figure 5).

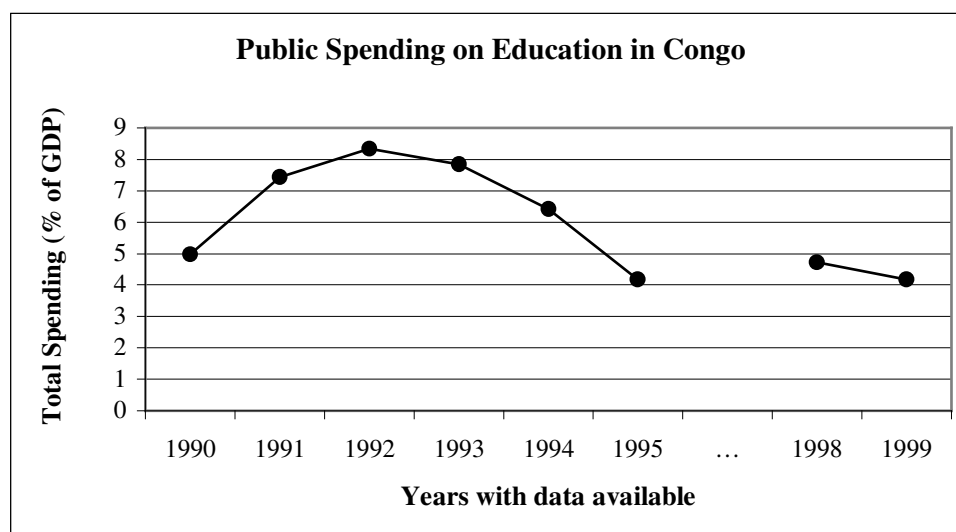


**Figure 5:** *Public spending in Mali remains lower than the SSA average of 3.4%*

In addition to low overall spending on education, the breakdown of the education budget shows inefficiencies. Although 80 percent of students are enrolled in grades one through five, only 45 percent of the educational budget is spent on primary education. While only one percent of students are enrolled in higher education, 18 percent of the educational budget is devoted to

higher education (Marlowe-Ferguson, 2002). It is difficult to achieve universal primary education when insufficient funds are being devoted to its funding.

Congo spent an average of 6 percent of GDP on education for the years 1990-2000, more than twice as much as Mali spent (see Figure 6). Between 1990 and 1998, this translated to an average of 26.3 percent of the government's budget being spent on education. Also during the same years, 51.5 percent of the educational budget funded primary education (UNESCO, 2000a). Though public spending as a percent of GDP has decreased through the decade, it remains well above the regional average of 3.4 percent for sub-Saharan Africa.



*Figure 6: The decrease in public spending on education in Congo may be partially attributable to recurring violent conflict.*

#### Alternative Hypotheses

Some may argue that other factors could negate the effects of an effective educational system, making literacy rates misleading as an indicator of childhood malnutrition. The effect of income has already been controlled for through case selection, therefore this section will observe the democracy levels and prevalence of violent conflict in each country.

### *Violent Conflict*

One may argue that the presence of violent conflict could have a strong negative impact on educational enrollment, and thus, would lead to an increase in childhood malnutrition. If parents didn't believe their children would be safe attending school, there would certainly be a decline in enrollment. The same effect would be observed if violent conflict forced large amounts of the population to flee. Finally, if conflict drained the country's monetary resources and damaged the educational infrastructure, educational effectiveness would certainly decline, leading to decreased literacy and a rise in malnutrition. In other words, some may argue that analyzing the educational system alone will not have adequate predictive power in determining the level of childhood malnutrition because the presence of violent conflict could negate the gains of an effective educational system. Based on this reasoning, we would expect that Mali would have experienced more conflict than Congo, since Mali has lower literacy rates and higher malnutrition than Congo.

As already discussed, the past forty years for Congo have been replete with violent domestic, ethnic conflict. Multiple coups d'état and military regimes have damaged the infrastructure and hurt Congo's economy. Civil war erupted in 1992 after the first democratic elections, and again in 1997. Cease-fire agreements were reached in 1999 but the prolonged fighting caused extensive damage to Congo's infrastructure. More fighting broke out again after the 2002 elections, and although another peace agreement was reached in 2003, fighting continues to break out sporadically. And yet, in spite of all of this conflict and instability, the governments have always maintained a firm commitment to universal primary education, as is evidenced by their strong spending on education.

Mali has experienced a great deal of conflict due to the discontent of the Touaregs in northern Mali. Since independence, the Touaregs led innumerable armed rebellions aimed at the politicians in Bamako (Mali's capital). The conflict worsened in the early 1990s. When Konaré took power, he was able to slowly put an end to the marginalization of the Touaregs, and through encouraging their participation in all levels of government, peace was gained by 1996.

Both countries, therefore, experienced a fair amount of violent conflict. Mali, however, was able to achieve peace, while Congo remains conflict-ridden. Since Congo has better educational indicators, and thus lower childhood malnutrition, this refutes the alternative hypothesis that Mali's high childhood malnutrition could have been due to the intervening impact of violent conflict causing Mali's literacy rates to remain lower.

#### *Level of Democracy*

Another possible argument is that a low level of democracy could hamper educational achievements, as autocracies are often more corrupt and have less concern for the well-being of their people. This would lead to lower levels of expenditures on health and education, and we would expect to see that an autocracy has a higher level of illiteracy and therefore of childhood malnutrition. Following this argument, we would expect for Congo to have a higher level of democracy than Mali since Congo's educational indicators are better, and its malnutrition levels are lower. The opposite is true.

The Polity IV democracy rankings assign countries a score from -10 to 10, where -10 indicates high autocracy, and 10 indicates high democracy. The measure is based on the openness of the country's political institutions. Both Mali and Congo became democratic in 1992, with the election of their first presidents. That year, Mali ranked 7 and Congo ranked 5. In 1997, however, Congo fell to a -6 and remained there for the rest of the decade. Mali

remained at a ranking of 7 until 1996, and has had a ranking of 6 ever since then. In other words, Mali has been able to maintain a relatively high level of democracy since 1992, whereas Congo was ranked democratic for five years, and has been a relatively strong autocracy since. Democracy, therefore, does not appear to have an impact on childhood malnutrition for these countries.

### Summary

Based on our predictions concerning the effectiveness of a school system, Congo undoubtedly had a more effective school system than Mali in the 1990s, which certainly played an important role in determining each country's level of child malnutrition. Because Mali had school fees, large enrollment gaps, low government spending on education, and their curriculum was taught in a foreign language, it is likely that their school system is not very effective. This conclusion is further supported by their female illiteracy rates, which stood at 89.6 percent at the start of the decade, and fell slightly to 84.0 percent by 2000. This undoubtedly had a strong influence on Mali's childhood malnutrition rates, which remained high at 43.4 percent in 2000.

The Republic of Congo, on the other hand, did not have school fees, had high government spending on education, and had lower enrollment gaps than Mali, and though they did teach in a foreign language, it is one more widely used than in Mali. This leads to the conclusion that their school system was likely an effective one, and this is once again supported by their female illiteracy rates, which were 42.1 percent in 1990 and fell sharply to 25.6 percent in 2000. Again, the decreased literacy rates due to Congo's effective school system likely played a significant role in the level of childhood malnutrition, which was low (compared to the region) at 13.9 percent in 2000.

It was also possible to reject the alternative hypotheses that violent conflict or democracy played a role in determining the levels of childhood malnutrition in each country. Because Mali had a higher level of democracy and lower level of conflict than Congo, and yet Congo was able to maintain a lower level of malnutrition. It is therefore possible to determine that the factors level of democracy and violent conflict are not as important as the effectiveness of the educational system in determining literacy rates and thus malnutrition.

## CHAPTER 7

### CONCLUSIONS

Although Congo and Mali maintained similar levels of GNI per capita in the decade 1990-2000, Congo performed significantly better at maintaining low levels of childhood malnutrition in spite of its instability and conflict. This paper has attempted to demonstrate the link between childhood malnutrition and female education, and to determine what factors are most important in increasing educational effectiveness in order to decrease childhood malnutrition. The implications are clear: if countries can improve the effectiveness of their educational systems, they can attack malnutrition through lowering illiteracy.

It appears that the most important variables in determining educational effectiveness are the absence or presence of school fees and governmental expenditures on education as a percent of GDP. Mali required school fees in the 1990s, while Congo did not. As noted above, school fees are especially devastating in countries where poverty is so abundant, as it is in both Mali and Congo. Fortunately, Mali has since determined that school fees should be phased out, which will likely have a significant positive impact on educational enrollment. Likewise, the Congolese government spent more than two times the percentage of GDP on education than the government in Mali, which undoubtedly played a large role in Congo's high levels of literacy and low levels of malnutrition.

Language of instruction appears to have had a smaller effect on malnutrition than the other variables. Both Congo and Mali used French in the 1990s as the official language of instruction, but the Congolese people use French much more widely than the Malian people. I

hypothesized that parents and students would feel frustration and resentment at the use of a colonial language in education, but a study showed that for Mali at least, parents want their children to learn French as it represents a more promising future for their children. Since the end of the decade, both countries have made a shift towards bilingual education, in which the first year of education is taught primarily in the child's native language. This will likely have a positive impact on literacy rates, particularly in Mali.

Enrollment gap differences in the two countries also showed that Congo has performed better in terms of providing access to a greater portion of its population. This may be due in part to the high degree of urbanization in Congo. However, because of their greater educational spending, they may have been able to provide greater access to rural areas. Additionally, because Congo didn't require school fees, rural poor and females weren't at a disadvantage as they would be in countries where school fees are required.

One concern frequently cited when policy reforms require greater government spending in developing countries is that poor countries with low government budgets cannot afford such reforms. This is undoubtedly an important concern, because without adequate funds countries will be unable to implement significant changes. Mali and Congo are similarly impoverished countries, and yet Congo has been able to devote more funds towards education than Mali. One solution is to observe current government spending trends and determine if funds can be moved from other areas of the budget into education reforms. For example, Mali maintains higher military spending than Congo. In 2002, Mali spent 15 percent of its GDP on military expenditures, whereas in 2001, Congo spent just 2.8 percent of its GDP on the military (CIA World Factbook, 2003a). Mali's military spending could arguably be decreased in order to increase educational spending. Second, international aid agencies have placed a great emphasis

on promoting education in developing countries (UNICEF, for example), and the involvement of these agencies in education reform would be a wise (and free!) method of improving educational systems. Finally, activists arguing for the cancellation of developing world debt by industrialized nations have cited the freeing of funds for government spending on education as one important possible outcome of decreased debt burden. In order to address the issue of debt, the World Bank Highly Indebted Poor Country Initiative (HIPC) aids the most impoverished developing nations (including Mali) by canceling a small portion of their debts in exchange for greater social expenditures on health and education by the governments in HIPC nations.

There is reason to believe the findings of this study could be generalizable throughout sub-Saharan Africa. It would be helpful, however, if future studies observed a larger number of African countries over time. Also, this study does not take into account the differences that likely exist between countries in terms of curriculum and quality of teaching. One would need to do an intensive study of textbooks as well as prolonged fieldwork in order to capture more accurately these subtle differences. One would then be able to explain variation in childhood malnutrition levels among countries with similar literacy rates.

Universal primary education is an exceedingly important goal that all developing countries must aim to achieve. Education decreases childhood malnutrition, improving the prospects for future generations. The sooner developing countries can create literate populations, the sooner they will increase the productivity and health of their people in general, and decrease their levels of childhood malnutrition in particular.

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