# Zentrum für internationale Entwicklungs- und Umweltforschung der Justus-Liebig-Universität Gießen

## Does the availability of secondary schools increase primary schooling?

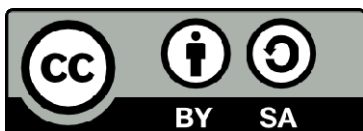## Empirical evidence from northern Senegal

by

Iris GOENSCH

No. 63

Gießen, April 2013

*Center for International Development and Environmental Research (ZEU),
Section 3
Justus Liebig University Giessen
Senckenbergstr. 3
D-35390 Giessen, Germany
e-mail: Iris.Goensch@zeu.uni-giessen.de
phone: +49-6171-291439

**Abstract**

When parents in Senegal decide upon primary school enrollment of their children, they might consider future returns to education. These future benefits in turn heavily depend on a child's prospects to attend secondary school. If private returns to primary schooling are very low and secondary schooling is costly but yields higher returns, the incentive to send children to primary school might be low for poor families.

Based on a new household survey from urban and rural northern Senegal, this paper reassesses the puzzling results of Filmer (2007) according to which the availability of secondary schools does not affect primary school participation in Senegal. The empirical results confirm that secondary school availability does not play a role for the average child. Distance to the next secondary school matters only for the two highest wealth quintiles. Instead, the availability of primary schools and household wealth are important determinants of primary school enrollment. To shed further light on this surprising result, the paper discusses various reasons why the distance to the nearest secondary school might not be a very good proxy of a child's prospect of secondary school attendance.

## Introduction

The launch of the Education for All initiative and the Millennium Development Goals manifested the focus of attention on primary education from the early 1980s up to the late 1990s. This shift was encouraged by the World Bank and as a consequence the World Bank itself, but also other aid donors and governments channeled resources especially to primary schooling, as opposed to secondary and especially higher education (e.g. Glewwe, 1991; Bennel, 1996, and Heyneman, 2003). Primary education was believed to yield higher returns (Psacharopulos, 1994) and to be more easily accessible to poor children which would make investments into primary schooling more pro-poor than investments into secondary or higher education. However, both methodology and results of these studies have been criticized (Bennel, 1996).

Several more recent studies that do not combine data from different countries (e.g. Kadzamira and Rose, 2003) have shown that investments into primary education and fee abolishing are not necessarily pro-poor: When private returns to primary schooling are very low and secondary schooling is costly but yields higher returns, as it is the case in some West African countries (e.g. Glewwe, 1991, and Schultz, 2004), wealthier households benefit from an expansion of primary schooling or the abolishment of primary school fees. If returns to primary schooling are low and the higher returns to secondary schooling are unreachable either due to direct costs of secondary schooling or due to big distances to the next secondary school, poorer families might be less willing to send their children to primary school in the first place.

This literature suggests a positive impact of secondary school availability on primary schooling. However, Filmer (2007) found a significant association of distance to the nearest secondary school with enrollment only in seven of the 24 datasets from 21 developing countries. However, for most countries, including Senegal, the distance to the nearest secondary school did not have a significant impact on rural children aged six to 14 years. This paper aims to shed more light on this puzzling result.

In a first step, I examine whether the result of Filmer (2007) that distance to the next secondary school is not significantly related to (primary) school enrollment holds for northern Senegal and for more recent data. Second, the article provides several explanations why secondary school availability might not fully reflect a child's actual prospects of attending secondary school once he or she has completed primary school. Where possible, these potential explanations are tested empirically.

To analyze the major determinants of primary school participation including the availability of secondary schools, we conducted a representative household survey in the northernmost region of Senegal, Saint-Louis, in 2011. As typical for West Africa, this region includes some economic centers with a variety of employment possibilities and economic

activities as well as remote areas that mainly rely on small-scale agriculture and animal husbandry. In the Saint-Louis region, the economic centers are concentrated in the western part of the region, especially at the Senegal River. Some (predominantly rural) households are very large, the mean household size in the survey amounts to ten persons. This is partly due to the popularity of polygamy, but also a result of close and distant relatives and sometimes non-relatives living together in a single household.

Primary school enrollment in the Saint-Louis region is still relatively low, 39 percent of young people aged seven to 16 have never attended school (UNESCO, 2011). In contrast to most developing countries, girls are not less likely than boys to enter primary school (UNICEF, 2010 and UNESCO Institute for Statistics, 2010). The survey data show, however, that girls tend to drop out of school earlier than boys.

The empirical results show that several household characteristics matter for primary schooling. Children in rural households and those raised by a household head that has not been to school or a head who is livestock farmer are less likely to be enrolled. The availability of a primary school within or nearby the community of residence also has a positive impact on primary school enrollment. In contrast, the distance to the next secondary school does not have a significant effect on primary schooling in the regression analysis – in line with the findings by Filmer (2007). These results hold if distance to school is replaced by travel time.

The remainder of this paper is structured as follows: Section 2 briefly reviews the literature on the impact of school availability on educational outcome and enrollment, with a focus on Africa. The study region, especially with regard to schooling, is introduced in Section 3. Section 4 presents the data used and descriptive statistics. Section 5 and 6 provide the regression results and a discussion of the results, respectively. Section 7 concludes.

## Literature review: Does the availability of secondary schools matter for primary school enrollment?

Typically, economic theories see the demand for education as the result of the child's or the parents' assessment of costs and benefits (see for example Orazem and King, 2008). Glewwe and Kremer (2006) provide a production function of learning and give an overview over different functions used in the literature to estimated quantity of schooling. The utility maximization problem can then be converted to a reduced form demand equation such as the one used by Handa (2002):

$$S_i = F(X_c, X_h, X_s, u),$$

where the demand for schooling for child $i$ is a function of characteristics of the individual child ($X_c$), of the household ($X_h$) and of school infrastructure ($X_s$). $u$ is a random error term. One can

also think of the vector of school infrastructure as capturing the existence of a school – possibly a primary and a secondary school – in the community.

Before turning to the findings of empirical studies that include secondary school availability into their estimation of primary schooling, I provide some reasons why there might be a relationship between primary schooling and the availability of a secondary school. First of all, positive private returns to education are found for virtually all countries and are relatively similar across developing countries (Orazem and King, 2008): On average, each year of completed schooling is associated with an increase of labor earnings by eight percent (Orazem and King, 2008).

When parents estimate the future returns to their children's education, these expected returns might depend on the expected level of education the children will attain. If there is no secondary school within reach and no other way for children to continue their education after primary school, parents will only consider returns to primary schooling. If, however, attendance of a secondary or high school seems feasible and these yield different returns, expected average returns per year of schooling are different. Given that returns to higher levels of schooling are higher than returns to primary schooling, the prospect of attending a secondary school will increase the incentive to start primary schooling.

Using aggregate rates of return to education estimates, Psacharopoulos (1994) reaffirms earlier studies that find that primary education yields the highest private returns and social profitability for all world regions including sub-Saharan Africa. Since data used in this study partly seem to be outdated and several methodological issues can be raised, the results of these aggregated studies should be taken with caution (Bennel, 1996). Glewwe (1991 and 1996) questions the reliability of standard estimates of returns t investments into schooling and more generally casts doubt on the usefulness of private rates of return to schooling for governments deciding upon investments into different levels of schooling.

In contrast to Psacharopoulos (1994), Bennel (1996) finds some evidence that returns to primary schooling might be lower than returns to secondary education in many sub-Saharan African countries. In Ghana, returns to primary school are lower than returns to lower and higher secondary schools and specifically rates of return to primary education in the private sector are very low (Glewwe, 1991). For Burkina Faso and some other African countries, returns to all levels of education are substantial for both men and women (Schultz, 2004). According to the study of Nordman et. al. (2011), returns to education are higher for men than for women in the five major West African cities under analysis. However, the returns to secondary schooling in Burkina Faso and other African countries are higher than those to primary schooling (Schultz, 2004).

This view is supported by Siphambe (2000), who finds that rates of return to education in Botswana increase with the level of education. Convex returns to education were also found for

West African cities (Kuepie et al., 2009). For Dakar, returns to education in the informal sector are almost as high as in the public and private formal sector (Kuepie et al., 2009). These rates of return are, however, linked to the completion of school levels and average rates of return to education are lowered by high repetition rates (Glick and Sahn, 2010).

Even for agricultural productivity, schooling of a country's population has a positive effect (Reimers and Klasen, 2013). Educated farmers gain better yields than uneducated farmers when applying new agricultural techniques (Foster and Rosenzweig, 1995). In Senegal, formal schooling increases the consumption levels of adults (Lambert et al., 2011).

Turning to the question whether primary and especially secondary school availability might impact primary schooling decisions, Colclough et al. (2000) provide some evidence that proximity to a primary school is important for primary school enrollment in Ethiopia and Guinea. Bommier and Lambert (2000) find that children who do not live near a school in Tanzania enroll later and attend school for a shorter period. In his study using DHS data from 21 poor countries, Filmer (2007) simulates the enrollment effects of a reduction of the distance to school. He finds a statistically significant negative relationship between school enrollment of 6- to 14- year-olds and distance to a primary school in about half of the datasets. A negative effect of distance to secondary schools is found in one third of the datasets. However, the magnitudes of these associations – if found – are small.

Lavy (1996) uses data from the Ghana Living Standards Survey 1987-88 and finds that costs of higher levels of education have a substantial impact on enrollment decisions at the primary school level. Limited access to middle and secondary schools lowers primary school participation in rural Ghana at least as much as distances to primary schools. Similarly, Burke and Beegle (2004) find for a predominantly rural area in northwestern Tanzania that the number of primary schools within the community does not affect hours of attendance of children aged 10-15. In contrast, girls' attendance is significantly higher if a secondary school exists within five kilometers of the community.

Summarizing this literature, there are contradicting findings regarding the question whether returns to primary education are higher than returns to secondary education. For Sub-Saharan Africa, there is some evidence that returns to secondary education are larger. While proximity of a primary school is related to higher enrollment, there is no clear impact of the availability of a secondary school on primary school participation.

**The study region**

Senegal, as a coastal state, is located in West Africa and borders Mauretania in the north, Mali in the east and Guinea and Guinea-Bissau in the south. It almost surrounds The Gambia, which stretches from the Atlantic along Gambia River to the east. Senegal is divided into two climate

zones. The north-east is characterized by the drought and heat of the Sahel zone. Towards the south and near the coast, the climate changes into more tropical rainfall. Senegal is marked by a seasonal change of a dry and a rainy season. Recurring droughts are a serious problem, especially in the center and the north. Approximately 80 percent of the population work in the agricultural sector which accounts for just 20 percent of GDP (CIA, 2012). The main crops are groundnut, sugar cane, millet and rice. Because of the large fields used for the groundnut production, the cultivation of staple foods like millet and rice is not sufficient, so these produces have to be imported. Due to the rich fishing grounds, today the main industry and export good is fish.

In Senegal nearly half of the 12.9 million inhabitants live in cities, like the capital Dakar (CIA, 2012). The mean life expectancy at birth is clearly higher (59 years) than the one for sub-Sahara Africa overall (54 years) (UNDP, 2012). Based on the still generally low life expectancy and the high fertility rate of 5.2, the proportion of young people is very high, like in many other developing countries. About half of the citizens are younger than 14 years (CIA, 2012). Senegal counts many different ethnic groups. The most common are Wolof (43 %), Pular (24 %) and Serer (15 %) (ANSD/ BIT, 2007). The official language is French, but the inhabitants talk to each other in many different languages and dialects, depending on their ethnic group and place of residence. Wolof serves as a lingua franca and is also used for some radio and television programs. Besides the ethnic belonging, religion plays an important role. About 94 percent of the population confesses to Islam (ANSD/ BIT, 2007).

Regarding education and human development, first of all adult literacy is very low in Senegal: Only half of adult men and one third of women are literate. 33.5 percent of the population live below the income poverty line, which means they have less than 1.25$ per day at their disposal (UNDP, 2012).  Influenced by the low levels of both education and economic performance, Senegal ranked 155th out of 187 countries in the Human Development Index (HDI)[1] in 2010 (UNDP, 2012).
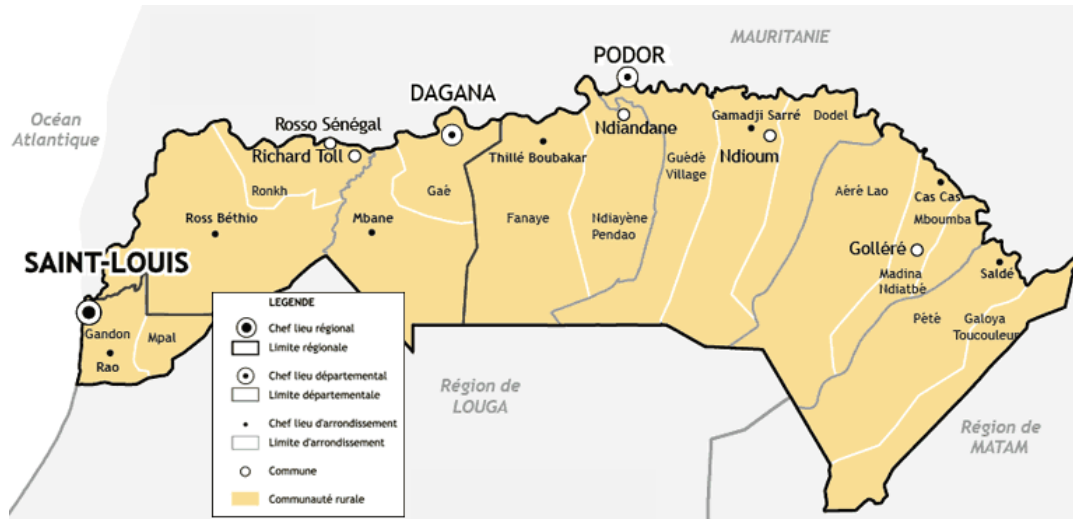
The survey which provided the data used in this article was conducted in the Saint-Louis region, one of the 14 regions of Senegal. The region is located in the north of Senegal at the Mauritanian border. At most places, the region is separated from Mauretania only by the Senegal River. The region covers an area of 19.034 km², which is ten percent of the entire country. With 901,036 inhabitants, the population density of Saint-Louis is about 43 people per km², much lower than the country average (ANSD, 2010). As illustrated by Figure 1, the region is divided into three departments, named Saint-Louis, Dagana and Podor. 37 percent of the

---

[1] The United Nations Development Program (UNDP) annually publishes the Human Development Index (HDI) in which almost all countries of the world are included. By combining information on life expectancy with income and education, a welfare index is calculated for every country.

inhabitants live in the regional capital Saint-Louis (ANSD, 2010), a city that was founded during French colonial rule in 1659 and that gave the name to the region.

The agricultural sector concentrates on the cultivation of rice, sugar, tomatoes, onions and sweet potatoes, made possible by alluvial irrigation systems close to the Senegal River. Especially the north-west is well-known for its food processing and its sugar and tomato canning factories (ANSD, 2010).

Figure 1: Map of the Saint-Louis region, Senegal



Source: http://www.au-senegal.com/carte-administrative-de-la-region-de-saint-louis,038.html?lang=fr

### *Schooling in the Saint-Louis Region*

The first secular schools in Senegal were established by the French and many characteristics of the educational system are still similar to the French one. Most primary schools are run by the state and are officially free of charge. However, an annual inscription fee and sometimes examination fees are charged. This school type is available in all towns and major villages. Some private secular or catholic schools exist in the cities and bigger towns. Relatively recently, mostly private Franco-Arab schools that combine the formal education according to the national curriculum with Arabic and religious education have become more widespread. All these different types of private schools award the standardized national degrees and usually charge fees. For secondary and higher levels, school availability is much more limited – and more expensive for the students' families.

Primary school lasts six years, followed by four years of (lower) secondary and three years of high school. Thus, 13 years of school have to be completed to achieve the *baccalauréat*, the degree that qualifies for entering university. Before entering primary school, children have the opportunity to attend preschool for three years, but preschool enrollment is

very low.[2] The tuition language is French for all subjects and every school stage ends with an official nationwide examination that determines progression to the next stage.

In 1990, six years of compulsory schooling were officially introduced (Adick, 2012), but not implemented. As a response to the low education quality (see e.g. Michaelowa, 2001) and a stagnation in school participation, the state adopted a law in 1991 that states that every inhabitant has the right to education and that the government is responsible for realizing a functioning education system (UNESCO International Bureau of Education, 2010). In spite of some efforts, this does not mean that the law is enforced or that it is possible for all children to attend a school close to their place of living.[3]

In contrast to most West African countries, net primary school enrollment in the Saint-Louis region is higher for girls (81.6 % in 2008) than for boys (69.5 %) (ANSD, 2010).[4] During the last years, a continuous increase of nearly five percent annually in primary school enrollment was observed. In this context, the district Podor has the highest growth rate and Dagana the lowest.

Secondary school enrollment rates are much lower than primary enrollment rates in spite of a big increase – especially for girls – in secondary enrollment during the last decade. However, while enrollment rates for girls are higher than for boys at primary school level, they are underrepresented in secondary school.

Only one percent of the inhabitants reaches the highest degree, a graduation at university. Despite of the efforts that have been made in the last years, the illiteracy rate is still high (39 percent, ANSD, 2010). Table 2 shows that especially women in the region are disadvantaged.

Table 1. Gross secondary school enrollment rates (i.e. grade seven to grade 10) for the Saint-Louis region in 2003 and 2009 (in percent).

|  | 2003/2004 | 2008/2009 |
|---|---|---|
| male | 25.3 | 37.8 |
| female | 19.6 | 36.6 |
| total | 22.5 | 37.2 |

Source: ANSD, 2010

Besides the gender differences, the table also shows disparities between the departments. By far, Podor department has the highest illiteracy rate in the Saint-Louis region.

---

[2] Although a preschool attendance rate of 30 percent by the year 2010 was targeted for the Saint-Louis region, the rate only amounts to 7.3 percent (ANSD, 2010). The number of girls in preschools is higher than the number of boys.

[3] The Senegalese school system and some perceived problems are described in more detail in Goensch and Graef (2011). The structure and legal framework of the educational system are explained in UNESCO (2010).
[4] The advantage of girls is thus bigger than on the country average where the net enrollment ratio is at 74 percent for boys and 76 percent for girls in 2010 (UNICEF, 2010).

Table 2. Illiteracy (of adults aged 15 and above) in the Saint-Louis region in 2002 (in percent).

| | department | | | total |
| --- | --- | --- | --- | --- |
| | Dagana | Podor | Saint-Louis | |
| male | 27.8 | 49.6 | 15.5 | 32.4 |
| female | 44.0 | 63.0 | 23.3 | 45.6 |
| total | 35.9 | 56.7 | 19.5 | 39.1 |

Source : ANSD, 2010

Alongside the public, catholic or laicist private and Franco-Arab schools, in the following called "formal schools", which all conduct standardized tests and award recognized degrees, a further school form exists in Senegal: Koranic schools. These schools are named *daara*, a word from the Wolof language, which means "place for learning". Because of no restriction regarding opening up such a school and a great variety of forms, reliable statements about the existing numbers are difficult to make. Estimates from 2009 stated that in the region Saint-Louis alone, 350 *daara* existed (Engelhardt, 2009). Like in many other Muslim countries the public education system does not teach religion. Therefore, this takes place mainly in the informal sector such as the Koranic schools, which were the first schools at all established in West Africa.

Often very young, at the age of four or five, children start Koranic education where they usually start learning and memorizing the Koran. The largest part of the Koranic students, so-called *talibés*, attend a Koranic school for two or three years to learn the Koran and sometimes also the Arab language, but some are taught "Islamic science" in the secondary and higher Koranic level (André and Demonsant, 2012). In nearly all *daara* the pupils do not study the subjects – such as French and Mathematics – and follow the curricula of formal schools. The wide range of different Koranic schools includes full-time residential education, but also *daara* that function as afternoon or weekend school so that children can additionally attend a formal school (Charlier, 2002).

**Household survey and descriptive statistics**

The household data used in this study were collected in the Saint-Louis region in March and April 2011. In a first stage, 25 census districts were drawn with probability proportional to size with assistance of the Senegalese National Agency for Statistics and Demographics (*Agence Nationale de la Statistique et de la Démographie, ANSD*). This means that the probability of selecting a census district was proportional to the size of its population. In the second stage, 15 (plus five replacement) households were drawn randomly from each of the selected census districts: eleven urban clusters and 14 rural clusters, so that 165 urban and 210 rural households have been interviewed and were asked questions about all household members. Only if one or

more of the 15 selected households could not be located or refused to participate in the survey, one or more of the additionally selected households was interviewed. Overall, the readiness to participate was very high, only eleven households from the initial sampling list could not be interviewed and had to be replaced by additionally selected households.

Two teams of four to five enumerators including the head of the survey team plus a supervisor[5] travelled together to the neighborhoods and villages where the selected census districts were located. These enumerators had been selected and trained during a three-day enumerator training that was combined with a pre-test. Directly prior to the survey, all enumerators met again to discuss some organizational matters. The enumerators were subdivided into two teams. Upon arrival in a selected census district, the head of each survey team then showed each enumerator which households she or he had to survey plus one replacement household. In most cases, the supervisor accompanied this procedure and watched some of the interviews. Therefore, I am confident that the enumerators did not falsify any interviews. At least in the rural areas, there were no alternative activities an enumerator could do and an unfamiliar urban Senegalese waiting in a small village would surely have arisen some attention.

A standardized questionnaire was used to conduct the interviews with the household head or another adult household member. The questionnaire was in French and for most interviews, the enumerators translated it into the local languages, Wolof and Fulah.
Table 3 shows the distribution of the interviewed households. Altogether, information on 3,755 individuals was gathered. The mean household size thus amounts to ten persons. In the department Podor, however, the mean household size is clearly higher (11.4 persons). Similarly, the mean number of household members was lower for urban (9.4 persons) than for rural households (10.5 persons). Roughly half of all surveyed inhabitants are under the age of 20. In fact, the mean age of the surveyed population is 24.9 years.

Table 3. Households in the dataset.

|  | all households | persons total | urban households (%) | urban persons (%) |
|---|---|---|---|---|
| Saint-Louis | 120 | 1,152 | 75.0 | 79.0 |
| Dagana | 105 | 895 | 42.9 | 42.9 |
| Podor | 150 | 1,708 | 20.0 | 15.1 |
| region, total | 375 | 3,755 | 44.0 | 41.3 |

Source: Author's survey.

---

[5] The author and an assistant acted as supervisors during the field work. The head of the survey teams and all enumerators were recruited locally at Saint-Louis to ensure the knowledge of relevant local languages.

*Household composition*

In 64 of the 375 households, the (male) household head has more than one wife, and 13 thereof even have three wives. Actually, polygamy is much more widespread in the region than suggested by these figures. Newly-married women that still attend school at a different place do not always move to the husband's house immediately after marriage and are therefore not considered here. Additionally, in many households the oldest male member remains the household head even if younger members contribute more to the household income. In the dataset used for this paper, the mean age of all household heads is 55 years and 15 percent of all household heads are older than 70 years, so it is very likely that a non-negligible share of household heads has already lost one or more wives.

58.1 percent of the household heads in the survey were literate, as stated by the respondents. The enumerators did not assess the literacy of household members; they fully relied on the answers of the respondents. 34.9 percent of the heads belonged to the ethnic group Woulof and 51.6 percent to the ethnic group Fulah. 34.4 percent primarily worked in agriculture and 8.5 percent in livestock farming.

48 household members were not akin to the household head. Many respondents did not provide a clear reason why these individuals have joined the household, but schooling and search for employment were among the answers. For distant family members who have joined the household, economic reasons and the need to be looked after belonged to the answers given by respondents.

*Schooling*

As described above, compulsory formal education starts at age seven and lasts for six years. While many children enter a religious school at a very young age, formal school is typically started at about age seven or later, but 32 percent of the surveyed six-year-old children – mostly urban dwellers – already attended school.

The fact that the share of persons who have ever been to school is highest at age twelve highlights the extent of late enrollment. Figure 2 also illustrates that young people are much more likely to have been to school (or to be currently enrolled) than older cohorts.[6]

About two thirds of all children and youths aged seven to 18 were enrolled in formal schools at the time of the survey. Overall, the difference between boys and girls is almost negligible.

---

[6] Not long ago, births were not region-wide recorded and age or birthdays did not play an important role in society. Therefore, many people are not sure about their age and respondents tended to give round numbers. As a result, very few observations exist for some single ages. For example, only 22 observations for age 41 and twelve observations for age 57 are included in the dataset. This contrasts sharply to the 50 observations for age 50. Therefore, the single observation points in Figure 2 should not be given too much attention, they might be biased by rounding and estimation of age. The general relationship of age and school participation, should not be affected by this.

Table 4 shows, however, that while for young children, enrollment among girls is higher than among boys, girls tend to drop out of school before boys.

In the survey, the respondents were asked why their children aged seven to 18 had dropped out of school. For ten percent of the girls that had dropped out, the response option "not important for girls" was chosen. This illustrates the disadvantage of girls in completing school. In contrast, the same response option was only given in 2.6 percent of the cases to explain why a child of official school age was not enrolled in school at the time of the survey. Here, the need to "help the family" (14.8 percent) or "school too far" (22.6 percent) were more important reasons. Those who gave the latter answer on average lived nine kilometers away from the next primary school, far more than the sample mean.

Figure 2. Share of population that has ever been to school, by age.
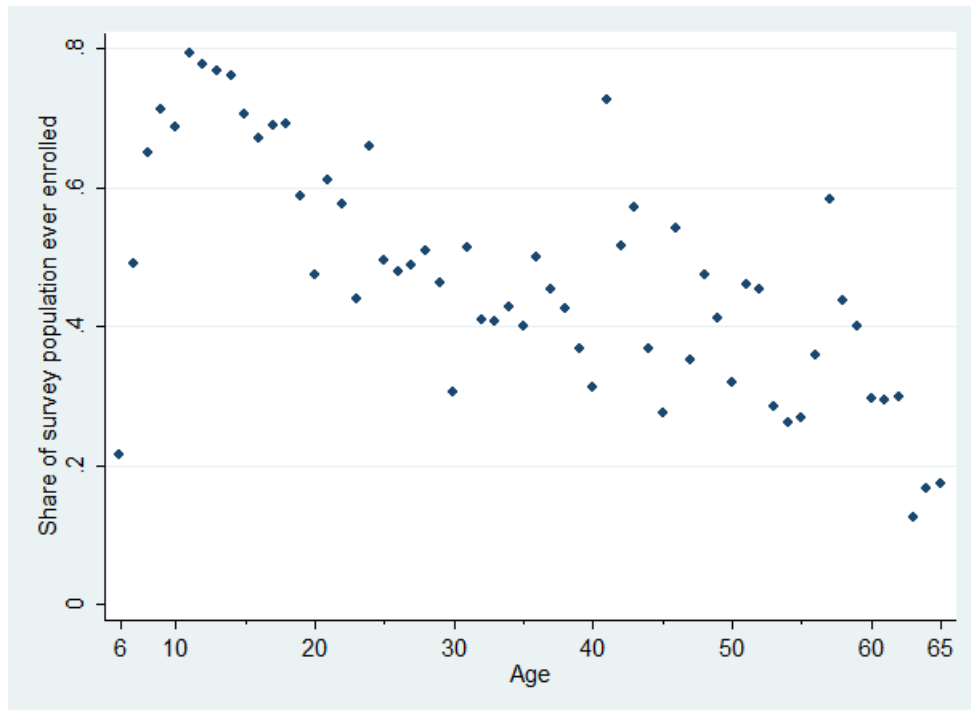


Source: Author's survey

As mentioned above, Koranic schooling is widespread in the region.[7] Of the sample, 27 children aged seven to 12 (4.6 percent) attend a full-time residential Koranic school. About the same number of younger children also attended this type of Koranic school.

---

[7] The explanation of different types of Koranic schools and different attendance schemes are beyond the scope of this paper and can be found elsewhere (e.g. André and Demonsant, 2012).

Table 4. Share of young persons enrolled in a formal school (by age group, in percent).

| age | total | boys | girls | urban |
|-----|-------|------|-------|-------|
| 7-12 | 71.26 | 67.92 | 74.58 | 86.19 |
| 13-18 | 60.67 | 61.98 | 59.42 | 74.75 |
| Total | 66.19 | 65.11 | 67.25 | 80.58 |

Source: Author's survey.

*Availability of schools*

Table 5 shows the share of households that live within five kilometers to the next school. As the first row of the table shows, 93 percent of households live close to a public primary school. For urban areas, no surveyed households lived further away from a primary school, but almost eleven percent of rural households do. Depending on the circumstances, even five kilometers are a very long distance for young children to walk on a daily basis and in some cases, walking might be impossible because of the Senegal River or its distributaries and the lack of bridges. Secondary schools are within geographic reach for most urban, but only for one third of rural households. While the rural-urban gap persists, the level of high school availability is even lower: Less than a quarter of all surveyed households live within five kilometers of a high school.

Table 5. Share of households with a school within five kilometers, by department.

| Region-wide | overall | urban | rural |
|-------------|---------|-------|-------|
| public primary school | 0.93 | 1.00 | 0.88 |
| secondary school | 0.63 | 1.00 | 0.34 |
| high school | 0.23 | 0.43 | 0.07 |
| **Saint-Louis** | | | |
| public primary school | 1.00 | 1.00 | 1.00 |
| secondary school | 0.99 | 1.00 | 0.97 |
| high school | 0.31 | 0.39 | 0.07 |
| **Dagana** | | | |
| public primary school | 0.97 | 1.00 | 0.95 |
| secondary school | 0.50 | 1.00 | 0.12 |
| high school | 0.28 | 0.44 | 0.15 |
| **Podor** | | | |
| public primary school | 0.85 | 1.00 | 0.82 |
| secondary school | 0.44 | 1.00 | 0.30 |
| high school | 0.13 | 0.53 | 0.03 |

Source: Author's survey.

*Summary statistics*

Since this paper examines the impact of primary and secondary school availability on primary school enrollment, the analysis is therefore limited to children of official primary

school age, i.e. seven to 12. Table 6 shows summary characteristics for this age group. By definition, the children on average lived in bigger households than the overall mean of ten percent found in the surveyed population. Using principal component analysis, an asset index was constructed as a proxy for household wealth. On average, the children lived in households with more than four children aged zero to ten. 65 percent of children belonged to households headed by a person without any formal education. Since for some surveyed children it was not possible to get information on the education of his or her mother, the highest education level of a female household member is included into the regression. Concerning the household head, some more variables are shown by Table 6: Two dummy variables indicating whether the main

Table 6. Summary statistics, children aged 7-12.

| | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| | | | | | |
| currently enrolled | 588 | 0.71 | 0.45 | 0 | 1 |
| age (in years) | 588 | 9.39 | 1.77 | 7 | 12 |
| sex (male=1) | 588 | 0.50 | 0.50 | 0 | 1 |
| father alive | 588 | 0.94 | 0.24 | 0 | 1 |
| mother alive | 588 | 0.96 | 0.20 | 0 | 1 |
| household size | 588 | 12.65 | 6.62 | 3 | 36 |
| no. of adult males in hh (age 18 +) | 588 | 2.91 | 2.24 | 0 | 11 |
| no. of adult females in hh (18+) | 588 | 3.17 | 2.12 | 0 | 14 |
| no. of children in hh (age 0-10) | 588 | 4.19 | 2.88 | 0 | 13 |
| education of hh head | | | | | |
|    primary schooling | 588 | 0.18 | 0.38 | 0 | 1 |
|    secondary or higher | 588 | 0.15 | 0.36 | 0 | 1 |
|    information missing | 588 | 0.02 | 0.12 | 0 | 1 |
| education of female hh member | | | | | |
|    primary schooling | 588 | 0.22 | 0.41 | 0 | 1 |
|    secondary or higher | 588 | 0.23 | 0.42 | 0 | 1 |
|    information missing | 588 | 0.01 | 0.07 | 0 | 1 |
| main occupation of hh head | | | | | |
|    agriculture | 588 | 0.45 | 0.50 | 0 | 1 |
|    livestock farming | 588 | 0.11 | 0.31 | 0 | 1 |
| ethnic group of hh head | | | | | |
|    Wolof | 588 | 0.30 | 0.46 | 0 | 1 |
|    Poular | 588 | 0.60 | 0.49 | 0 | 1 |
| wealth index | 588 | -0.19 | 2.34 | -3.60 | 6.47 |
| distance to primary school (in km) | 588 | 1.55 | 3.52 | 0.01 | 40.00 |
| distance to sec. school (in km) | 588 | 10.14 | 13.74 | 0.01 | 50.00 |
| urban | 588 | 0.36 | 0.48 | 0 | 1 |
| community employment share formal sector | 588 | 0. 08 | 0.08 | 0 | 0.26 |

Note: Household is abbreviated as "hh". Source: Author's survey.

occupation of the household head is engaged in agriculture or in livestock farming and two dummies that show the ethnic group. The community's share of the workforce employed in the formal sector is supposed to capture general heterogeneity across communities and different employment options.[8] The mean formal sector employment of 8 percent of the labor force is very low, but perfectly in line with other sources of data (Benjamin and Mbaye, 2012, and Walther, 2006).

Based on the variables presented here, the best regression models were selected and are presented in the next section.


## Regression results

A logistic regression model is used to analyze the impact of the availability of primary and secondary schooling on current primary school enrollment. The dependent variable is a dummy variable that takes a value of one if the person was currently enrolled at the time of the survey and zero otherwise.

The distance to the next primary and secondary school in kilometers are included into the regression. In an alternative specification, the logs of these variables are included. All children of official primary school age, that is aged seven to twelve are included into regression (1) and (2). Regressions (3) and (4) include older children – aged seven to 14 and ten to 14 respectively – who might still be enrolled in primary school because of late enrollment or grade repetition.

In addition to the school availability variables, explanatory variables contain information about each child and about its household and household head. The estimation results are presented by Table 7. Distance to the nearest secondary school is not statistically significant in any of the four regressions. In contrast, the odds ratio of distance to primary school is smaller than one and statistically significant at conventional levels in all specifications except when the log of distance is used. Regression (1) indicates that if the primary school is one kilometer further away from a child's place of residence, the child is one percent less likely to be enrolled in school. An increase in distance of one standard deviation would be associated with a decrease of the enrollment probability of 3.7 percent. The magnitude of the effect is only slightly higher for children aged seven to 14 or ten to 14 (regressions (3) and (4), where a one-standard-deviation increase in distance is related to a 4.5-percent-decrease on the enrollment probability. As the log specification and the different age groups do not have a major impact on the results, regression specification (1) will be used as the reference model.

---

[8]  _____

Table 7. Regression results, odds ratio.

| logit: currently enrolled | (1) age 7-12 | (2) age 7-12 | (3) age 7-14 | (4) age 10-14 |
|---|---|---|---|---|
| distance to primary school (km) | 0.937* | | 0.924** | 0.922** |
| | (0.032) | | (0.035) | (0.030) |
| distance to secondary school (km) | 1.020 | | 1.015 | 1.011 |
| | (0.015) | | (0.014) | (0.016) |
| log distance to primary school | | 0.833 | | |
| | | (0.094) | | |
| log distance to secondary school | | 1.150 | | |
| | | (0.195) | | |
| age | 4.602*** | 4.287** | 2.743*** | 2.120 |
| | (2.723) | (2.614) | (0.888) | (3.124) |
| age squared | 0.930** | 0.934** | 0.957*** | 0.969 |
| | (0.030) | (0.031) | (0.015) | (0.060) |
| sex (male=1) | 0.640 | 0.637* | 0.628** | 0.548** |
| | (0.179) | (0.171) | (0.143) | (0.134) |
| household size | 1.008 | 0.998 | 0.999 | 0.994 |
| | (0.043) | (0.039) | (0.036) | (0.038) |
| number of children in hh | 0.917 | 0.949 | 0.970 | 1.013 |
| | (0.107) | (0.101) | (0.096) | (0.093) |
| education of hh head/ female hh member | | | | |
|   head: primary schooling | 2.421** | 2.345** | 2.199** | 1.913 |
| | (1.021) | (0.967) | (0.763) | (0.831) |
|   head: secondary or higher schooling | 1.814 | 1.583 | 2.347 | 1.557 |
| | (1.197) | (1.067) | (1.505) | (1.169) |
|   female: primary schooling | 2.230** | 2.169** | 2.175** | 1.919* |
| | (0.807) | (0.750) | (0.697) | (0.712) |
|   female: sec. or higher schooling | 2.704* | 2.689* | 2.592** | 2.414** |
| | (1.478) | (1.461) | (1.208) | (0.986) |
| wealth index | 1.228** | 1.242** | 1.277*** | 1.319*** |
| | (0.119) | (0.110) | (0.111) | (0.112) |
| main occupation of hh head | | | | |
|   agriculture | 0.960 | 0.857 | 0.950 | 0.876 |
| | (0.345) | (0.291) | (0.309) | (0.311) |
|   stockfarming | 0.251** | 0.339** | 0.251** | 0.200*** |
| | (0.145) | (0.173) | (0.147) | (0.109) |
| urban | 0.891 | 0.971 | 0.773 | 0.615 |
| | (0.503) | (0.614) | (0.407) | (0.363) |
| employment share formal sector | 0.318 | 0.280 | 0.106 | 0.275 |
| | (0.866) | (0.806) | (0.300) | (0.991) |
| constant | 0.002** | 0.002** | 0.016** | 0.066 |
| | (0.004) | (0.005) | (0.027) | (0.570) |
| observations | 585 | 585 | 749 | 456 |
| pseudo R-squared | 0.196 | 0.196 | 0.199 | 0.194 |

Note: "hh" stands for "household". ***: p<0.01, **: p<0.05, *: p<0.1. Robust standard errors are given in parentheses. Source: Author's survey and calculations

Household wealth as measured by the asset index is clearly positively related to school enrollment. A dummy for urban residence is included into the regression, but the fact that it is not significant in the regression does not mean that urban residence is not associated with enrollment probability. Even though the wealth index was constructed so that items typically owned by rural households are also included, rural households are typically disadvantaged in asset index rankings compared to expenditure measures. Interpreting the coefficient of urban when the wealth index is included in the same regression equation would thus combine the true effect of urban residence and a potential urban advantage inherent to the wealth index.[9] As indicated by the descriptive statistics above, school availability and urban residence are clearly positively related, rural residence is often related to fewer facilities and larger distances to them.

Regarding the other variables in the model, primary education of the household head and the education of an adult female household member are positively related to primary school enrollment of children. Interestingly, the household head working primarily in agriculture has no effect on his children's school participation, but a head working in livestock farming is significantly related to a lower enrollment probability. During my field trips I had the impression that it was very important for parents to introduce their children into their professions. For livestock farmers that often follow their herds for several days, it might be harder to combine this informal form of training with schooling.

## Discussion

The analysis above has shown that there is a clear positive impact of the availability of a primary school within five kilometers on the probability of school enrollment of children of the relevant age group. In contrast, there is no significant effect of the availability of a secondary school on primary school enrollment was found. The central hypothesis, that the availability of secondary schools at or near the place of residence encourages primary schooling, can therefore not be confirmed. Does this mean that the personal prospect of attending a secondary school do not play a role when deciding whether or not a child should enter primary school?

This section tries to answer this question. It discusses several factors that might confound the association between primary school enrollment and the availability of primary and secondary schools. The discussion takes on several issues in turn:

First, the measurement of school availability is explained and consequences for the analysis are discussed. Travel time to the next secondary school is introduced as an alternative measure of school availability. Second, a joint regression analysis of all children aged seven to twelve might mask effects for specific subgroups. Third, I discuss whether household mobility might

---

[9] This problem and further issues regarding the use of an asset index as a measure of wealth are discussed in Filmer and Pritchett (2001).

reflect schooling preferences. Fourth, school fees and additional costs such as for transport and uniforms might affect enrollment. Fifth, further barriers to public secondary schooling might limit the impact of availability.

*Measurement of school availability*

The availability of schools is a key element in this study, so it needs to be measured as accurately as possible. So far, the construct of school availability has been operationalized as the distance to the nearest school. Every household respondent was asked about the existence of schools of different levels – public primary school, private primary school, public secondary school, and public high school. Additionally, he or she was asked about the typical travel time and distance to the nearest facility of each type. This method was preferred over recording the information at the cluster level by a community respondent for two reasons: First, some rural clusters extended over a large area. Distance to school as a cluster aggregate would therefore introduce some degree of measurement error. Second, several small villages or hamlets in Senegal are usually organized as a rural community (*communité rurale*), that is headed by a president. However, links to small or remote villages within the rural community are very limited and each village is headed by a village elderly who is the local authority. In this context, it is not clear whether the estimations of the distance of a small village to the nearest facilities made by the president of a rural community or the village elderly would be more accurate than the response of each household. Instead, asking each household yields more than one statement about the distances for each of the small villages, even if several villages constitute a cluster. Outliers and missing values were replaced by the community means.

For most urban areas, it was possible to collect additional information about the facilities that exist. Missing or implausible values were replaced with this information.

Table 8. Regression results (travel time to school), odds ratios.

| currently enrolled | (5) | (6) |
|---|---|---|
| | | |
| time to next primary | 1.002 | |
| time to next secondary | 1.006 | |
| community time to primary | | 0.967* |
| community time to secondary | | 1.002 |
| | | |
| individual characteristics | yes | yes |
| household characteristics | yes | yes |
| constant | 0.002 | 0.004** |
| observations | 323 | 585 |
| pseudo R-squared | 0.198 | 0.201 |

Note: Odds ratios.  ***: $p<0.01$, **: $p<0.05$, *: $p<0.1$.

Source: Author's survey and calculations

17

Because distance to the next schools does not exactly reflect the condition of the land, the same distance might require very different travelling time, depending on rivers, streets, etc. Therefore, I introduce an alternative measure, travel time, which might more precisely capture the costs incurred from commuting t a secondary school. Regression (5) in Table 8 includes all children of official primary school age where information on travel time to the next primary and secondary schools is provided whatever means of transport is typically used. In this specification, I do not find travel time to either a primary or a secondary school to have a significant impact on primary school enrollment.

There are some indications that the high amount of missing values might not be at random but might be correlated with school enrollment: Respondents are more likely to know how long it takes to get to the schools if some of their children are actually attending them.

Taking this into account, Regression (6) includes the mean travel time for households within the same cluster where all time designations corresponding to the most commonly used means of transport for each cluster were used. Even when school availability is measured by travel time, the main results hold: Secondary school availability does not have a significant impact on school enrollment of children aged seven to twelve. The further the next primary school is away, the less likely are children to attend it. The magnitude of the odds ratio now suggests that a ten-minute (i.e. slightly less than a one-standard-deviation change which corresponds to a change of 10.24 minutes) longer travel time implies a 5.3 percent lower enrollment probability.

*Heterogeneity across groups*

The previous regressions include all children of the relevant age group. The previous finding that neither distance nor travel time to secondary school matter for primary school enrollment might hide differences within the population. For some specific groups, secondary school availability might matter but the effect might be cancelled out by other subgroups for which it is not important. Table 9 therefore provides results of the estimation for some subgroups of children. While Regression (7) only includes children from the two poorest wealth quintiles, Regression (8) includes children from the two richest wealth quintiles. For the remaining two regressions, the sample is split according to place of residence: Regression (9) and (10) focus on urban and rural children, respectively. As can be seen, the odds ratio for distance to secondary school is significantly smaller than one for children from the 40 percent wealthiest households and for children living in urban areas, but not for poor and rural children. On average, for each kilometer the secondary school is further away, a child from the two highest wealth quintiles is 6.7 percent less likely to attend a primary school. As the standard deviation of distance to secondary school for this subgroup is 4.38, the effect is quite important: A one-standard-

deviation increase in distance would be associated to a 29.5 percent decrease in the enrollment probability. In contrast, for urban children, the standard deviation of distance to secondary school is only 0.56, so the magnitude of the negative effect of distance to secondary school on primary school enrollment is rather modest. For children in rural areas (see regression (10)), distance to secondary school is not significantly related to primary school enrollment. For these children, a one-standard-deviation increase in distance to the next primary school is related to a 5.3 percent lower enrollment probability.

Table 9. Regression results for sub groups related to wealth and place of residence.

|  | (7) quintiles 1-2 | (8) quintiles 4-5 | (9) urban | (10) rural |
|---|---|---|---|---|
| distance primary school (km) | 0.975 | 1.013 | 0.660 | 0.935* |
| distance sec.school (km) | 1.005 | 0.375*** | 0.486** | 1.023 |
|  |  |  |  |  |
| individual characteristics | yes | yes | yes | yes |
| household characteristics | yes | yes | yes | yes |
| constant | yes | yes | yes | yes |
| observations | 271 | 188 | 210 | 375 |
| pseudo R-squared | 0.220 | 0.291 | 0.228 | 0.173 |

Note: Odds ratios.  ***: p<0.01, **: p<0.05, *: p<0.1.  Source: Author's survey and calculations

*School availability as a reason for household mobility*

If families relocate to enable their children to attend schools, families more interested in the education of their children could move to areas where schools exist. This could have two consequences: On the one hand, distance to school might not only represent a barrier to education, but might also be correlated with the willingness of parents to send their children to school. On the other hand, parents might not think about the future schooling options of their children as long as they are still in primary school, because they could still move to a place with a secondary school when a child is finishing primary school.

These concerns can be moderated by looking at the survey data: 72.85 percent of household heads and 90.55 percent of young people aged seven to 18 live at their place of birth. This low willingness to relocate the whole household is reflected by another fact: 91.26 percent of all households and 98.06 percent of rural households own the house or hut that they occupy. School placement could also be endogenous, i.e., schools could be built where demand is highest. This does not seem to be the case in northern Senegal, where the regional administration can express their needs, but decisions on school constructions are made centrally in Dakar.

In contrast to this, the willingness to temporarily send family members away to live in a rented room, with relatives or friends, is high. Whether parents send away their children for educational reasons obviously depends on the mentality of parents, but also on their family links to urban areas. For many respondents it is very abstract to think of whether they have relatives or friends at a place with more school facilities who could temporarily host a child. Therefore, this information is not included in the dataset. However, 95 respondents (25.3 percent) stated during the survey that they had received cash or in-kind transfers from family members or friends during the year prior to the survey. This includes 32 recipient households (8.5 percent) that lived further than five kilometers away from the nearest secondary school. Information on the family relationship or the school availability of the relative or friend who supports the family is not available, but these households might at least have an advantage if they look for a host family for a child.

*Costs of schooling*

While public primary schools are officially free of charge, small registration fees and contribution to parents' associations often accrue as well as transportation costs. Transportation costs are implicitly captured by distance to school, but other costs have been ignored so far. In the survey, the average annual amount of these fees was 2,170 Franc CFA (about € 3.30) for students in public primary schools. For secondary school students (grade seven to grade ten), these fee amounted on average to 8,200 Franc CFA (about € 12.50). While these costs are already unfeasible for some families, especially if they have several children of school age, additional indirect costs often represent a bigger obstacle. On average, the respondents estimated the indirect costs – for uniforms, books, materials, transport, and room – of secondary schooling of their children who currently attended secondary school at 26,070 Franc CFA (€ 39.70) per year. Considering these costs, the availability of a secondary school in the proximity might not enable all families to send their children to a secondary school.

Indirect costs of schooling, especially opportunity costs, are hard to assess. Even though according to a survey from ANSD/ BIT (2007) one fifth of Senegalese children aged five to 17 has worked during the reference week, 82.8 of them did so at the family farm or enterprise without payment and the amount of work was very limited especially for younger children. Wage labor opportunities for young children seem to be very limited (ANSD/ BIT, 2007).

*Further barriers to secondary schooling*

The results of the nationwide exams at the end of grade six and the competition to enter secondary school determine whether a child is entitled to attend a public secondary school. Another prerequisite to enter a public secondary school is that a child is not older than 14 years (Agence de l'Informatique de l'Etat, 2005). Children can circumvent these two restrictions by

enrolling in a private secondary school, but these schools are not available region-wide and they charge fees.

If attendance of a private secondary school is not feasible, children have to pass the primary-school-leaving exam (*certificat de fin d'études élementaires, CFEE*) and pass the competition of secondary school entry if they intend to continue their school education. Therefore, the previous success rates in the primary school-leaving exam of the relevant primary school might affect the enrollment decision. In 2010, the overall CFEE success rate in Saint-Louis region was 69.95 percent (Fall, 2010) and varied widely across primary schools. Ten primary schools in the region even reached a success rate of 100 percent (Fall, 2010).

During my fieldwork, however, various conversations suggested that most parents are not aware of possible difficulties their children might face in getting a place in a public secondary school and how this might be related to the current primary school. This observation is supported by the finding that primary school quality does not affect attendance in northwestern Tanzania (Burke and Beegle, 2004). We are therefore confident that different CFEE success rates of primary schools might rather affect the choice of a specific primary school if more than one exists in the community than the decision whether or not to enroll in school.

This section has shown that the personal perspective to continue school beyond primary school might still be a driver of primary school enrollment. There are various reasons why the availability of a secondary school in the proximity of a child's place of residence might not reflect his or her actual chance of attending it.

For some subgroups, especially for children from more wealthy families, a larger distance to the next secondary school is significantly related to lower enrollment at primary school age. One possible explanation of this finding is that wealthier families might be more able to deal with the costs of and additional barriers to secondary schooling. For many poor families, secondary schools might remain largely inaccessible even if they are close to the place of living.

## Conclusion

The objective of this paper was to test the hypothesis that children living further away from secondary schools have a lower incentive to start primary school and are thus less likely to be enrolled. However, the empirical results in this article show that distance to secondary school does not matter on average for primary school enrollment in Senegal – in line with previous research by Filmer (2007). Nevertheless, there are various reasons why the personal prospects of attending a secondary school could still influence primary schooling decisions. Most

importantly, entrance barriers to secondary schools such as exams and costs not linked to geographical distance might prevent that the availability of secondary schools translates into greater primary school enrollment. Although there is no evidence for the average child, this paper finds a positive effect of secondary school availability on primary school enrollment for children from the two highest wealth quintiles. These relatively well-off households can best assess their children's perspectives to attend secondary school and deal with the costs.

Future research should analyze the possible impact of administrative and tuition fees and further costs of secondary schooling as well as of success rates of primary schools on primary school enrollment rates.

Taken together, the results of this paper suggest that reducing distance to secondary schools alone does not necessarily translate into increased school enrollment. More importantly, these schools have to be made more accessible by increasing school capacities. Rationing of places in secondary schools is likely to become more severe if capacities are not increased – taking into consideration the young and growing population (44 percent of all inhabitants are under age 15 and annual population growth is 2.7 percent) and the recent increases in primary school participation. Generally, there are two ways of increasing capacities: Expansion of capacities at existing schools or construction of new secondary schools. This paper gives (even though week) evidence that distance might also matter, leading to the construction of new secondary schools as the preferred policy measure. For the primary school level, Duflo (2001) found that the school expansion program in Indonesia increased schooling outcomes primarily by reducing the distance to school. Even though secondary school students are generally more able to deal with longer ways to school, nearby schools might still provoke some incentive to enroll.

As many teachers and headmasters are already complaining about the decrease in school quality and overcrowded school buildings, an attractive – but not inexpensive – alternative might be the expansion of vocational schools that teach more application-oriented skills. Today, these exist almost exclusively in urban centers and leave many students that cannot access a secondary school either because of distance, costs or age without any significant degree.

**References**

Adick, C. (2012). Bildung in Subsahara-Afrika, in: *Bildungsentwicklungen und Schulsysteme in Afrika, Asien, Lateinamerika und der Karibik*, editor : C. Adick, Münster, Germany: Waxmann.

Agence de l'informatique de l'Etat (2005). S'inscrire à l'examen d'entrée en sixième, République du Sénégal, Dakar :

http://www.demarches.gouv.sn/ressource.php?id_esp=1&th=&ss_th=&id_dem=50

ANSD and BIT (2007). Enquête nationale sur le travail des enfants - Sénégal, Rapport National d'analyses, Dakar: Agence Nationale de la Statistique et de la Démographie (ANSD) and Bureau International du Travail (BIT).

ANSD (2010). Situation économique    et sociale de la région de Saint-Louis de 2009. Dakar : Agence Nationale de la Statistique et de la Démographie, ANSD

André, P., and J.-L. Demonsant (2012). Koranic Schools in Senegal: A real barrier to formal education?, CEPS Working Paper No. 2012-34.

Au-Senegal.com (2012). http://www.au-senegal.com/carte-administrative-de-la-region-de-saint-louis,038.html?lang=fr (assessed March 14, 2013).

Benjamin, N. and A. A. Mbaye (2012). The Informal Sector in Francophone Africa: Firm Size, Productivity and Institutions, Washington, DC: Agence Française de Développement and The World Bank.

Bennel, P. (1996). Rates of Return to Education: Does the Conventional Pattern Prevail in sub-Saharan Africa? *World Development*, Vol. 24, No. 1, 183-199.

Bommier, A., and S. Lambert (2000). Education demand and age at school enrollment in Tanzania, *The Journal of Human Resources* 35 (1), 177-203.

Burke, K. and K. Beegle (2004). Why children aren't attending school: The case of northwestern Tanzania, *Journal of African Economies* 13 (2), 333-355.

Central Intelligence Agency, CIA (2012). The World Factbook - Senegal. https://www.cia.gov/library/publications/the-world-factbook/geos/sg.html    (assessed March 14, 2013).

Charlier, J.-E. (2002). Le retour de dieu: l'introduction de l'enseignement religieux dans l'école de la république laïque du Sénégal, *Education et sociétés* 2/2002 (no. 10), p. 95-111.

Colclough, C., P. Rose and M. Tembon (2000). Gender inequalities in primary schooling: the roles of poverty and adverse cultural practice, *International Journal of Educational Development* 20 (1), 5-27

Duflo, E. (2001). Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment, *American Economic Association* 91 (4), 795-813.

23

Engelhardt, M. (2009). Mit Koran und Konservendosen. Published in: taz.die tageszeitung. Berlin: 09.03.2009.

Fall, S. O. (2010). CFEE 2010:Un taux de réussite de 69,95 %. Published in: Le Soleil, Dakar: 26.07.2010.

Filmer, D., and L. Pritchett (2001). Estimating Wealth Effects Without Expenditure Data – or Tears: An Application to Educational Enrollments in States of India. *Demography* 38(1), 115-132.

Filmer, D. (2007). If you build it, will they come? School availability and school enrolment in 21 poor countries. *The Journal of Development Studies* 43(5), 901-928.

Foster, A. D., and M. R. Rosenzweig (1995). Learning by doing and learning from others: Human capital and technical change in agriculture, *Journal of Political Economy* 103(6), 1176-1209.

Glewwe, P. (1991). Schooling, Skills, and the Returns to Government Investment in Education. An Exploration Using Data from Ghana, LSMS Working Paper No. 76.

Glewwe, P. (1996). The relevance of standard estimates of rates of return to schooling for education policy: A critical assessment, *Journal of Development Economics* 51, 267-290.

Glewwe, P., and M. Kremer (2006). Schools, teachers, and educational outcomes in developing countries, in: *Handbook of the Economics of Education*, Vol. 2, editors: E. A. Hanushek and F. Welch, Elsevier: 945-1017.

Glick, P. and D. Sahn (2010). Early Academic Performance, Grade Repetition, and School Attainment in Senegal: A Panel Data Analysis, *The World Bank Economic Review* 24 (1), 93-120.

Goensch, I., and S. Graef (2011). Education for All and for Life? An Introduction into Primary School Education in Senegal. ZEU Discussion Paper No. 55. Giessen.

Heyneman, S. P. (2003). The history and problems in the making of education policy at the World Bank 1960-2000, *International Journal of Educational Development* 23 (3), 315-337.

Handa, S. (2002). Raising primary school enrolment in developing countries: The relative importance of supply and demand. *Journal of Development Economics* 69(1), 103-128.

Kadzamira, E., and P. Rose (2003). Can free primary education meet the needs or the poor?: evidence from Malawi. *International Journal of Educational Development* 23(5), 501-516.

Kuepie, M., C. J. Nordman, and F. Roubaud (2009): Education and earnings in urban West Africa, *Journal of Comparative Economics*, 37, issue 3, p. 491-515.

Lambert, S., M. Ravallion and D. van de Walle (2011). Is It What You Inherited or What You Learnt? Intergenerational Linkage and Interpersonal Inequality in Senegal. World Bank Policy Research Paper 5658, Washington, DC: The World Bank.

Lavy, V. (1996): School supply constraints and children's educational outcomes in rural Ghana. *Journal of Development Economics* 51(2), 291-314.

Michaelowa, K. (2001). Primary Education Quality in Francophone Sub-Saharan Africa: Determinants of Learning Achievement and Efficiency Considerations, *World Development* 29(10), 1699-1716.

Nordman, C., A.-S. Robilliard, and F. Roubaud (2011). Gender and ethnic earnings gaps in seven West African cities, *Labour Economics* 18, S132–S145.

Orazem, P. F. and E. M. King (2008). Schooling in developing countries: The roles of supply, demand and government policy, in: *Handbook of Development Economics*. Vol. 4, editors: T. Schultz and J. Strauss. Elsevier, 3475–3559.

Psacharopoulos, G. (1994). Returns to Investment in Education: A Global Update, *World Development* 22(9), 1325-1343.

Reimers, M. And S. Klasen (2013). Revisiting the Role of Education for Agricultural Productivity, *American Journal of Agricultural Economics*, 95, issue 1, 131-152.

Schultz T.P. (2004), Evidence of Returns to Schooling in Africa from Household Surveys: Monitoring and Restructuring the Market for Education. *Journal of African Economies* 13, AERC Supplement, ii95-ii148

Siphambe, H. K. (2000). Rates of return to education in Botswana, *Economics of Education Review* 19: 291–300.

UNESCO International Bureau of Education (2010). World Data on Education , 7th edition, 2010/11, Senegal. UNESCO-International Bureau of Education. http://www.ibe.unesco.org/fileadmin/user_upload/Publications/WDE/2010/pdf-versions/Senegal.pdf (assessed March 14, 2013).

UNESCO Institute for Statistics (2010). Statistics in Brief, http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=121&IF_Language=en&BR_Country=6860 (assessed March 14, 2013).

UNESCO (2011). EFA Global Monitoring Report 2010: Reaching the marginalized. Paris: UNESCO Publishing.

UNICEF (2010). Country statistics: Senegal. http://www.unicef.org/infobycountry/senegal_statistics.html (assessed March 14, 2013).

UNDP (2012). Human Development Report 2011. New York: Palgrave Macmillan.

Walther, R. (2006). Vocational Training in the Informal Sector, Report on the Senegal Field Survey, AFD Working Paper No. 21, Paris.

# Bisherige Veröffentlichungen in der Discussion-Papers-Reihe

No. 1  HERRMANN, R., KRAMB, M. C., MÖNNICH, Ch. (12.2000): Tariff Rate Quotas and the Economic Impacts of Agricultural Trade Liberalization in the WTO. (etwas revidierte Fassung erschienen in: "International Advances in Economic Research", Vol. 7 (2001), Nr. 1, S. 1-19.)

No. 2  BOHNET, A., SCHRATZENSTALLER, M. (01.2001): Der Einfluss der Globalisierung auf staatliche Handlungsspielräume und die Zielverwirklichungsmöglichkeiten gesellschaftlicher Gruppen.
(erschienen in: "List-Forum für Wirtschafts- und Finanzpolitik", Bd. 27(2001), H. 1, S. 1-21.)

No. 3  KRAMB, M. C. (03.2001): Die Entscheidungen des "Dispute Settlement"-Verfahrens der WTO im Hormonstreit zwischen der EU und den USA – Implikationen für den zukünftigen Umgang mit dem SPS-Abkommen.
(überarbeitete Fassung erschienen in: "Agrarwirtschaft", Jg. 50, H. 3, S. 153-157.)

No. 4  CHEN, J., GEMMER, M., TONG, J., KING, L., METZLER, M. (08.2001): Visualisation of Historical Flood and Drought Information (1100-1940) for the Middle Reaches of the Yangtze River Valley, P.R. China.
(erschienen in: Wu et al. (eds) Flood Defence '2002, Beijing, New York 2002, pp. 802-808.)

No. 5  SCHROETER, Ch. (11.2001): Consumer Attitudes towards Food Safety Risks Associated with Meat Processing.
(geänderte und gekürzte Fassung ist erschienen unter Christiane SCHROETER, Karen P. PENNER, John A. FOX unter dem Titel "Consumer Perceptions of Three Food Safety Interventions Related to Meat Processing" in "Dairy, Food and Environmental Sanitation", Vol. 21, No. 7, S. 570-581.)

No. 6  MÖNNICH, Ch. (12.2001): Zollkontingente im Agrarsektor: Wie viel Liberalisierungsfortschritt? Ergebnisse und Diskussion einer Auswertung der EU-Daten.
(gekürzte Fassung erschienen in BROCKMEIER, M., ISERMEYER, F., von CRAMON-TAUBADEL, S. (Hrsg.), Liberalisierung des Weltagrarhandels - Strategien und Konsequenzen. "Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues e.V.", Bd. 37(2002), S. 51-59.)

No. 7  RUBIOLO, M. (01.2002): EU and Latin America: Biregionalism in a Globalizing World?

No. 8  GAST, M. (02.2002): Zollkontingente bei US-amerikanischen Käseimporten. (gekürzte Fassung erschienen in: "Agrarwirtschaft", Jg. 51, H. 4, S. 192-202.)

No. 9  BISCHOFF, I. (08.2002): Efficiency-enhancing Effects of Private and Collective Enterprises in Transitional China.

No. 10  KÖTSCHAU, K. M., PAWLOWSKI, I., SCHMITZ, P. M. (01.2003): Die Policy Analysis Matrix (PAM) als Instrument zur Messung von Wettbewerbsfähigkeit und Politikeinfluss - Zwischen Theorie und Praxis: Das Fallbeispiel einer ukrainischen Molkerei.

No. 11  HERRMANN, R., MÖSER A. (06.2003): Price Variability or Rigidity in the Food-retailing Sector? Theoretical Analysis and Evidence from German Scanner Data.

No. 12  TROUCHINE, A. (07.2003): Trinkwasserversorgung und Armut in Kasachstan: Aktueller Zustand und Wechselwirkungen.

No. 13  WANG, R.; GIESE, E.; GAO, Q. (08.2003): Seespiegelschwankungen des Bosten-Sees (VR China).

No. 14  BECKER, S.; GEMMER, M.; JIANG, T.; KE, CH.. (08.2003): 20th Century Precipitation Trends in the Yangtze River Catchment.

No. 15  GEMMER, M.; BECKER, S.; JIANG, T (11. 2003): Detection and Visualisation of Climate Trends in China.

No. 16  MÖNNICH, Ch. (12.2003): Tariff Rate Quotas: Does Administration Matter?

No. 17  GIESE, E.; MOßIG. I. (03.2004) Klimawandel in Zentralasien

No. 18  GIESE, E.; SEHRING, J. TROUCHINE, A. (05.2004) Zwischenstaatliche Wassernutzungskonflikte in Zentralasien

No. 19  DIKICH, A. N. (09.2004) Gletscherwasserressourcen der Issyk-Kul-Region (Kirgistan), ihr gegenwärtiger und zukünftiger Zustand

No. 20  CHRISTIANSEN, Th.; SCHÖNER, U. (11.2004) Irrigation Areas and Irrigation Water Consumption in the Upper Ili Catchment, NW-China

Stand: 30. April 2013

Die Diskussionsbeiträge können auf der Homepage des ZEU
http://www.uni-giessen.de/zeu
im Menü „Forschung", „Veröffentlichungen" kostenlos heruntergeladen werden.