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The Surprisingly Dire Situation of Children's Education in Rural West Africa

Results from the CREO Study in Guinea-Bissau (Comprehensive Review of Education Outcomes)

Peter Boone, Ila Fazzio, Kameshwari Jandhyala, Chitra Jayanty, Gangadhar Jayanty, Simon Johnson, Vimala Ramachandran, Filipa Silva, and Zhaoguo Zhan

8.1 Introduction

Despite declining global poverty, there are many regions of the world where poverty remains widespread and chronic (Young 2012). Children grow up in these regions with poor health, and their prospects are harmed by poor education (Boone and Johnson 2009). The right of every child to

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Authors' roles: Peter Boone conceived the study, participated in the design of the survey, analyzed results, coauthored this chapter, and raised the financing for the survey. Ila Fazzio conceived the study, lead the design of the survey, lead the training and management of field work teams, analyzed results and coauthored this chapter. Kameshwari Jandhyala advised on study design, surveys, and implementation, and coauthored this chapter. Chitra Jayanty conceived the study, participated in the design of the survey, supervised the implementation of the project, and coauthored this chapter. Gangadhar Jayanty conceived the study, participated in implementation of the project, and coauthored this chapter. Filipa Silva participated in the design of the survey, trained and supervized the field work teams, and coauthored this

primary school education is one of the Millennium Development Goals for 2015, yet in many of the most extreme "pockets of poverty" little is being done to address these issues.

However, in order to understand the extent of problems and potential solutions, we need a good understanding of the current conditions. Statistics from very poor regions are generally unsatisfactory for this purpose (Jerven 2013). Often statistics are biased or missing because authorities have incentives to paint a rosy picture, or they simply do not make the effort or allocate resources to measure. Even when good statistics are available, the measures usually cover service provision (such as the level of school enrolment), rather than the desired outcome (indicators of educational and skills levels achieved).

In this chapter, we report on a unique survey that was conducted in 2010 in rural villages and schools of Guinea-Bissau, in West Africa. Guinea-Bissau is one of the poorest nations of the world, ranking 192 on income per capita, at $600 per person (World Bank 2012). The United Nations Education, Scientific and Cultural Organization (UNESCO) reports the national adult literacy rate is 54.2 percent, while 72 percent of Guinea-Bissau's youth ages fifteen to twenty-four are literate. The net primary school enrolment ratio is 73 percent. These figures represent national averages, but our work suggests they mask extremely poor educational outcomes in rural regions.[1] (See figure 8.1.)

One goal of the CREO (Comprehensive Review of Education Outcomes) survey was to provide an accurate, comprehensive overview of children's learning outcomes and the relation of these to school quality, parental care, and socioeconomic variables. We are not aware of any other similarly comprehensive, integrated surveys of schools, households, caregivers, and children in such poor regions of West Africa.[2] Our analysis is based on surveys from 202 villages (approximately 20 percent of the population) with interviews from 3,968 households. We interviewed 8,782 parents, and analyzed numeracy and literacy tests for 9,947 children ages seven to seventeen. We

chapter. Simon Johnson conceived the study, analyzed results, coauthored this chapter, and raised financing for the survey. Vimala Ramachandran advised on study design, surveys, and implementation, and coauthored this chapter. Zhaoguo Zhan carried out statistical analysis and coauthored this chapter.

1. The UNESCO defines literacy as "The ability to read and write with understanding a simple statement related to one's daily life. It includes a continuum of reading and writing skills, and often includes basic arithmetic skills."

Our survey population represents approximately 25 percent of the country's population. If youth literacy rates in urban areas were approximately 90 percent, then the UNESCO data could be consistent with our data. We have not surveyed urban areas; however, our experience suggests literacy rates would be substantially lower than 90 percent, but well above the rural rates reported here.

2. Demographic and Health Surveys (DHS) cover important socioeconomic variables. This survey allows us to identify children's outcomes with their respective schools, villages, and parents, thus permitting us to examine richer correlations. Since this is a survey, we cannot make causal interpretations based on these correlations.

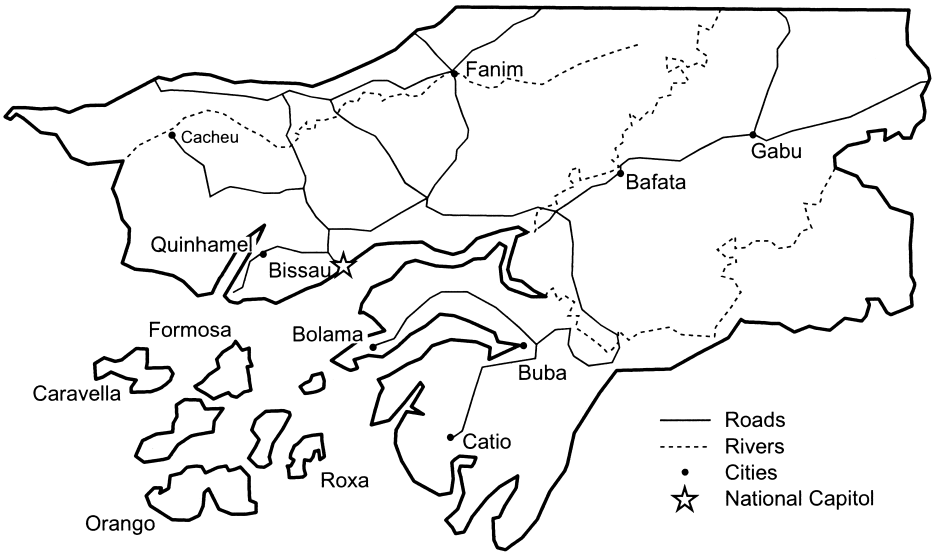

Fig. 8.1 Map of Guinea-Bissau

asked children which schools they attended, and then visited 351 schools and interviewed 781 teachers. We checked whether schools were operating, measured attendance compared to enrolment, and surveyed school materials.

The results of the survey present a bleak picture of educational resources and outcomes in rural Guinea-Bissau. According to the national curriculum, by third grade (children age nine) children should be able to read and comprehend a story, and complete the simple math test we used (see section 8.3.3). We found that 81 percent of ten-year-olds could not sum two single-digit numbers, and 91 percent could not read single words. Among the 1,169 ten-year-olds with test results, we found only one child who was capable of completing both the numeracy and literacy tests.

Why are these results so poor? While survey responses should be taken with caution since they may not reflect actions, our "demand" indicators suggest parents have a strong desire to send their children to good schools. Over 98 percent of household heads reported they would be willing to pay an average 20 percent of monthly income for school fees for each of their school-aged children if good schooling would be provided. In our spot checks of schools, we found 72 percent of enrolled children at the school. Attendance rates are probably boosted by functioning school lunch programs. The fact that children attend schools despite poor outcomes, and the reported willingness to pay for schooling, suggest additional interventions that target attendance, such as conditional transfers implemented in Mexico, are probably not of primary importance to improve educational outcomes (Kremer 2003; Schultz 2004).

On the supply side, given the poor test results, it is surprising to learn that 86 percent of schools were open and roughly three-quarters of enrolled children were attending when we conducted spot checks. The teachers reported substantial experience and some training. However, very few schools have adequate text books, and many teachers had a poor grasp of spoken Portuguese.

Guinea-Bissau has many local languages. The most widely spoken language is a mix of Portuguese, the national language, and local dialects called "Kriol." The only spoken language with a written script is Portuguese. Our numeracy tests (apart from number recognition) were simple math questions written on paper, and instructions were given verbally in the local language, so children did not need to know Portuguese in order to succeed in the test. Instructions for literacy tests were given in the child's local language, but children were tested on reading and comprehension of Portuguese.

An important goal of our project was to find "examples of success" with the aim of using these to better understand how projects to improve education can be developed. We anticipated that we could find individual schools or villages where education levels were high, and lessons could be learned from these. Unfortunately, we found only six schools (with more than ten pupils) where average scores implied students could read a paragraph. For the numeracy tests, there were no schools where the average student could multiply or divide.

These survey results provide a comprehensive picture of a dysfunctional school system. The reasons for the poor functioning are numerous. However, we believe the evidence points to a strong latent demand for education in these villages that remains unsatisfied due to the very poor quality of existing teaching and schools' organization. While there are many steps that could be taken to make schools function better (Ramachandran 2003; Kremer and Holla 2009), it is important to understand which should be prioritized in regions such as Guinea-Bissau.

The public sector cannot be relied on to provide regular services due to political instability, institutional capacity, and a political system that does not serve the very poor. Private-sector provision of schooling in these villages is not profitable enough to generate activities due to low-income levels. The difficult logistics of finding trained teachers, gaining finances, securing materials, and supervising performance makes it daunting for individual villages to improve schools on their own for a sustained period. Similar problems plague non-governmental organizations (NGOs) and foreign donors who attempt to improve school outcomes. To some extent, when faced with the choice of attempting to build and maintain effective schools, or waiting to learn whether the existing public schools might get better, many villages choose to wait and hope.

The result is that one more generation of children is growing up without even basic numeracy and literacy skills.

8.2 Methods

8.2.1 Survey Location and Eligible Population

When the survey was conducted, the last published census in Guinea-Bissau dated from 1991. We compiled a list of 913 potentially eligible villages from the census based on demographic estimates of whether they were likely to have a population between 200 and 1,000 in 2010. We then randomly ordered these villages numbering them from 1 to 913.[3] Field workers then visited each village and interviewed village leaders to learn the estimated true population of the village. Village and household-level surveys were completed from December 2009 until the end of the academic year in 2010. Some delays in implementation and data checking were caused by security concerns during and after the survey was completed.

A village was eligible for the survey if the village leaders agreed to the interview and survey, and if the population was estimated to be between 200 and 1,000 during the field worker's visit with a minimum of twenty households, and it was accessible by land during the dry season. From the list of 913 villages, we visited villages sequentially with a target of 200 villages. The teams visited 411 villages; however, 209 of these were ineligible due to the number of households, or population, being above or below eligibility thresholds. Ultimately, surveys covering 202 villages were completed and reported here in the analysis.[4] Village elders were interviewed to complete baseline data on villages.

There are no maps of households in villages. We selected households for interviews according to systematic sampling (Luman et al. 2007). This sampling methodology generates an average of twenty households per village, independent of the size of the village.[5]

3. The randomization was conducted in ACCESS, assigning each village a unique number using a random number generator. Villages were then ordered sequentially according to assigned numbers. The first 202 eligible villages from this ordering are reported here.

4. We planned to complete 200 villages before the end of the 2009/10 school year. The teams kept working to complete their last village once the 200 total had been achieved.

5. The system used to select houses was derived from the SystRS methodology, which was developed to be an easy but representative way of randomly selecting households when there is no sampling frame. An estimate of the number of households in the village is made, and then a "skipping interval" is calculated by dividing the total houses by twenty. To establish the "starting" point of the "random walk," supervisors asked a senior member of the community to take them to two opposite edges of the village, preferably along the longest axis in the village (i.e., the two most distant houses in the village). These were the starting points for two interviewers. The interviewers then picked a random number between 0 and the "skipping interval" to determine the first house to visit. They then walked in a line counting houses until they reached this starting number. That would be the first house to interview. They then walked toward the village center in a serpentine way, enumerating houses according to the calculated skipping interval. If they did not enumerate a minimum of twenty houses using the interval system, they would walk back toward the edge and enumerate houses that had not been enumerated until they reached twenty.

A household was eligible for inclusion if they were in an eligible village, they were selected by systematic sampling, they had at least one eligible child, and the household head agreed to be interviewed. We conducted an initial interview with a household head to determine characteristics of the household, and the eligible children in the household.

A child was eligible if she lived in an eligible house, she was age seven to seventeen years, she was available on the day of the survey visit, and she had at least one eligible caregiver who was available to interview on the day of the visit. We interviewed each child and conducted literacy and numeracy tests. We also interviewed all the child's available caregivers.

When we surveyed villages, we listed all Portuguese-language schools in the region. There are Koranic schools in these regions where Portuguese is not taught; however, we did not visit these as they do not teach the national curriculum, and nearly all such children were also enrolled in a Portuguese-language school. We then visited all schools that children reported they were enrolled at (during our child interviews). We sought permission from head teachers to survey schools and conduct teacher interviews. We interviewed every teacher who was available on the day of interview if they taught any grades 1 to 4.

We sought permission to interview from village leaders, head teachers, household heads, and each participant. All villages and schools agreed to be included in the study. Only one household head refused to permit interviews. In the remaining households, all children and caregivers agreed to be interviewed.

8.2.2 Main Outcome: Test Scores

The primary outcome measure for the survey is test score results from literacy and numeracy tests given to eligible children. In our initial field work we recognized that a wide range of outcomes was possible, but that a substantial fraction of the population would likely score poorly on common international tests, so we needed a test that was more sensitive at discriminating at poorer levels of education. We chose to modify the ASER tests developed by Pratham, a large Indian NGO that specializes in educational outcome tests in India, to suit the environment in Guinea Bissau. We conducted multiple field tests in villages prior to the survey.

The literacy test was implemented as follows: The test starts at a medium-level task where children are asked to read a sentence. If they were able to read at least two of the four sentences offered, they would be asked about the meaning of some underlined words and also asked (in local language) two questions about the comprehension of these sentences. If a child was able to read sentences they would be offered to read a story, and tested on comprehension of the story. A child who was not able to read a sentence would be offered mono- and dissyllabic words to read. Children who were not able to correctly read four out of five words were then asked to recognize

letters. A child got the highest possible mark (a score of eight) if they could read and comprehend a short story, while they received zero if they could not read monosyllabic words.

The numeracy tests are designed similarly, starting with addition of two single-digit numbers without carrying forward. If a child was able to solve correctly at least one sum, they would be offered to solve subtraction with borrowing, followed by multiplication, simple division, and inexact division. A child got the highest possible mark if they could answer all questions correctly. If they could not complete the initial addition questions, they were asked if they could recognize two-digit and single-digit numbers. A child scored zero if they could not recognize single-digit numbers.

The interviewers conducted the tests in languages that were convenient for the child. However, since local languages are not written, and the national curriculum teaches children to read in Portuguese, we tested children's ability to read and comprehend Portuguese.

We also conducted background surveys to help interpret the reasons behind test score results. We interviewed caregivers to learn their socioeconomic status as well as attitudes toward schooling for their children. We also conducted a survey to measure the quality of school facilities, and we interviewed teachers to learn their overall training and work conditions. Our school interviews also provided spot checks to learn if schools were functioning, and they measured attendance.

8.2.3 Data Collection and Management

An initial team of ten people and ten vehicles traveled and located eligible villages based on the 1991 census. They sought consent from village leaders, recorded the GPS location of the village, determined the estimated current size of the village, and recorded the schools that children resident in the village attended.

The remaining survey data collection was managed by five teams of three people, including one supervisor for each team. These teams completed the household and child surveys, as well as implementing child numeracy and literacy tests. They first sought permission to conduct the survey from the head of the household. If permission was granted, and if there was an eligible child, they proceeded to complete the survey. They sought interviews with all caregivers for eligible children in the household. The field workers would typically stay in a village three days, and they were trained to repeatedly seek out interviews with caregivers and children until all eligible children and caregivers had been reached. When conducting tests, children were asked to step away from their friends and other onlookers to complete the test. All surveys and discussion were completed in a local language. For the numeracy tests, children were asked to answer written questions. If the child could sum two digits correctly, we proceeded to harder questions. Hence, to pass the numeracy tests, children did not need to speak any Portu-

guese.[6] Instructions for literacy were stated in local languages; however, the words and stories used in the test were in Portuguese.

The schools survey was completed by our survey supervisors during the village visits. Supervisors made several attempts to visit schools during hours when they should be open, and if schools were functioning, they sought the head teacher's approval to conduct the survey. They examined the official enrollment data at the school, and they visited classrooms to count the number of children actually attending along with textbooks available.

During each village survey, supervisors double-checked survey forms and errors were corrected at that time. Four data entry personnel conducted double-blind data entry. A supervisor was responsible for correcting errors found when checking double-blind entry. If needed, we attempted to revisit interviewees to correct any errors found during data entry. Due to political uncertainty before and after the survey, some data correction had to be delayed for security reasons and this slowed the completion of data analysis; however, such corrections were very minor.

8.2.4 Sample Size

The survey was designed to cover a national footprint and provide adequate power to learn the importance of covariates. We were limited by access to good quality vehicles and needed to complete the study within a school year. We were also limited by political upheaval, which delayed implementation of the survey due to security concerns. By surveying approximately 200 villages with 10,000 children tested, we have a well-powered data set to examine correlations between test outcomes and other variables.

8.3 Results

8.3.1 Population Covered

The analysis is based on outcomes for the 202 surveyed villages, including 3,968 household surveys, 4,907 female caregiver surveys, and 3,875 male caregiver surveys. In total we found 19,776 children age birth to seventeen living in these households, of which 10,014 were age seven to seventeen and eligible for our literacy and numeracy tests. We managed to complete surveys, as well as numeracy and literacy tests, and so base the analysis on 9,947 of these children (table 8.1).

6. If a child could not add two single-digit numbers, then the test reverted to checking if they could recognize single- and double-digit numbers. They were required to respond verbally in Portuguese to this number recognition test. So a child that spoke no Portuguese, and could not add two single digits in a written test, would score zero. A child that could add single digits in a written test was presumed to be able to recognize numbers and received no verbal test.

8.3.2 Characteristics of Villages and Households

Table 8.2 shows average population of villages is 458 people. The average household size is ten persons. Our survey of twenty households covers 40 percent of an average village. Fifty-four percent of the villages had a school in the village, and when there was no school, the average walking time to the nearest school used by villagers was thirty minutes. On average villages were ninety-seven minutes from the nearest road with regular transport, and six hours walking distance from a village with a secondary school. The World Food Program provides school lunches across the nation, and 46 percent of the villages in our survey reported children had access to these meals within the village.

None of the villages in the survey had access to publicly provided electricity. Seven percent of households report they have their own generator, and six percent have televisions. Battery-operated radios are common, with three-quarters of households reporting they have one. For transportation, two-thirds of households had bicycles, and only 7 percent have motorbikes.

Table 8.1 Population surveyed and analyzed

	Persons or units
Eligible villages	913
Randomly selected villages	202
Households	3,968
Female caregivers	4,907
Male caregiver	3,875
Children in households:	19,776
of which age 7–17	10,014
of which fully completed interviews and tests	9,947
Schools used by the children	351
of which: were open to be assessed	303
Teachers present and interviewed	781

Table 8.2 Characteristics of villages

	Units	Average of sample	Standard deviation	Min.	Max.
Average population	N	458	230	200	1,000
Walking distance to nearest school	Minutes				
Is there a school in the village?	1 = Yes, 0 = No				
Is there a meals program in the village?	1 = Yes, 0 = No	0.460	0.50	0	1
Walking distance to nearest road with regular transport	Minutes	97	80	3	600
Walking distance to nearest village with secondary school	Minutes	363	483	0	2,880

Note: Observations are excluded where data is missing or not answered unless otherwise reported.

The self-reported total monthly income was CFA 44,292 ($88.11 at the average exchange rate of 502.71 CFA/USD during the survey), equalling roughly $9 per person in the household.

In table 8.3 we report questions related to attitudes of the household leader to education. Nearly 100 percent of respondents said they would be willing to pay extra money to add and improve education for their boys and

Table 8.3 Characteristics of households

	Units	Average of sample	Standard deviation	Min.	Max.
How many people in household?	N	9.68	5.17	2	47
How many rooms in the house?	N	4.71	2.25	1	14
Does your house have?	1 = Yes, 0 = No			0	1
Generator		0.07	0.255	0	1
Television		0.061	0.24	0	1
Radio		0.749	0.433	0	1
Mobile		0.04	0.197	0	1
Table		0.282	0.451	0	1
Motorbike		0.067	0.25	0	1
Bicycle		0.677	0.468	0	1
Watch/clock		0.618	0.486	0	1
Total monthly income of all members	FCF	44,292	34,053	0	420,000
Any person in the house who can read or write?	1 = Yes, 0 = No	0.614	0.487	0	1
Would you be willing to pay extra to have a son get schooling?	1 = Yes, 0 = No	0.995	0.069	0	1
If so, how much per year?	FCF	8,308	7,892	0	180,000
Would you be willing to pay extra to have a daughter get schooling?	1 = Yes, 0 = No	0.994	0.079	0	1
If so, how much per year?	FCF	8,171	7,814	0	180,000
Main reasons that boys stop schooling	1 = Yes, 0 = No				
School isn't available nearby		0.371	0.483	0	1
Needs to earn money		0.27	0.444	0	1
Gets married		0.389	0.487	0	1
Helps at home		0.382	0.486	0	1
Avoid enticement away from family morals		0.091	0.288	0	1
Family can't afford it		0.471	0.499	0	1
Main reasons that girls stop schooling	1 = Yes, 0 = No				
School isn't available nearby		0.314	0.464	0	1
Needs to earn money		0.069	0.254	0	1
Gets married		0.731	0.444	0	1
Helps at home		0.217	0.412	0	1
Avoid enticement away from family morals		0.121	0.326	0	1
Family can't afford it		0.318	0.466	0	1
She becomes pregnant		0.527	0.499	0	1

Note: Observations are excluded where data is missing or not answered unless otherwise reported.

Table 8.4 Characteristics of parents/caregivers

	Units	Average of sample	Standard deviation	Min.	Max.
Female caregiver (4,907 respondents)					
Age	Years	38.51	12.1	15	90
Ethnic background	1 = Yes, 0 = No				
Balanta		0.258	0.438	0	1
Fula		0.414	0.493	0	1
Mandinga		0.151	0.358	0	1
Other		0.177	0.381	0	1
Religion					
Animist		0.301	0.459	0	1
Muslim		0.619	0.486	0	1
Christian		0.046	0.209	0	1
Other		0.034	0.181	0	1
Claims knows how to read and write and	1 = Yes,	0.0569	0.232	0	1
was able to pass a literacy test	0 = No	0.0273	0.163	0	1
Attained a school level of at least grade 1	1 = Yes, 0 = No	0.0913	0.288	0	1
Male caregiver (3,875 respondents)					
Age		47.50	14.1	17	100
Claims knows how to read and write and	1 = Yes,	0.358	0.517	0	1
was able to pass a literacy test	0 = No	0.239	0.427	0	1
Attained a school level of at least grade 1	1 = Yes, 0 = No	0.404	0.491	0	1

Note: Observations are excluded where data is missing or not answered unless otherwise reported.

girls. There was no indication of gender bias. They reported they would be willing to spend 18 percent of their monthly income.[7]

When asked the reasons for why children stop going to school, the most common reported reason for girls was marriage (73 percent of respondents), pregnancy (53 percent), and lack of a nearby school (37 percent). Since girls in these villages tend to marry soon after puberty, the findings suggest girls would stay at school until their early teens. For boys, the most common reason to stop school was that the family cannot afford it (47 percent), followed by getting married, needing to help at home, and lack of a nearby school (37–39 percent). Very few respondents reported moral concerns regarding the schooling of girls or boys.

8.3.3 Characteristics of Caregivers and Children

Tables 8.4 and 8.5 present findings for caregivers and children. The tribal and religious breakdown of women and men (not shown) was similar and

7. The IMF estimates GDP per capita in 2010 was $42 per month, which would include household income and other factor incomes. These rural villages should be substantially poorer than the average population as our data implies.

Table 8.5 Characteristics of children

	Units	Average of sample	Standard deviation	Min.	Max.
Age					
Sex	1 = Girl, 0 = Boy	0.526		0	1
Languages at home					
Kriol		0.577	0.491	0	1
Portuguese		0.001	0.041	0	1
Other		0.421	0.497	0	1
Does she speak/understand Kriol a little or fluently at interview?	1 = Yes, 0 = No	0.748		0	1
Ever attended pre-school?	1 = Yes, 0 = No	0.057	0.231	0	1
Ever attended a school?	1 = Yes, 0 = No	0.845	0.362	0	1
Attending a school at time of interview?	1 = Yes, 0 = No	0.703	0.457	0	1
What type of school does she attend (can be none, or more than one for each child)?	1 = Yes, 0 = No			0	1
Public		0.413	0.492	0	1
Community		0.238	0.425	0	1
Private		0.026	0.158	0	1
Missionary		0.027	0.163	0	1
Koranic		0.217	0.163	0	1
What languages do they speak at school?					
Portuguese		0.752	0.432	0	1
Creole		0.899	0.301	0	1

Note: Observations are excluded where data is missing or not answered unless otherwise reported.

matches national figures, with approximately three-fifths of the population reported as Muslim, and 30 percent animist.

Six percent of female caregivers reported they could read, but less than half of these were able to read a simple sentence when presented with a literacy test. Thirty-six percent of men claimed to be able to read, but we found one-third of these could not read a simple sentence, leaving 24 percent of interviewed men who claimed they could read and then proved able to read a sentence.

Among the children we interviewed, 58 percent stated that they spoke the local creole language at home, and interviewers found 75 percent of children were able to speak Kriol somewhat or fluently during their interviews. Less than 1 percent of children reported their family spoke Portuguese at home.

When asked about school, only 5 percent of children reported they had attended a preschool, and 85 percent reported they had attended school

sometime in the past. Seventy percent of children reported they were currently enrolled in school. Forty percent of children attended public schools, while 24 percent were enrolled in community schools. Twenty-two percent of children attended Koranic schools, and 98 percent of these children reported that they also attended another school.[8]

8.3.4 Characteristics of Schools and Teachers

Tables 8.6 and 8.7 present findings from school and teacher interviews. We compiled the school list from our village surveys and from asking children which school they attended. We then attempted to visit all schools that children attended at times when the school should have been open, and we repeatedly visited over at least three days if teachers were not present on the first occasion. In total we found 351 schools that were reported to serve children in the selected villages; however, when our field workers visited these, only 303 had teachers present on at least one visit.

In these schools we found 781 teachers who taught grades 1–4. We did not visit Koranic schools as these do not teach the national curriculum, and are generally not recognized officially as schools. Approximately half the schools we visited received support from the community for cleaning and/or infrastructure, while 28 percent of schools reported that communities provided assistance directly to teachers (financial or in kind). Only 45 percent of schools had a toilet, and 28 percent had drinking water accessible.

The average school had three teachers for grades 1–4, and 80 percent of teachers were male. Teacher's ages ranged from eighteen to sixty-one, with an average of thirty-eight, and on average they completed ninth grade. Despite a young national population, the average teacher had been teaching for nearly thirteen years. Three-quarters of teachers reported that they had a textbook.

When field workers visited classrooms, they found slightly less than three-quarters of enrolled students were present in the class. If we consider the attendance rate in functioning schools, and assume the attendance rate in nonfunctioning schools is zero, then average attendance would be approximately 62 percent for the overall population (assuming the closed schools had similar enrollment size to schools that were functioning).

Nearly all schools had blackboards, and there was chalk visibly available in almost all classes. However, there were very few textbooks for any course or grade. For example, on average there were twenty-nine enrolled children for every grade 2 math textbook visible.

8. Koranic schools do not teach the national curriculum.

Table 8.6 Characteristics of school

	Units	Average of sample	Standard deviation	Min.	Max.
School (303 respondents)					
School type	1 = Yes, 0 = No				
Public		0.591	0.493	0	1
Community		0.314	0.465	0	1
Private		0.059	0.237	0	1
Missionary		0.036	0.187	0	1
Does the school receive support from the community?	1 = Yes, 0 = No				
Cleaning		0.538	0.499	0	1
For teachers		0.277	0.448	0	1
Food		0.185	0.389	0	1
Water		0.092	0.29	0	1
Infrastructure		0.469	0.5	0	1
How many teachers for grades 1–4 work in the school?					
Male	N	2.38	1.55	0	11
Female	N	0.611	1.31	0	8
How many children are enrolled in grades 1–4?					
Grade 1	N	60.7	39.1	7	252
Grade 2	N	45.7	33.7	6	221
Grade 3	N	39.7	294	6	184
Grade 4	N	42.7	34.5	4	210
Average pupil per teacher ratio for combined grades 1–4[a]	N	63.4	24.4	7.2	17.8
Attendance ratio at time of visit (among schools that were operating when visited)					
Grade 1	Proportion	0.772	0.223	0.139	1.72
Grade 2	Proportion	0.74	0.236	0.056	2.07
Grade 3	Proportion	0.724	0.306	0.083	3.29
Grade 4	Proportion	0.744	0.233	0.067	1.92
Average number of math textbooks per enrolled child at the school					
Grade 1	Proportion	0.033	0.135	0	1
Grade 2	Proportion	0.035	0.102	0	0.96
Grade 3	Proportion	0.036	0.123	0	1
Grade 4	Proportion	0.041	0.112	0	0.88
Does the school have a toilet?	1 = Yes, 0 = No	0.452	0.499	0	1
Does the school have drinking water available?	1 = Yes, 0 = No	0.274	0.447	0	1

Note: Observations are excluded where data is missing or not answered unless otherwise reported.

[a]Teachers teach an average 1.67 classes, so pupils per class will be lower.

Table 8.7 Characteristics of teachers

	Units	Average of sample	Standard deviation	Min.	Max.
Gender	1 = Female, 0 = Male	0.19	0.392	0	1
Age	Years	38.5	10.7	18	61
Highest grade achieved	Grade level	9.41	1.74	4	12
Did she receive training before teaching?		0.595	1.23	0	8
How many years has she been teaching?	Years	12.6	11.6	0	46
How many years has she been teaching at this school?	Years	6.51	6.48	0	35
Does she use a textbook when teaching?	1 = Yes, 0 = No	0.739	0.44	0	1
Does she test students regularly?	1 = Yes, 0 = No	.986	.118	0	1

Note: Observations are excluded where data is missing or not answered unless otherwise reported.

8.4 Test Score Results

8.4.1 Numeracy Test Results

Table 8.8 presents results from the numeracy tests for all children. The total number of children tested declines from 1,527 at age seven, to 1,018 at age twelve, and then falls sharply to 406 by age seventeen. We have roughly 7 percent more males than females, with the bias increasing with age. These patterns are probably due to children dropping out of school and moving outside their village as they get older. As reported from the household survey, women tend to leave school earlier than men due to marriage and pregnancy, while men leave when they need to earn an income.

The numeracy test results show educational levels are extremely poor. For example, by age ten, according to the national curriculum of Guinea-Bissau, a child should be in grade 3 or grade 4, and they should be able to pass all aspects of this test. Instead, we find that 36 percent of ten-year-olds cannot even recognize a number. A further 31 percent can recognize single digits but cannot recognize two-digit numbers. This is despite the fact that 74 percent of ten-year-olds reported that they were currently attending school. In this survey, there is one child who, at age ten, was able to complete all questions from the test.

8.4.2 Literacy Test Score Results

Table 8.9 presents results from literacy tests. The materials for these tests were conducted in Portuguese; however, children were able to respond in their local language or Creole if they chose to. These other languages do not

Table 8.8 **Results from numeracy tests by age and standard achieved**

		Percentage of children at specific standards (by age)										
	Age:	7	8	9	10	11	12	13	14	15	16	17
Standard	Test score:											
Not able to recognize single digits	0	78.13	61.24	44.57	36.36	26.27	21.02	15.92	14.71	17.57	13.64	14.04
Can recognize single-digit numbers	1	18.66	28.45	34.63	31.22	33.05	25.34	21.46	19.33	15.34	15.29	7.88
Can recognize two-digit numbers	2	1.77	5.96	9.73	13.43	14.16	16.4	17.33	16.46	13.81	14.67	16.01
Can add two single-digit numbers	3	0.52	1.45	4	5.47	5.21	8.25	9.43	7.23	8.37	5.58	4.93
Can add a single- and two-digit number	4	0.59	1.87	5.43	7.44	12.59	16.01	19.93	20.7	19.67	20.45	18.97
	5	0.33	0.68	0.92	3.34	4.84	7.37	5.31	7.61	10.04	7.23	8.62
Can subtract one two-digit number from another	6	0	0.17	0.31	1.45	1.57	2.06	3.42	5.49	4.74	7.64	8.13
	7	0	0	0.2	0.68	0.97	1.08	3.42	3.49	3.35	7.23	6.4
Can multiply a two-digit number by a single-digit number	8	0	0.17	0.2	0.34	0.85	1.18	1.18	2.62	2.09	2.48	5.91
	9	0	0	0	0.17	0.24	0.79	1.18	0.75	1.26	2.07	2.71
Can divide a single-digit number into a two-digit number	10	0	0	0	0	0	0.2	0.59	0.25	1.12	1.24	1.72
	11	0	0	0	0	0	0.1	0.24	0.62	1.53	1.45	1.97
Inexact division, a single-digit number into a two-digit number	12	0	0	0	0.09	0.24	0.2	0.59	0.75	1.12	1.03	2.71
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Number	1,527	1,174	976	1,169	826	1,018	848	802	717	484	406

Note: Tests are administered in a progressive stepwise way. We start by asking children to read a sentence. If they are unable to read a sentence, we ask them to read words. If they are able to read a sentence, we ask them to read a paragraph. Based on 9,947 test scores.

Table 8.9 **Results from literacy tests by age and standard achieved**

		Percentage of children at specific standards (by age)										
	Age:	7	8	9	10	11	12	13	14	15	16	17
Standard	Test score:											
Cannot recognize letters	0	92.67	81.26	71.11	62.28	52.42	44.2	35.5	33.17	31.94	29.34	25.12
Can recognize letters but not words	1	7.14	16.87	23.67	28.83	31.36	30.26	32.31	29.55	26.22	21.69	17
	2	0	0.09	0	0.09	0.12	0.29	0.12	0.12	0.14	0.41	0.25
Can recognize and comprehend words but cannot read a simple paragraph	3	0.2	1.53	4.3	5.73	9.32	14.34	16.51	15.59	16.18	15.08	16.01
	4	0	0	0	0	0	0.2	0.12	0.12	0	0.21	0
Can read paragraph but cannot answer simple comprehension questions	5	0	0	0.2	0.34	1.33	1.57	1.89	3.37	1.67	2.69	3.69
Can read and comprehend a simple paragraph but not a story	6	0	0.09	0.61	1.54	3.39	4.22	4.72	6.23	8.65	10.12	9.36
	7	0	0	0	0.34	0.12	0.79	0.94	0.87	1.67	1.03	1.97
Can read and comprehend a story	8	0	0.17	0.1	0.86	1.94	4.13	7.9	10.97	13.53	19.42	26.6
	Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of children assessed		1,527	1,174	976	1,169	826	1,018	848	802	717	484	406

Note: Tests were conducted sequentially. For example, if a child could not add two single digits, we did not ask that they multiply. Based on 9,947 test scores.

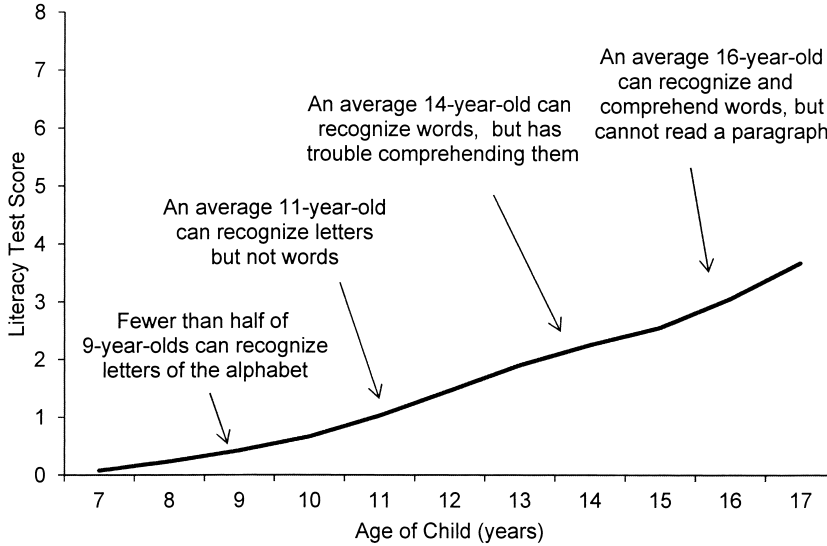

Fig. 8.2 Literacy scores by age

have a written script, so schools teach reading and writing in Portuguese, and children who attend school should be familiar with the materials.

The literacy tests show similar outcomes to numeracy tests. Under the national curriculum, by the end of grade 2 a child should be able to read and comprehend a simple sentence. However, we found 62 percent of ten-year-old children were not even able to recognize letters, while 91 percent were unable to read simple words. Only one ten-year-old in the whole sample was able to successfully complete the numeracy and literacy test in full.

Figures 8.2 and 8.3 illustrate average literacy and numeracy test scores by age. Those children, who do eventually learn to read or learn simple maths, tend to do so far later than the school curriculum calls for. We suspect learning occurs according to need—with some children more exposed to money and economic and social activities, such as small-scale trading, where limited literacy and numeracy is required.

8.4.3 Multivariate Analysis

We examined multivariate outcomes at the level of the child and school. The school-based results are shown in table 8.10 where we regress average student scores by school against a number of control variables.[9] The general picture from these results—correlations only—is that children at private

9. We report linear ordinary least squares (OLS) regression results in order to simplify the interpretation of coefficients. Logistic regressions provided similar results and are not reported.

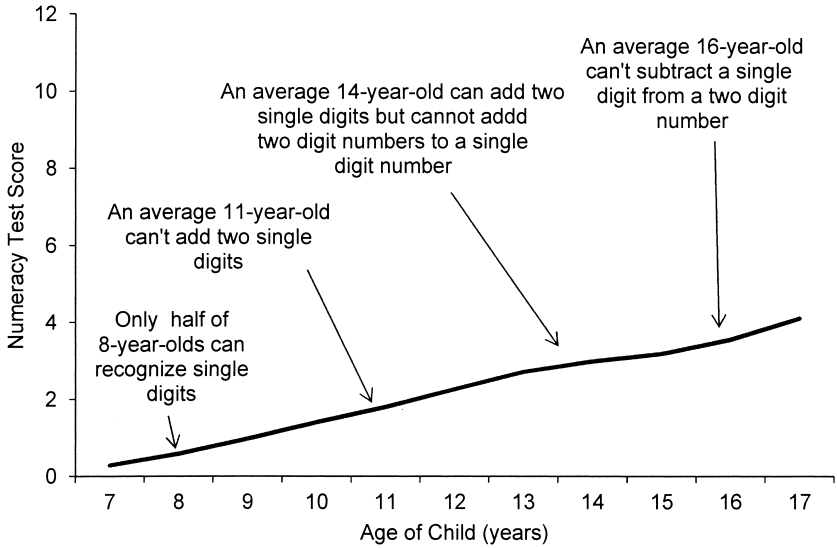

Fig. 8.3 Numeracy scores by age

schools have slightly (0.7) higher scores than children at other schools (results normalized against community schools). The number of teachers at the school is statistically significant; however, the teacher-student ratio is not important. We suspect this reflects the size of the school, with larger schools being closer to urban areas and in regions where written language is probably more commonly seen. The ability of the teacher to speak Portuguese is statistically significant. However, other variables measuring school and teacher quality (such as training, an indicator of equipment including chalk and blackboards, as well as books) do not enter the regressions.

Given the generally low level of outcomes and the limited variance across villages and schools (see section 8.4.3), the empirical importance of the right-hand-side variables is small. For example, a private school with fluent Portuguese-speaking teachers is predicted to have an improvement of 1.2 on the average literacy test compared to the same-sized public school with teachers who speak very little Portuguese. An improvement of 1.2 is a minor change compared to the large learning gap revealed here (see figure 8.2).

We do not report the outcomes from child-level regressions in this chapter as there is little additional contribution from the findings. The implied "impacts" of realistic changes in the statistically significant right-hand-side variables were not empirically relevant compared to the learning gap. We did find statistically significant correlations between test scores and ability to speak creole (+'ve: positive correlation), a household wealth indicator (+'ve), mother and father's ability to read (+'ve), and walking distance to nearest road (-'ve).

Table 8.10 School-based regression results

RHS Variable:	Dependent variable: Literacy score Coef. (se)	Dependent variable: Numeracy score Coef. (se)
Average student age	0.463***	0.526***
	(0.049)	(0.062)
Public school	–0.040	–0.134
	(0.188)	(0.211)
Private school	0.669**	0.741*
	(0.285)	(0.383)
Missionary school	0.095	0.412
	(0.530)	(0.717)
Student-to-teacher ratio	–0.002	–0.001
	(–0.003)	(0.004)
Equipment	–0.006	–0.018
	(0.020)	(0.023)
Number of primary school teachers	0.727***	1.121***
	(0.16)	(0.220)
Average years of teacher training	–0.086	–0.121
	(0.082)	(0.118)
Average years teaching	–0.002	–0.001
	(0.009)	(0.012)
Teacher's walking distance from school (minutes)	0.001	0.001
	(0.001)	(0.001)
Teacher teaches more than one grade (1 = yes)	–0.300*	–0.221
	(0.162)	(0.188)
Number of shifts the teacher teaches	–0.231	–0.703
	(0.185)	(0.260)
Teacher speaks local language	0.064	0.082
	(0.115)	(0.145)
Teacher speaks Portuguese (rank 0, 1, 2)	0.237*	0.425**
	(0.137)	(0.199)
Average monthly salary ('000 CFA)	0.008	0.006
	(.0073)	(0.00936)
Constant	–4.235***	–5.571***
	(0.656)	(0.880)
N	280	280
R^2	0.591	0.612
RMSE	1.127	1.322

Note: Regressions based on average variables for schools. Due to missing variables, twenty-three schools were excluded.

***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

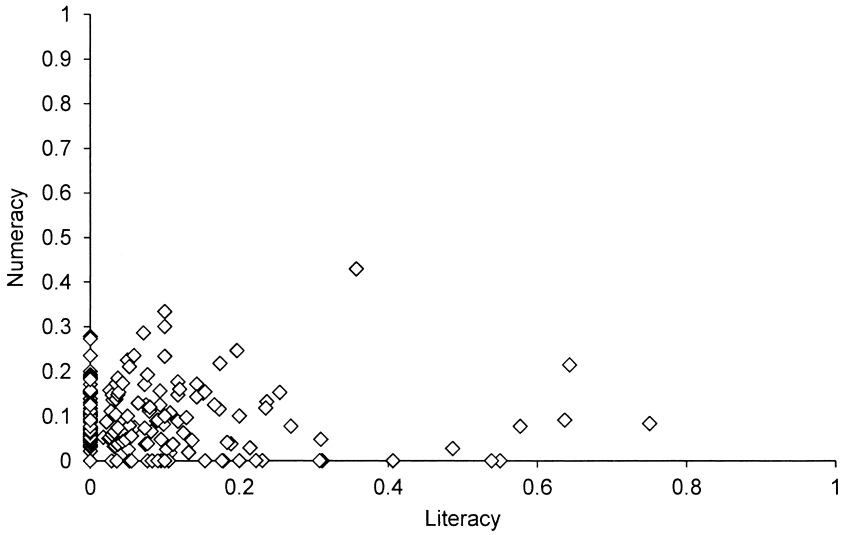

Fig 8.4 Plot of the proportion of children in each school that met national curriculum standards for literacy and numeracy (children age eight to seventeen, schools with at least ten interviewed students)

Note: Each point presents the results for one school. For a point 0.1, 0.1 would represent a school where 10 percent of children enrolled in the school achieved the national curriculum standards in both literacy and numeracy. The results cover 185 schools where ten or more children had test scores, and 5,360 students.

8.4.4 Searching for Excellence

Figure 8.4 illustrates the proportion of students at each school who met national curriculum standards for literacy and numeracy. National standards are not demanding. Children enter grade 1 after their sixth or seventh birthday.[10] After first grade a child is expected to be able to understand letters and numbers, and read and write simple sentences. At the end of second grade they should be able to read and write short texts, add, and subtract. By grade 3 they should be able to read and write texts, understand basic grammar, and add, subtract, multiply, and divide.

We used test scores to calculate whether a child met the age-specific standard implied by the national curriculum (assuming a child did not fail a grade). If a child followed the national curriculum, by the age of ten a child should have been able to easily complete the literacy and numeracy tests.[11]

10. At the time of the survey when a child passed their seventh birthday they were required to enroll at school, however, parents often enrolled children at age six. Subsequent to this survey, the entry age for grade 1 was changed to six years.

11. Our survey was conducted in the last trimester of the school year, so a ten-year-old child would be nearing completion of either grade 3 or grade 4 if they had begun school at age seven and passed each school year successfully.

We assumed that a child of seven could score zero on a test as they may have just entered school recently, while a child by age eight should have completed only the material of grade 1, and a child age nine should have completed grade 2. We then compared children's actual scores to what could have been expected if they followed the national standard. We used this data to examine whether any specific schools or villages were "outliers" with very good results compared to the poor national averages.

Figure 8.4 shows that there are no good outliers among schools. We found similar results when examining village-level outcomes (not reported). There are no schools where 50 percent of children could meet their standards for numeracy scores, and only six schools where more than half the children met national standards for literacy.

We also examined whether schools financed by NGOs showed improved test results. There were thirty-five schools that reported significant NGO financing from two foreign NGOs that have operated for many years in the region. Only 17 percent and 10 percent of children in these schools met national literacy and numeracy standards, respectively.

8.5 Discussion

We conducted a representative survey of educational outcomes in small- and medium-sized villages in Guinea-Bissau. The results illustrate extremely poor literacy and numeracy outcome for children, regardless of whether they attend school.

8.5.1 Study Limitations

There are several limitations to this survey. We have provided a snapshot of the conditions in the spring and early summer of 2010. This was a period of political uncertainty, but during this period the government had made efforts to pay teachers' salaries on time. Although this would not have impacted test scores quickly, the reported attendance levels and school openings may have been modestly better than other years.

Our literacy tests were in Portuguese, and children in rural villages are generally only exposed to Portuguese at school. We managed the interviews in the local languages in order to be able to improve compliance, and to give children their best chance at communicating correct answers. However, the language barrier would naturally reduce literacy scores. We do not see a reason for language barriers to directly impact numeracy scores.

Given this is a survey, the correlations reported should not be treated as describing causality.

8.5.2 General Discussion

One goal of this study was to use the unique combination of interviews with parents, children, teachers, and schools in order to better understand

the key factors determining educational outcomes in the nation. This could provide a background for interventions aimed at improving outcomes in the future.

The results provide some evidence that community demand for education is substantial. Nearly 100 percent of heads of households reported they were prepared to pay money in order to improve the education of both boys and girls. On average, they were willing to spend approximately 20 percent of income on children's education. We found that 24 percent of children attended community schools. Many of these were created and partially financed by local communities.

The reasons for dropping out of school also pointed to a healthy desire for education. Girls were reported to mainly drop out when they became pregnant or got married, meaning that they would remain at school until after puberty. Boys were more likely to drop out in order to gain income, but this may also have been associated with fatherhood and marriage.

We did not conduct any surveys on the returns to education, but there is no reason to think the pattern in Guinea-Bissau differs from elsewhere in Africa (Kuepie, Nordman, and Roubaud 2009). We did find that their parents reported a willingness to pay for this education, and for the younger children in this study, parents' views of perceived returns may be most important (Jensen 2010). A literate and numerate child would probably move to the capital, or another major city, where demand for skilled labor is strong.

However, if demand for education were truly strong, we should expect communities and households to find means to improve the quality and extent of schooling. There are some good reasons to think that barriers to this are large. The extremely low education levels suggest some communities will not have active members with the information and knowledge needed to intervene successfully in schools. Private schools do exist in urban areas, but they are rare in small villages. This is probably due to the large costs and logistic efforts needed to create, supervise, and maintain schools in these isolated villages. Given the spending power of households is small (with $88 average monthly household income), revenues would be modest.

Communities can and do form schools on their own, but to maintain these schools concerted effort and financing is needed. We found students at community schools did not perform better than those at state schools. Anecdotally, we were told in many villages that it is difficult for them to attract good teachers who are willing to stay for long periods. Both seasonal and permanent migration interferes with the sustainability of schools. Further, since families with school-age children change as children grow up, there needs to be a means to ensure regular financing as households who use the schools change. Some ethnic communities, such as the Fula, are known to have stronger community structures than others such as Balanta, however, ethnic background did not correlate strongly with test outcomes (Einarsdóttir 2004).

The fact that NGO-financed schools, with better infrastructure and equipment, did not demonstrate good test scores suggests that it is the operations in the classroom, such as teacher activities and supervision of the outcomes of the school, which may be needed to generate better outcomes.[12] One common barrier to all schools is language. Children and teachers have little opportunity to use or improve Portuguese outside the classroom, and while teachers can teach using local languages, the communication barrier when books are used, or literacy is taught, can be large. It is hard to underestimate the difficult task a teacher faces. They work in communities where few adults read and write, there are very few books and written language to be seen, children may not have notebooks or pens and paper, and there is no good lighting at night.

The results from our survey suggest there is little pressure coming from teachers or their supervisors to improve outcomes at schools. We are not aware of any attempts to incentivize teachers to improve children's educational outcomes (Glewwe, Ilias, and Kremer 2010). Nearly all teachers reported they were testing children regularly, and classes appeared to be functioning in most schools. Hence, teachers must have been aware that children were faring extremely poorly at schools compared to national standards.

If demand for education services is substantial, while collective action problems prevent the formation of functioning schools, then we should observe that a provision of high-quality services would lead to substantial improvement in learning outcomes, especially compared to the low levels observed in these villages in 2010. A cluster randomized controlled trial has recently been completed in tribal regions of Andhra Pradesh, where public school quality is considered to be very low, to learn whether average test scores of all children in villages can be raised if the children are offered additional high-quality afterschool training. Such research will help discern whether supply, rather than issues related to the demand for schooling, drives the poor results in that region (Eble et al. 2010).

There are no randomized school allocations or "natural experiments" that could permit us to examine whether improved supply of quality schooling has a causal impact on outcomes in our survey population. We could only determine indicators of quality through variables such as the availability of textbooks, chalkboards, and some basic characteristics of teachers. The

12. In a study comparing children's test results in twenty-one sub-Saharan African nations, equipment and the number of school shifts of teachers were highly correlated with test score outcomes. We did not find similar results here. It is possible that reported correlations in our study, as well as this other study, effectively capture indicators of the schooling regime rather than causality. Since no regimes appear to work across our populations, there are only weak correlations between indicator variables and test scores (Fehrler, Michaelowa, and Wechtler 2009).

A randomized evaluation of providing textbooks to children in Kenya found no impact on test scores for children receiving textbooks (Glewwe, Kremer, and Moulin 2009).

results from this analysis were mixed, but generally suggested that improvements in these indicators do not correlate with large changes in educational outcomes.

8.6 Conclusion

Guinea-Bissau is an extremely poor nation with frequent political instability and poor schooling, health, and educational infrastructure. As we prepared our survey in 2009, the president was assassinated. In the midst of our survey in April 2010, the prime minister and army chief of staff were imprisoned during an attempted coup. While other parts of Africa are reported to be improving rapidly on socioeconomic indicators, Guinea-Bissau is an example of a country that appears trapped in poverty despite official data that claims improvements. Our survey suggests nearly the entire current generation of children in rural villages is growing up innumerate and illiterate.

Our survey indicated substantial desire by parents and household chiefs for improved education in villages. Children continue to attend schools despite learning very little, and among schools that were open, teachers were usually in the classrooms. Despite this, little learning is occurring. We believe a main factor driving these poor results is poor quality of teaching within the schools. Teachers are isolated, underequipped, receive salaries after long delays, and have little training. A program that substantially improved conditions for teaching, while introducing strong supervision of teachers and monitoring of student progress, may address some of the key reasons that children are learning little despite attending schools.

However, further research is needed to learn which factors are at the heart of Guinea-Bissau's poor outcomes, and to understand which interventions may be able to change these. If left unattended, educational outcomes of young children in rural Guinea-Bissau are likely to remain dire well into the future.

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