

## 1 An overview of the Senegalese school system

Senegal is a developing country located in West Africa. With an estimated population of 14.8 million in 2016 (ANSD<sup>4</sup>, 2019) (Agence Nationale de la Statistique et de la Démographie, 2019), the growth rate reached almost 7 per cent in 2016. As in many African countries, poverty is pervasive in Senegal: affecting 47 per cent of the population in 2010 in 2011, the poverty rate stood at 47 (respectively 38) per cent using a national (respectively international) poverty line according to the World Bank (2018). This phenomenon is mainly rural: a quarter of urban residents were poor compared to 57 per cent of people living in rural areas in 2011. About 83 per cent of Senegal's poor live in low-income households, a situation that has changed little over the past decade (World Bank, 2013).

~~According to the Senegalese constitution, education is a right and primary education is free and compulsory. The education system~~ The Senegalese school system comprises four levels of instruction: preschool, elementary school, secondary school (including academic teaching and public technical and vocational training), and higher education (International Bureau of Education, 2010). Public education is dominant (over 75 per cent) at these levels, but the system also encompasses private schools. Children aged from three to five years attend preschool, which has three levels. Students aged from seven to 12 years attend primary school. Middle school, which follows primary school, lasts four years. This level is crowned by the Brevet de Fin d'Etudes Moyennes (BFEM), ~~which students generally obtain at age 16.~~

After ~~completion of~~ completing middle school, students attend high school. This second part of secondary education represents three years of general or technical and vocational training, after which students obtain a Baccalaureate to enter university. ~~The~~ Technical or vocational secondary ~~education programme~~ schools offer two- or three-year courses that end with the passing of the

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Brevet d'Etudes Professionnelles and Brevet de Technicien. ~~Senegal has multiple options for institutes or faculties for higher education, with both private and public universities.~~ ~~In addition to the formal school system, there are Koranic schools where children traditionally acquire the bases of their religious and spiritual education.~~ |

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~~In addition to the formal school system, there are Koranic schools where children traditionally acquire the bases of their religious and spiritual education.~~ Senegal has multiple options for institutes or faculties for higher education, with both private and public universities. ~~Finally, the school system has many other challenges. These challenges include~~ The educational system of Senegal faces many challenges, including the well-known issue of school quality (PASEC, 2016), and a high number of children who do not attend any type of school (United States Agency for International Development, 2017). ~~These children generally serve as a labour force for income-generating activities or as apprentices in the informal sector. Children living in rural areas of the country are disadvantaged and generally work in agriculture instead of attending school.~~

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The Ministry of Education ensures the implementation of educational policy at the central level. Academic Inspections are responsible for the implementation of educational policy at the regional level. ~~They manage the Education and Training Inspectorates (French acronym IEF) who are that are responsible for educational policy implementation at the department level. IEFs oversee schools of their department.~~ These Inspectorates oversee the schools in specific geographic areas of responsibility. |

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## 2 Data

### 2.1 Sample size and data collection tools

~~Our sample includes 4,826 students surveyed in 440 primary schools randomly selected to participate in an evaluation program. Within these schools, three rounds of data collection occurred in~~ We use three rounds of data collected on Senegal's education system in November 2009 ( $t = 0$ ), November 2010 ( $t = 1$ ) and May 2011 ( $t = 2$ ) to evaluate the impact of school grants on learning outcomes. Our sample includes 440 primary schools; in each, 12 randomly chosen students took two written (French and mathematics) tests developed by the Senegalese Institute for National Assessments (INEADE). ~~Amongst Of these 12 students, six randomly chosen passed the oral tests and four amongst these latter six, also randomly chosen, have household data~~ household data were available for all but two; a total of six passed the oral tests.<sup>2</sup> Throughout this process, 4,826 students participated in surveys. The surveys simultaneously followed two cohorts of students: the first from the start of grade 2 through the end of grade 3, and the second from the start of grade 4 through the end of grade 5. |

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The cognitive tests used during the surveys were specific to the cohorts and identical across all waves. Thus, we can assess the school size effect in the medium run (after 2–3 years of exposure to school size) on students followed from grade 2 to 3, and in the long term (after 4–5 years of exposure) on students followed from grade 4 to 5.

~~Grade 2 written tests consisted of items covering reading comprehension and sound/written form correspondence. Grade 4 written tests focused on the functioning of the language. It included vocabulary, syntax, writing comprehension, spelling, grammar, and conjugation items. Oral tests included topics such as reading, word recognition, non-word recognition, number of sounds, and letter recognition.~~ The French written tests for grade 2 students took 30 minutes and comprised

items covering reading comprehension and sound/written form correspondence. The French written tests for grade 4 students lasted 45 minutes and focused on functional language; questions assessed knowledge of vocabulary, syntax, writing comprehension, spelling, grammar, and conjugation. The mathematics tests for second and fourth graders comprised items on numeracy, measurement, geometry and problem-solving. The total test took 50 minutes at grade 2 and 70 minutes at grade 4. Oral tests took 15 minutes for both grades and included topics such as reading, word recognition, non-word recognition, number of sounds, and letter recognition. Given that multiple test scores were measured for each student, we computed a summary outcome, which is the sum of the three original outcomes. ~~which is the sum of the three original (French, mathematics and oral) outcomes~~ We standardized this outcome within cohort-by-survey. This means, for each cohort, that we standardized test scores separately for November 2009 ( $t = 0$ ), November 2010 ( $t = 1$ ) and May 2011 ( $t = 2$ ). The standardized outcome, normally distributed across time and grades, has mean 0 and standard deviation 1; we use the standardized value as our single outcome to assess the effect of school size.

The use of a summary index has a number of advantages over testing individual outcomes. First, because it represents a single measure, the likelihood of a false rejection of a hypothesis to assess does not increase as additional outcomes participate in its computation. Second, measuring an effect on the index provides a statistical test for whether large school size has an overall impact on the three test scores and, third, it has more power to detect an effect than individual-level tests (O'Brien, 1984).

The surveys also collected detailed contextual data at the student, household, classroom, school and locality levels. We describe the full list of variables included in this analysis in Appendix Tables 1–3.

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