

Summary

Evaluation of Meal and Deworming Programs for Primary Schools in Rural Senegal}

By Fatoumata Lamarana Diallo

Program evaluation is an important tool to inform policy makers about the effectiveness of programs and the efficient allocation of resources. Several studies have examined the impact of school feeding and deworming programs on educational outcomes in developing countries.

However, conflicting evidence still exists regarding the effectiveness of these programs on school performance. Also, there are little evidences on the cost effectiveness of these programs.

Although nutritional and health experiences have been developed in recent years in Senegal, there is no empirical study gearing towards assessing the impacts of meal and deworming programs on educational outcomes, that also addresses issues related to the complementarity or substitutability of the two programs.

This thesis aims at filling this gap. We use experimental and quasi-experimental data and rely on both program evaluation and structural approaches. The thesis is organized in 5 chapters. After introduction in Chapter 1, Chapter 2 uses a quasi-experimental data to assess the impacts of meal and deworming programs taken on isolation. We study the impact of these programs on school performances measured by test scores, while elaborating on the determinants of test scores. This explains that the meal and the deworming programs can increase pupils' scores. The impact of each program is more important for pupils who are in school with association of mothers. Deworming in school has a positive effect on pupils' performance, while the deworming at home has a negative impact on pupils' scores. In addition, the deworming program increases significantly the scores of pupils who are in school with association of their mothers or school project. Among the determinants of test scores, education expenditure, household size, Koranic school, early childhood institution and existence of a college in the village have a positive effect on pupil's performance, while controls such as disturbed courses, temporary shelters, gender of teacher and absenteeism of teacher have negative impact on scores.

In terms of policy analysis, the Local Average Treatment Effect (LATE), reveals that if the objective is to increase scores, the most cost-effective way is to combine the canteen and the association of parents compared to other options including management committee, school project, school cooperative and reduction of teacher absence.

Chapter 3 uses the quasi-experimental data to assess the school feeding and deworming programs as a *package* on school performances (aggregate score, French score, math score, enrollment, repetition and dropout rates), while elaborating on the determinants of these performances. In this chapter we develop a model for two treatments, which makes it possible to estimate a variety of treatment effects, while also addressing issues related to complementarity or substitutability of programs. We found out that both meal and deworming programs increase scores, but the combination of the two programs is more beneficial in terms of increasing pupils' achievements. The sequence of implementation does matter. The two programs are complementary in the goal of increasing scores and promotion rates. However, they are substitutes with the aim at reducing dropouts. The cost-effectiveness analysis shows that deworming is by far cheaper than school meals. However, the implementation of meals program before deworming is more cost-effective than the reverse.

In terms of the determinants of scores, the results found in this chapter are consistent with those in Chapter 2. In addition, deworming at home impact scores negatively, while existence of latrine and existence of hand washing device in school impact scores positively.

An interesting and intuitive result is that having a literate household head increases the enrollment rate. In contrast, the enrollment rate declines with school expenses. This result is important for education policy in terms of reducing the illiteracy rate in rural areas where the living standard is very low. Indeed, if policy makers seek to encourage families to send their children to school, it would be interesting to ensure that the cost of schooling is not too high. Two other results are worth noting: having a male teacher and holding arable land have negative effect on enrollment.

As a whole, our findings in terms of determinants of school performances presented in Chapters 2 and 3 suggest that despite the fact that temporary shelters reduce dropout rates with having positive effects on enrollment and promotion rates, it also contributes to reducing pupils' achievement (scores). In addition, even if school manual can improve on the competence of pupils, when the number of pupils per manual become higher (more than 4 pupils per manual), the effect seems to be negative on scores. Implementing a policy gearing towards reducing teachers' absenteeism and disturbances will improve educational quality. It also seems important to promote more experienced teachers (from 33 years old) and female teachers. Finally, encouraging them to have professional qualification CAP and CEAP, supporting teachers with High school diploma and more as an academic qualification, while increasing the duration of continuing training for teachers are some of the measure towards improving pupil achievement.

Chapter 4 uses an experimental data to assess the impact of the meal program on school performances in the presence of attrition and partial adherence. Estimation results show that the school feeding program significantly increases pupils' performances and enrollment rate, while reducing dropout rate. However, the program increases the repetition rate and decreases promotion rate, which is unexpected. This may follow from the measures taken by the Government of Senegal consisting in removing repetition during the first year of each step in the primary cycle and capped at 5\% maximum rate of repetition at the end of each step.

We also found out that, the meal program has greater effect for girls compared to boys in math score, while boys outperform the girls in French score.

The cost-benefit analysis conducted in this chapter shows that the meal program is justified in terms of economic gains, while the result of the cost-effectiveness analysis is consistent with findings in Chapter 3.

Chapter 5 summarizes the key findings of all chapters, with some policy implications. It also discusses the limitations of the thesis and justifies the need for some future research projects.

Overall, this thesis provides empirical evidence on the impact of meal and deworming programs on school performances using both experimental and non-experimental studies. To our knowledge, this is the first study to show that the combination of meal and deworming programs as package would be more effective in terms of increasing school performances while giving the effect of each intervention and several other effects to inform policy makers.