International Initiative for Impact Evaluation

Quality education for all children?

What works in education in developing countries

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International Initiative for Impact Evaluation
c/o Global Development Network
2nd Floor, West Wing, ISID Complex,
4, Vasant Kunj Institutional Area,
New Delhi – 110070, India
Tel: +91-11-2613-9494
www.3ieimpact.org

Quality education for all children?

What works in education in developing countries

Shari Krishnaratne, Howard White and Ella Carpenter

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September 2013

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Preface

The evidence base for what works in development and why is growing. Pulling together this evidence from multiple studies can deliver stronger and clearer messages for policymakers and programme managers. 3ie is committed to looking for ways to combine, re-analyse, and re-present findings from different studies in an accessible manner. This working paper applies that approach to the education sector.

Quality education for all children? What works in education in developing countries is based on the 3ie-funded study by Anthony Petrosino and colleagues (2012) entitled *Interventions in developing nations for improving primary and secondary enrolment of children,* plus additional studies identified in a supplementary search. The authors present a new categorisation of supply-and demand-side interventions, drawing out lessons about the effectiveness of each type of intervention.

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Abbreviations and Acronyms

BRIGHT	Burkinabé Response to Improve Girl's Chances to Succeed
CCTs	Conditional cash transfers
ECD	Early childhood development
LEAP	Learning and Education Achievement in Pakistan Schools Project
MDGs	Millennium Development Goals
NGO	Non-governmental organisation
PACES	*Programa de Ampliación de Cobertura de la Educación Secundaria*
PROGRESA	*Programa de Educación, Salud y Alimentación (The Education, Health, and Nutrition Program of Mexico)*
SBM	School-based management
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
WFP	World Food Programme

1 Introduction

Introduction

Education is critical to economic and social development. A child who has received a good education is more likely to develop into a better parent, make informed decisions, earn a better living, adopt new technologies, cope with crises and be a responsible citizen (World Bank, 2011). Access to education is enshrined as a fundamental human right in the United Nations (UN) Universal Declaration of Human Rights and the UN Convention on the Rights of a Child. The Millennium Development Goals (MDGs) highlight education as one of the key factors in alleviating poverty, and aim to achieve universal primary education for all boys and girls by (MDG 2) and eliminate educational gender disparities by 2015 (MDG 3).

Most of the international goals set for 2015 will be missed by a wide margin

There has been substantial progress in these goals. Between 1999 and 2009, an extra 52 million children enrolled in primary school, resulting in the net enrolment ratio in primary education[1] reaching 89 per cent in developing countries (UN, 2011). Sub-Saharan African showed the greatest improvement, increasing from 12 to 76 per cent in 2009, and most regions around the world have recorded improving enrolment ratios. The number of girls enrolled in primary school has risen from 77 to 86 per cent between 1999 and 2008 in developing countries, almost equal to boys' enrolment. Fewer girls dropped out of school than boys in 2007: 16 per cent compared to 18 per cent (UNESCO, 2011).

However, these positive figures mask some worrying trends. The overall message of the latest UN *Education For All Global Monitoring report* is that most of the MDG goals set for 2015 will be missed by a wide margin (UNESCO, 2011). In recent years, improvements in enrolment worldwide have slowed down, increasing by only two per cent between 2004 and 2009.

It is important for children not only to enrol in schools but to also complete their schooling. Here too, there is cause for concern. Only 87 per cent of children in developing countries finish primary education. In Sub-Saharan Africa alone, more than 10 million children drop out each year (UNESCO, 2011). And there would be an additional 3.6 million girls in primary school if gender parity had been achieved in 2008. If current trends continue, there could be more children out of school in 2015 than there are today (UNESCO, 2011). The 2011 UN Millennium Development Goals

[1] Defined as the number of pupils of the theoretical school age for primary education enrolled either in primary or secondary education, expressed as a percentage of the total population in that age group.

Report identifies key groups of children who are currently less likely to be attending primary school. Around half of the children not in school live in Sub-Saharan Africa. Conflict severely hinders children going to school: 42 out of 100 children not enrolled in primary education live in countries affected by conflict. Refugee children – both in urban areas and refugee camps – are reported to be especially disadvantaged, with 37 per cent of them in urban areas having no access to schooling, and half of all schools in refugee camps enrolling fewer than 70 per cent of school-aged children (UNICEF, 2011). Being female remains a significant barrier to going to school in some countries. In 52 countries, the enrolment ratio of girls to boys is 0.95 or less in primary school, and for 26 countries this drops to 0.90 or below (UNESCO, 2011).

This working paper shows what works in getting children into school in developing countries, keeping them there, and ensuring that they learn whilst there

The international community has focused predominately on getting children into school. However, it is just as important to ensure that children are able to learn and acquire new skills when they do enter classrooms. Yet the quality of education in many schools is unacceptably poor, and many children are leaving primary school without even basic reading, writing or numeracy skills.

So there are three main challenges: (1) getting the remaining children into primary education: notably those in inaccessible groups; (2) ensuring those completing primary education stay on for secondary education; and (3) ensuring that all those in school have an opportunity to learn. Only when these challenges are met will the UN's vision of quality education for all be achieved.

Interventions to improve schooling

Approaches to improving the quantity and quality of schooling can be divided into supply- and demand-side interventions (see figure 1).

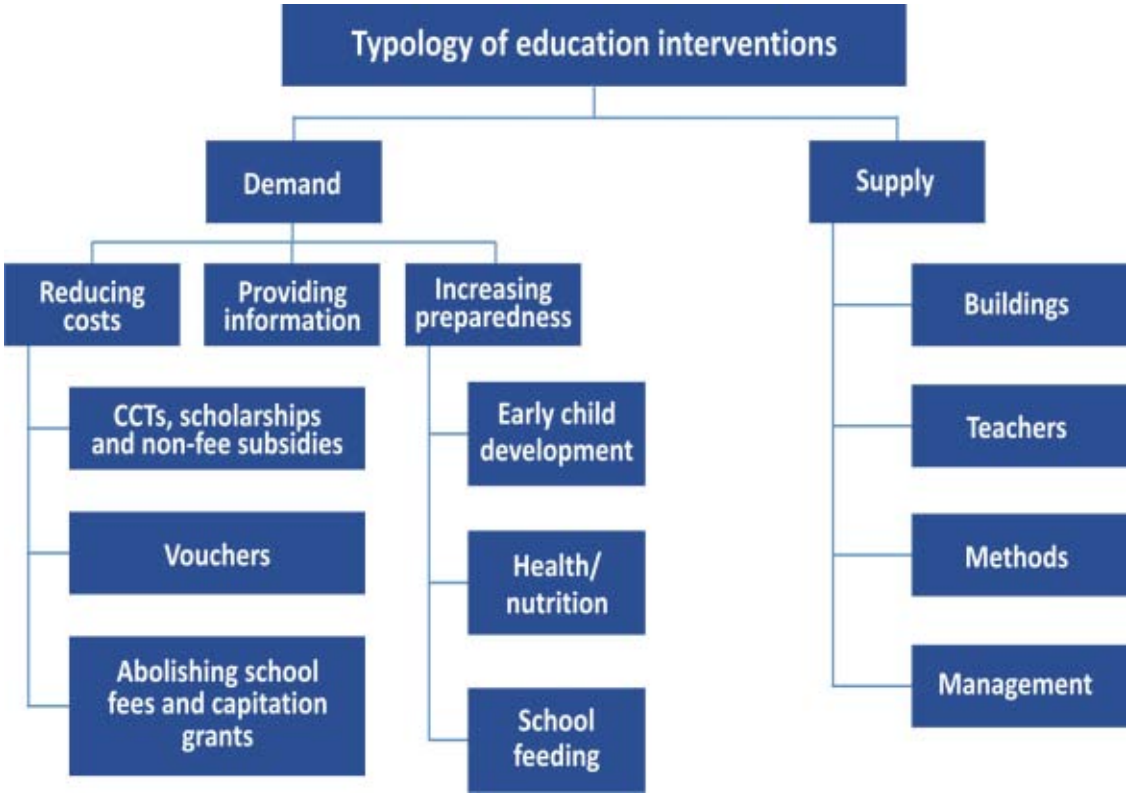
Education interventions have traditionally focused on the supply side of buildings, teachers, and learning materials. More recently, there has been a growing focus on management, notably community-based school management committees. Materials now also include computer-assisted learning, and some countries use less well-qualified assistant teachers to bring down the pupil-teacher ratio.

But there has also been increasing attention to the demand side. These interventions can be divided into three main categories: (1) reducing costs; (2) providing information and; (3) increasing children's preparedness for learning. The first and third of these categories comprise a number of different intervention types.

Overview of this working paper

This working paper shows what works in getting children into school in developing countries, keeping them there, and ensuring that they learn whilst there.

Figure 1: Supply-and demand-side approaches to education



It is based on a systematic review[2] undertaken by WestEd (a nonprofit, public research and development agency) on studies from 1990 to 2009 (Petrosino *et al.*, 2012), plus additional studies with evidence on test scores and studies which were published after 2009 (see appendix 1 on the search strategy, and the list of included studies on pages 47-52). The WestEd review identified all studies that reported outcomes related to enrolment, attendance, progression or graduation. Eligible studies were those which had assessed primary or secondary school outcomes linked to the four main schooling effects under examination, used robust evaluation methods and had been conducted in a low- or middle-income country.

The chapters in this working paper present the evidence with respect to the interventions identified in figure 1. Each chapter describes the intervention, its theory of change, implementation experience and evidence of impact. The final chapter pulls together conclusions about what works and what does not.

[2] A systematic review identifies, appraises, analyses and synthesises all relevant evidence about a specific intervention or question.

2 Reducing costs

Reducing costs

Conditional cash transfers

Conditional cash transfers (CCTs) offer a regular cash payment to individuals or families conditional on some behaviour, such as a child enrolling in school and attending regularly, sometimes with a performance requirement (Fiszbein *et al.*, 2009). CCTs are often targeted, both geographically and then further within those areas, using proxy-based means testing or community-based identification. Some programmes adopt gender-based targeting, such as the Bangladesh Female Secondary School Stipend, which gives cash to all girls nationwide who attend secondary school, get good grades and remain unmarried until they are aged 18 (Chaudhury and Parajuli, 2006).

CCTs emerged in the 1990s in Latin Central American countries. One of best known is *Programa de Educación, Salud y Alimentación* (PROGRESA) in Mexico (later renamed *Oportunidades*), launched in 1997 to replace a host of badly targeted subsidies. Over time the programme has expanded to be a nationwide programme. The largest programme is *Bolsa Familia* in Brazil, which reached over 12 million families by 2010. Following evidence of positive outcomes in countries such as Mexico and Brazil, CCTs have been adopted by most countries in Latin America, and now operate in over 30 countries around the world.

CCTs increase enrolments and attendance, with benefits concentrated amongst the poorest children

Theory of change for CCTs

CCTs increase household income so they can better afford the costs of schooling through the 'income effect'. The conditions alter the relative costs and benefits of schooling versus other uses of children's time, creating a 'price effect' or 'substitution effect' (Baird and Ozler, 2009). Both enrolment and attendance should improve as a result of both of these effects. Learning outcomes can be positively affected if attendance increases, and if there are performance requirements that provide an incentive for more effort.

Programme success depends on successful targeting, which may be undermined by a variety of factors. For example, the administrative costs of applying to the programme may be too burdensome for poor households.

The expected positive effects will only be observed so long as the subsidy is not paying households for things they would have done anyway. CCTs will clearly have less impact on primary enrolments if they are nearly universal. There may also be substitution if the subsidy targets children of a specific age or sex, for example, girls go to school but boys are kept out.

What evidence is there that CCTs improve schooling outcomes?

The evidence from 23 studies strongly indicates that CCTs increase enrolments and attendance, with benefits concentrated amongst the poorest children. However, there is no overall impact on learning outcomes.

The effect on enrolment is strong. For example, in Honduras, there was an overall increase in enrolment and the largest impact was seen in the poorest households. In Mexico, enrolment increased, but with a larger impact on older children since primary enrolments were already 95 per cent. Children still out of school before the programme were from poorer families, so benefits were skewed to the poorest (Parker *et al.*, 2006; Todd and Wolpin, 2003).

There are exceptions. In Colombia, the poorest families had the weakest response to the cash transfer, which may have been caused by the modest transfer being too small to offset all schooling costs (Barrera-Osorio *et al.*, 2008). Since virtually all Colombian children attend primary school anyway, the payments for children of primary age is more akin to an unconditional cash transfer, which raises the policy question of whether to refocus those resources at higher levels of education.

Positive effects may be partly offset when schooling decisions for one child negatively affects decisions for their other siblings. In Bogota, siblings who did not benefit from the CCT worked more and attended school less than children in households with no CCT at all (Barrera-Osorio *et al.*, 2008). Similar effects were found in Mexico. If an older sibling was already attending school, parents gave less priority to schooling younger siblings (Parker *et al.*, 2006).

CCTs also increase attendance and reduce dropouts. In Mexico, older children's attendance increased by 9-13 per cent, and both older and younger children completed more grades, resulting in an estimated extra 0.5 years of schooling.

In the Honduras CCT programme, dropout rates reduced by 4.3 per cent, with the largest impact among the poorest children. The long-term effect on 14-year-olds is an extra 0.7 years of schooling.

Despite greater attendance and reduced dropouts, there was no overall significant impact on learning outcomes, which confirms an earlier summary of the evidence that CCTs work at getting children into school but not learning once there (Fiszbein *et al.*, 2009).

Using evidence to inform CCT programme design

Do conditions make a difference?

Should cash transfers be conditional, or is simply increasing a family's income sufficient? Most of the evidence supports the view that conditions matter:

- An unconditional cash transfer in Bangladesh was not associated with any increase in enrolments (Ahmed *et al.*, 2009); and
- Enrolments increased by 9–13 per cent under the Ecuadorian *Bono de Desarrollo Humano* programme, despite no enforced schooling requirement or monitoring. However, a quarter of all parents were swayed by advertising, which implied the transfer was conditional on school attendance. The children of these parents showed the most significant impact, suggesting that the incentive effect of the transfer was stronger than the increased income effect in this project (Araujo and Schady, 2006).

An exception was Malawi, where the impact of conditional and unconditional cash transfers on girls' enrolment or learning was, on average, the same (Baird and Ozler, 2009).

Altering the time of payment

In Bogota, delaying the timing of the transfer and paying a lump sum at the end of the year resulted in greater effects for all schooling outcomes. There were also positive spillover effects on peers. A pupil with a friend who was getting the transfer was more likely to attend school; this indirect effect was of a similar magnitude to the programme effect (Barrera-Osorio *et al.*, 2008).

Targeting CCTs

Targeting provides more resources to the poor than random allocations, but effective targeting can be costly and difficult to implement (Slater and Farrington, 2009). Since benefits are greatest for the poorest, targeting can cut costs whilst maintaining programme effectiveness, though perhaps not the breadth of political support.

But in most cases, targeting will suffer from Type I (paying those not eligible for the programme), and Type II (excluding those who should be in the programme) targeting errors.

A Type I error may arise if programmes are not implemented according to their design. In a PATH programme in Jamaica, monitoring fulfilment of the conditions was not always effective (Levy and Ohls, 2007). In Honduras, although the enrolment criteria were strictly enforced, there were problems with monitoring attendance (Glewwe and Olinto, 2004).

A Type II error may occur if intended beneficiaries fail to enrol in the programme. In the *Ecuadorian Bono de Desarrollo Humano* programme, 22 per cent of those assigned to receive the transfer did not take up the opportunity. Lack of information, the cost of travelling to the bank and stigma may have discouraged these poor households from benefiting from the transfer (Araujo and Schady, 2006). In Honduras, some households did not enrol their children in the programme, despite the financial incentives. There is no explanation of why this occurred (Glewwe and Olinto, 2004).

In addition, some targeting mechanisms may miss deserving groups. A CCT in Bogota targeted children already attending school, therefore it excluded children who had never enrolled or already dropped out of education (Barrera-Osorio *et al.*, 2008).

How large should the transfer be?

In Malawi, doubling transfer size from US$5 to US$10 had little impact on enrolment. Hence, policymakers should assess carefully the possibility of reducing transfer sizes to ensure greater cost effectiveness (Baird and Ozler, 2009).

Are CCTs cost-effective?

There is limited analysis of the cost-effectiveness of CCTs, and many studies do not give any indication of the overall costs of the programme. But some comparisons have been made between programmes.

The CCT programme in Ecuador was found to be more cost-effective than PROGRESA in Mexico. Authors suggested that the poorer context in Ecuador, with a lower enrolment rate, explained this difference (Araujo and Schady, 2006). *Red de Proteccion Social* in Colombia had a significantly larger effect than PROGRESA, but it was also more expensive, partly due to monitoring and administrative costs and intensive municipal involvement to ensure adequate supply, which the other programmes lacked (Maluccio and Flores, 2004).

The extra costs of monitoring school attendance in Malawi were not worthwhile, as conditional and unconditional transfers had similar effects, but this has not been found to be true elsewhere. Finally, in countries with near universal primary education, there is little sense in monitoring enrolment amongst children of primary school age.

CCTs: conclusions

Children are more likely to enrol, attend and progress in school when they are part of a CCT programme. Programmes often target the poorest children, who are the ones who respond the most positively. CCTs play an important role in reducing inequality of education opportunities between rich and poor families.

However, doubts remain about the ability of CCTs to contribute to long-term improvements in learning outcomes. Many programmes do not measure whether children are learning more, as well as attending more. Where there is evidence, it suggests no impact on learning outcomes. Transfers could be conditional on performance, but this would disadvantage the poorest. Rather, this finding suggests that supply-side interventions to improve school quality are needed alongside CCTs.

As the impact of CCTs on the primary outcomes is demonstrated, further research can address detailed design questions, such as the frequency, timing and means of payment, so that similar programmes can be designed and implemented to best effect.

Vouchers

Providing vouchers reduces the financial burden that parents face when sending their children to school, and may allow children to attend private schools rather than public schools. Examples of voucher programmes include:

- **restricted school vouchers.** The *Programa de Ampliación de Cobertura de la Educación Secundaria* (PACES) vouchers in Colombia were awarded by lottery to children living in poor neighbourhoods and attending public primary school, as long as they had been accepted to a private secondary school participating in the PACES programme. Students were eligible for voucher renewal if they performed well in school.
- **unrestricted school vouchers.** In Chile, a nationwide programme has been in place since the 1980s, in which all children are able to receive vouchers from the central government to attend school (Behrman *et al.*, 2010).

Vouchers: theory of Change

Similar to scholarships, the abolition of school fees and some cash transfer vouchers can lead to improved schooling outcomes by reducing the cost of education.

Vouchers can help children who would not otherwise go to school to enrol in and attend classes, which can improve learning outcomes for those children. However, it may worsen for those already in school if the programme leads to overcrowding.

Vouchers may also improve learning outcomes through two other channels: (1) parental choice increases competition amongst schools to improve their quality and (2) a child's ability to attend a better school is not constrained by household factors. This argument is often made if the voucher programme allows the child to attend a private school, which is assumed to be superior.

Impact of voucher programmes

No significant effects were found on learning outcomes (Chile and Colombia) or on school attendance (Colombia), although children did shift from public to private schools (Chile and Colombia).

For example, in Colombia, where the PACES programme granted over 125,000 pupils vouchers worth US$190, children shifted from public to private schools. Those already attending private school went to more expensive schools, with parents spending an additional US$19 on top of the voucher (Angrist *et al.*, 2002). Despite this, there was no significant impact on school enrolment, attendance or learning outcomes.

The two available studies show no evidence that vouchers have a positive impact on schooling outcomes

Vouchers: conclusions

These two studies show no evidence that vouchers have a positive impact on schooling outcomes. However, the evidence base is too narrow to draw firm conclusions about effectiveness or cost-effectiveness of vouchers.

School fees

Examples of school fee reduction interventions are:

- **providing free education.** Since January 1997, the policy of universal primary education in Uganda has entitled four children per family to benefit from free primary education. In Malawi, school fees were abolished in 1994 (Morgan, 2011).
- **meeting some school costs.** Achievement awards in Israel offered students completing their end of school exams US$800 in cash, US$1,000 for an educational trip or US$1,200 towards higher education (Angrist *et al.*, 2002). Wearing a school uniform is often compulsory, so providing free school uniforms helps with the indirect costs of schooling. For example, the Ghanaian Government launched its Free Uniforms Programme in 2009, aiming to reach 1.5 million children in 77 of the most deprived districts across the country.[3]

[3] http://ghana.gov.gh/index.php/component/content/article/991-first-lady-launches-free-uniform-programme

How reducing costs can improve educational attainment and achievement

Reducing or eliminating the costs of schooling removes a critical financial barrier which discourages parents from sending their children to school. Similarly, more targeted programmes of scholarships or free uniforms are expected to increase enrolment, provided that targeting ensures that the beneficiaries are not those who would have attended school anyway. Merit-based scholarships in particular may reach the children of better-off families with more educated parents, so the scholarship may not increase the likelihood of their attending school (Kremer *et al.* 2009). School uniform programmes not only relax financial barriers, they reduce the stigma for children from families who cannot afford uniforms or new uniforms.

Merit-based programmes may also increase learning outcomes, both by ensuring that more able learners attend school, regardless of their family background, and by providing an incentive for good performance. School uniforms are seen to increase discipline and morale and build a sense of identity with the school, which may be conducive to better learning outcomes; see Evans *et al.* (2008) on arguments for and against school uniforms.

But, as with all programmes which increase enrolment, if supply does not increase with demand then the higher pupil-teacher ratio may result in a lower quality of education (Fiszbein *et al.*, 2009). And if school quality is already poor, then eliminating school fees may attract more children but not help them learn anything (Fiszbein *et al.*, 2009).

Impact of fee reduction

Large initial impact on school enrolment from abolishing fees, though it depends on context

In Uganda, gross enrolment rose by 73 per cent in one year from 3.1 million to 5.3 million–following the abolition of school fees, compared to an increase of just 39 per cent over the whole of the preceding decade (Bategeka and Okurut, 2005). The Government of Mozambique announced the abolition of school fees in 2003 for grades 1–5, gradually extending the reach to grades 6–7: enrolment increased by 12 per cent after just one year (Fiszbein *et al.*, 2009). And in Malawi, enrolments doubled after school fees were abolished in 1994 (Morgan, 2011). These increases are of such magnitude that there can be no doubt that the new policy–both the removal of school fees and putting education high on the national agenda–contributed to a large part of the change, which is confirmed in the case study on Uganda by Deininger (2003).

In Uganda, gross enrolment rose by 73 per cent in one year– from 3.1 million to 5.3 million – following the abolition of school fees

The availability of free education in Uganda also reduced the likelihood of late enrolment, making school completion more likely (Grogan, 2009).

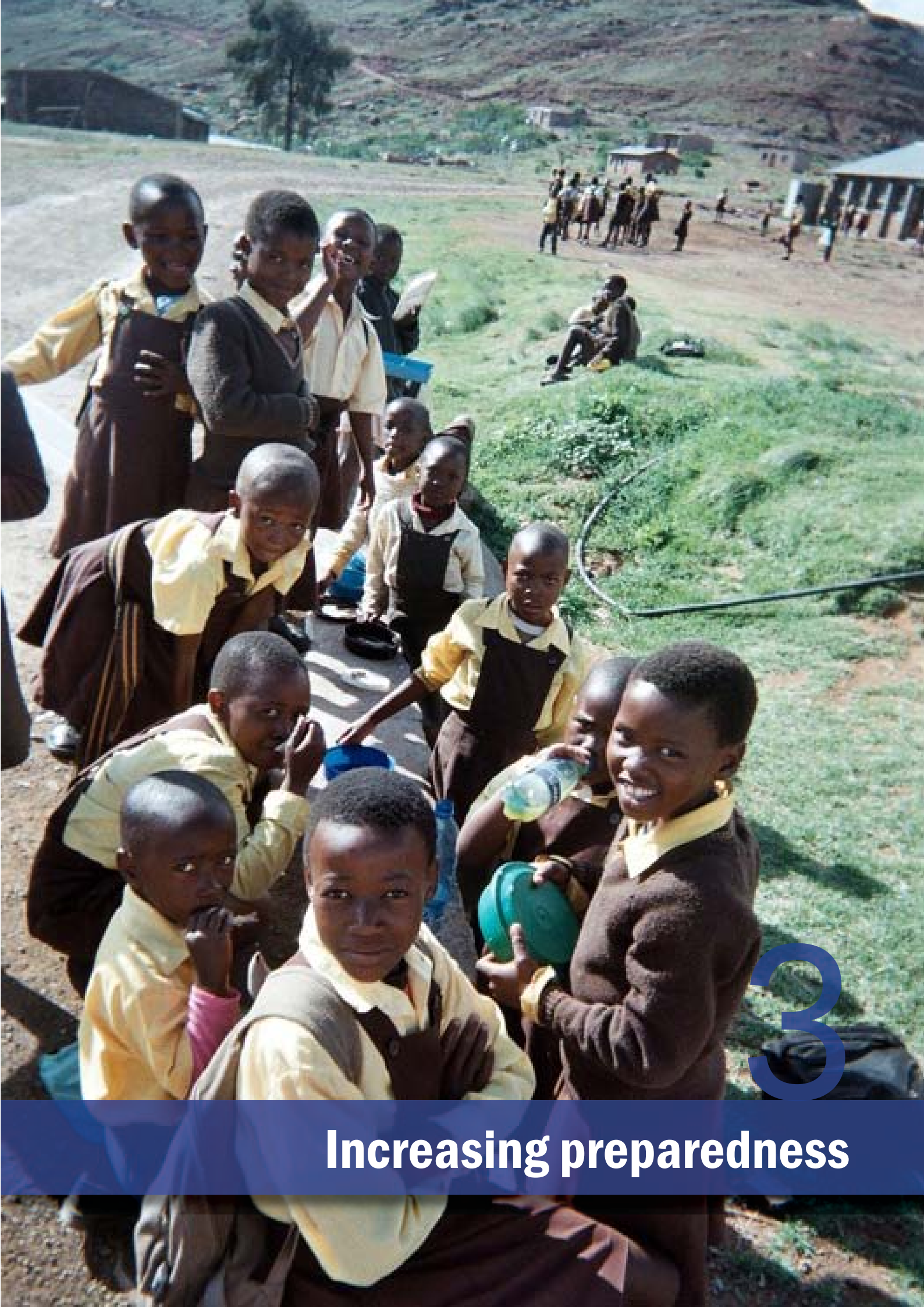
But in South Africa, eliminating school fees had no impact on primary enrolment in the country, where school costs were low and enrolments were already high. Secondary school enrolment increased by 3.5 per cent in the poorest households and not at all amongst the better off (Borkum, 2009). Where inequality is high and poorer communities are distinct from richer ones, as in South Africa, geographic targeting of interventions can be successful. This was also the case in Latin America, where enrolment increased by 10 per cent, but transfers were also larger, at 7-20 per cent of per capita expenditure, compared to just 1.5 per cent per child in South Africa.

Scholarship programmes can increase test scores

The Ningshan tuition relief programme in China paid for three years of high school tuition for students who were among the top 500 students in school entrance exams, resulting in significant positive impacts on maths test scores. The largest impact was seen among the poorest students.

Reduced school fees: conclusions

Reducing school fees increases schooling and merit-based scholarships increase learning outcomes. The poorest students benefit most. But context matters, as shown by the success of a tuition relief programme in Uganda at increasing enrolment and the failure of a similar programme in South Africa.



3 Increasing preparedness

Increasing preparedness

Early childhood development

Enhancing a child's cognitive and social skills through early child development (ECD) programmes can increase their school preparedness and hence their performance once they enrol in school. Getting children into the education system early may also increase the likelihood that parents commit to the child's full-time education later on. Although ECD is not part of primary and secondary education, which is the focus of this working paper, it is an intervention that may have strong positive effects on later stages of education.

Examples of ECD programmes include:

- **building and equipping preschool classrooms and providing new, trained teachers.** The Government of Uruguay built 414 new preschool classrooms in public primary schools from between 1995 and 1998, and increased the number of teachers to staffing them (Marco *et al.*, 2007).
- **at-home day care programmes**. In Colombia, local women provided day care in their own homes for up to 15 under-7-year-old children in a nationwide programme reaching one million poor children.
- **increasing parental engagement with young children.** Play leaders carried out home visits to families with undernourished children in rural Bangladesh, demonstrating play activities using homemade toys and promoting positive mother-child interaction (Baker-Henningham *et al.*, 2010).

ECD interventions had a positive impact on school enrolment and dropout rates as well as on maths and language scores

Links between ECD and learning

ECD programmes are expected to generate cognitive gains, which will enhance a child's ability to learn once he or she attends school. Moreover, exposure to learning materials, such as books, will increase school preparedness. This advantage is further enhanced in the case of preschool programmes by introducing children to a structured learning environment and developing social skills through interaction with other children.

Whether these gains are sustained or not is a matter for the evidence to determine.

A contrary perspective would highlight how some education systems, such as in Germany and the United States, start making children read much later than others, say the United Kingdom, for example. However, these differences in practices do not show up in adverse educational performance for late-starters in the later years of education. A possible reason for the failure of early gains to be sustained is that most ECD programmes come too late to make a real difference.

Making preschool available can make parents get in the 'education habit' either by seeing the benefits for their child or from having to make alternatives to relying on that child's labour. In addition, elder siblings who may have had to care for those now in preschool will be free to attend school, though the hours for preschoolers will be shorter.

Positive learning outcomes from ECD interventions

Based on the evidence from four included studies, ECD interventions had a positive impact on school enrolment and dropout rates, as well as on maths and language scores. In the case of a preschool programme in rural Mozambique, children who had attended preschool were 24 per cent more likely to be enrolled in primary school than the control group, and 21 per cent more likely to enrol at the intended age (Martinez *et al.*, 2011). School enrolment also increased for their elder siblings. Cognitive and problem-solving abilities improved, as did behavioural outcomes, with preschool children spending an extra 7.2 hours studying per week.

If children do better at school because of increased cognitive skills they are less likely to drop out. In Turkey, 86 per cent of children who had enjoyed daily games and activities with their mothers were still in school seven years after the intervention finished, compared to only 67 per cent of children who did not play with their mothers (Kagitcibasi *et al.*, 2001). In Jamaica, an ECD intervention targeted at stunted children led to improvements in test scores, and so significantly reduced dropout rates (Walker *et al.*,2005). The Jamaica study shows that home play can produce results that are as good as participation in formal preschool.

Not all programmes have worked. In Kenya, a preschool programme only increased test scores of those children with a more experienced teacher, showing that the quality of preschooling matters (Vermeersch and Kremer, 2004).

ECD: conclusions

ECD programmes have significant positive effects on children's educational achievement and for their prospects in later life. Playing games and interacting with children increases the number of years in school and their test scores, while building new preschools improves enrolment rates and test scores. As with all schooling programmes, it is essential that the quality of teaching is adequate to allow children to learn new skills in order to enhance school preparedness.

School feeding

School-feeding programmes may provide meals at school or preschool–either breakfast or lunch–or give out food parcels to be taken home.

Programmes are often targeted either geographically or within schools to the most disadvantaged children or to girls. Breakfast programmes in Peru (Jacoby, 1997), Jamaica (Powell *et al.*,1998) and Kenya (Vermeersch and Kremer, 2004), all targeted either remote areas or young children (grades 2 through 5 in Jamaica, and ages 4 through 6 in Kenya). The food given in school-feeding programmes varies, usually being procured locally. In Peru, fortified biscuits and a drink were provided; in Jamaica, a cheese sandwich or spiced bun; and in Kenya, porridge. The World Food Programme (WFP)-supported lunch programme in Burkina Faso was implemented in remote areas, serving meals in the canteen to all school children (Kazianga *et al.*, 2008). Providing lunch to schools in rural areas was one component of the pilot Dropout Intervention Programme launched in 1991 in the Philippines (Tan *et al.*, 1999).

WFP is the largest international agency supporting school feeding: in 2010 WFP delivered meals or take-home rations to 22.4 million children in 62 different countries around the world.[4]

[4]WFP website www.wfp.org

Take-home rations can also be linked to attendance requirements. In the Sahel, 10 kg of cereal flour per month is issued to girls if they have attendance rates of 90 per cent (Kazianga *et al.*, 2008). In Bangladesh, the nationwide Food for Education programme gives poor families a free monthly foodgrain parcel, conditional on having one primary-aged child in school who attended at least 85 per cent of classes (Meng and Ryan, 2007). This particular programme operated on a relatively large scale, reaching 2.1 million children after seven years of operation.

School feeding has a positive impact on enrolment, attendance and dropout rates and small, but significant, effects on learning outcomes

How does food translate into learning?

School-feeding programmes can improve children's education outcomes: addressing hunger and nutrition and by increasing school attendance.

Hunger affects children's ability to concentrate and malnutrition adversely affects cognitive development (Kristjansson *et al.* 2007). Breakfast, in particular, compensates for the decline in 'brain fuel' during the night (Jacoby *et al.* 1996). Better nourished children are less likely to become sick and miss school. But attendance is also affected ,as school feeding provides an incentive for parents to send their children to school. School feeding is a conditional non-cash (in-kind) transfer. The savings in food costs for the household help offset the cost of sending a child to school. Take-home rations reach other family members, and so may contribute to the cognitive development of younger siblings (Kazianga *et al.* 2008).

There are potential weak links in the causal chain between school feeding and better learning outcomes. The positive effect on hunger and malnutrition breaks down if there is substitution: parents give children less food at home as they get it at school. Moreover, the link between cognitive development and nutrition is strongest in early months and years of life. By the time children reach school age, the cognitive impact of additional nutrients is not clear (Vermeersch and Kremer 2004; Kristjansson *et al.* 2007). However, the immediate effects of assuaging hunger can benefit children of all ages and allow them to concentrate on learning rather than their stomachs. But the time spent administering school feeding may eat into teaching time, offsetting possible gains in learning outcomes.

Impact of school feeding

Greater attendance but little improvement in learning

Based on six included studies, school feeding has a positive impact on enrolment, attendance and dropout rates, and small, but significant, effects on learning outcomes. That is, school-feeding attracts children to enrol in school and to attend more frequently. While children are spending more time in class, this does not translate into better education outcomes for students. Why is that?

A first set of possible answers applies to all interventions that seek to increase demand.

Increasing demand can lead to overcrowded schools, and increasing the number of schools, teachers or classes available may mean that overall quality of education is low, as there are not enough trained teachers. Overcrowding has negative effects either as learning outcomes fall as the pupil-teacher ratio rises or because the new intake are less academically able and pulling down average test scores in the school. In the latter case, it is important to examine whether learning outcomes improve for new attendees, with that of already-in-school children being at least unchanged. Such a situation is not incompatible with no overall average effect, or even a negative one. But that average is misleading.

In Kenya, it seems that low school quality can explain the results. Overall, there was no impact on numeracy and literacy skills although children taught by more experienced teachers did experience improvements (Vermeersch and Kremer, 2004). Poor school quality was also argued to constrain learning outcome gains in Jamaica, though some improvements were seen (Powell *et al.*, 1998).

Increased enrolment indeed increased class sizes from 27 students to 34 in Kenya. However, it is not possible to know whether these increases adversely affected learning outcomes without knowing the relationship between class size and learning outcomes.

It is possible, in this context, that administering the school feeding disrupted the school day. In Kenya, breakfast was often served well into the school day, due to which teaching time dropped by 15 per cent in programme schools. In Jamaica, by contrast, breakfast was always finished before the start of the school day.

A variation on the story of new entrants doing badly is that incentives may encourage enrolment but that actual attendance remains low. The take-home ration programme found that girls in families receiving the take-home ration attended less than those that did not (Kazianga *et al.*, 2008). Families enrolled girls to get the ration, but were unable to free them from domestic obligations. Effective enforcement of attendance requirements can overcome this problem.

Issues in programme design may undermine impact: food may be of poor quality, insufficient (including if there is leakage), or may not be suitable for local tastes. And, as noted above, school feeding comes too late to reverse the adverse effect of malnutrition on cognitive development. No instances of these problems were found in the studies included in this chapter.

Gender-disaggregated effects

Enrolment gains are strongest for girls. In both Bangladesh and Burkina Faso, take-home ration programmes available for all children increased enrolments for girls by more than they did for boys.

School feeding: conclusions

School feeding attracts boys and girls into the classroom, with some programmes having a stronger impact on girls. However, spending more time in school does not automatically translate into increased learning. Extra food alone will not improve a child's ability to read or count.

School feeding is too late to offset the adverse cognitive effects of malnutrition. Getting more children into school can exacerbate overcrowding, and administering the feeding can eat into the school day. And if quality of schooling is low, simply getting children to sit at a desk, if there is one, will not improve their learning.

Health interventions

Interventions that invest in health to improve schooling outcomes include:

- **treatment-based interventions**. In 2011, the state of Bihar in India, administered deworming drugs to 17 million children in a statewide school-based programme.[5]
- **prevention based interventions.** In northern Thailand, insecticide-treated bed nets were given to families with school-aged children in a refugee camp (Lengler, 2009). In rural Albania, iodine-deficient children aged 10-12 in primary school were given iodized oil to improve cognitive performance.[6]
- **other programmes.** These involve the provision of a school meal, referral to child-friendly health clinics, provision of first aid kits and provision of counselling or psychological support (Bundy *et al.*, 2006).

What are the links between health and education?

Health and nutrition problems hinder children from getting an education by reducing school participation and their ability to learn when they are at school. Children who are ill, attend school less and therefore miss out on classes and learning opportunities (Fernando *et al.*, 2006). Once they are at school, ill health may simply make children less attentive. But there is also a direct physiological link with poorer performance, as some diseases are detrimental to cognitive development. Uncomplicated malaria causes significant short-term impairment to cognitive functions; cerebral malaria has been shown to result in severe brain injuries causing longer-term learning disabilities (Fernando *et al.*, 2006).

Poor nutrition can lead to micronutrient deficiencies, which has been linked to reduced cognitive abilities (Bundy *et al.*, 2006). Lack of iron causes physical and cognitive impairments; iodine deficiency in pregnant women is linked to mental retardation of infants and causes cognitive impairment in older children (Jukes, 2008).

Health and nutrition problems hinder children from getting an education by reducing school participation and their ability to learn when they are at school.

[5] http://www.dewormtheworld.org/?q=node/153
[6] http://www.ajcn.org/content/83/1/108.long

Some nutrient deficiencies open the door to other health problems. Lack of vitamin A impairs immune function and iron metabolism, which can lead to increased morbidity and mortality from infectious diseases, and can cause blindness in children (Jukes, 2008). Puberty creates additional obstacles for girls' education, as lack of sanitary products, limited access to toilets or cramps may cause absenteeism during menstruation (Oster, 2009).

Impact of health interventions

Mixed results but overall positive impacts on attendance

Positive effects were seen across almost all studies, but the only significant finding was on attendance. In Sri Lanka, small positive effects were seen when children were provided with vitamin A supplementation at school, but it is unclear whether this is due to children feeling better as a result of supplementation. Providing menstrual cups to girls in Nepal showed only very small effects. Girls without cups were 2.6 per cent less likely to be in school on days they were menstruating. Even when they attended, they were in school 21 minutes less. Girls stated that the main reason they missed school during their periods was due to cramps, which this treatment did not alleviate (Oster, 2009). There was some evidence that providing fish oil supplements to school children increased attendance compared to children with no supplements (Hamazaki *et al.*, 2008). Three studies examined the impact of malaria treatment interventions. In Sri Lanka, malaria treatment reduced school absenteeism due to that specific illness by 63 per cent, while other forms of absenteeism remained the same (Fernando *et al.*, 2006). In Malawi, there was an overall reduction in absenteeism after the implementation of a malaria treatment programme (Simwaka *et al.*, 2009). In Kenya, no effects on schooling outcomes were found after a malaria treatment programme (Brooker *et al.*, 2012). This evidence may indicate that malaria treatment programs only target one barrier to schooling outcomes and that targeting malaria alone is often not enough.

A recent systematic review, which combines the findings from Kenya with one other study of deworming and school attendance concludes there is no overall effect

In Sri Lanka, test scores were 26 per cent higher in maths and language for children receiving treatment for malaria than for untreated children. Performance was directly related to the number of malaria attacks a child suffered. The improved test scores could be linked either to missing less school or children not suffering the effects of malaria, even if during the programme period all infections were uncomplicated. Evidence showed that missing school for other non-malarial reasons did not affect performance in either maths or language, demonstrating that malaria itself caused cognitive impairments and was responsible for lower test scores (Fernando *et al.*, 2006).

Deworming in the Kenyan programme increased school participation by 7.5 per cent, resulting in an overall 25 per cent reduction in school absenteeism.

Younger children demonstrated greater effects of up to ten per cent improvement, probably as a result of higher rates of infection to start with. Increased school participation could have been caused by children not feeling weak and listless or having improved concentration. There were also significant spillover effects. Untreated children in treatment schools attended more, as did children in untreated schools. These externalities are due to treated children infecting other children less, whether in school or in the neighbourhood. Thus, overall the treatment resulted in an average of two per cent increase in school participation in the entire area, translating into an extra 0.14 years of schooling (Miguel and Kremer, 2003).

However, a recent systematic review, which combined the findings from Kenya with another study on deworming and school attendance, concludes that there is no overall effect (Taylor-Robinson *et al.*, 2012).

Even in Kenya, where attendance improved, the deworming programme had no effect on test scores, reinforcing the point that increased time in school did not necessarily translate into increased learning (Miguel and Kremer, 2003). The systematic review also suggested no relationship between deworming and cognitive development (Taylor-Robinson *et al.*, 2012).

In the Malawi deworming programme, treated children repeated grades less and dropped out less: rates reduced by 51 and 37 per cent respectively. Test scores were not measured. It appears that administering malaria prophylaxis at school allowed children to get medicine more quickly, without having to travel long distances to a health clinic, and allowed teachers to keep a close eye on children's health, resulting in positive effects on their schooling (Simwaka *et al.*, 2009).

Some nutrient supplementation programmes have little to no effect on a child's attendance or learning outcomes while others seem to increase attendance dramatically. In Sri Lanka, vitamin A supplements had no impact on dropout rates. Children receiving vitamin A supplements lost fewer days to coughs and colds than children with no supplements (5.8 days versus 6.7 days). But there were no significant differences in absenteeism for either health or non-health reasons between treated and non-treated children. The studies showed that the main reason children missed school in this area of Sri Lanka was to help parents with agricultural activities, which would be unaffected by taking vitamin A (Mahawithanage *et al.*,2007).

One of the biggest impacts of any intervention in this study is that of a health education programme in Argentina. Training and games for asthma and epilepsy sufferers resulted in significant reductions in absenteeism. Asthmatic children went to school less in the autumn or winter, and in this period, treated children's absences fell from 10 to 6.9 days over 100 days in the winter, compared to an increase from 7.3 to 10 days in untreated asthmatic children. Improvements were also noted in the spring. Missed school days for children with epilepsy dropped from 10.3 to 6.9 days, compared to no change for untreated children. The treatment resulted in children learning how to take charge of their own behaviour and stimulated more positive beliefs about their illnesses, which in turn encouraged them to attend school more (Tieffenberg *et al.*, 2000).

Health programmes: conclusions

Programmes that treat children in school for malaria appear not only to reduce absenteeism and dropout rates, but also improve test scores. These results underscore the cognitive damage that malaria inflicts, which can be significantly reduced through treatment. Deworming does not always lead to increase in school enrolment and attendance, or an increase in test scores. The results for micronutrient and vitamin supplementation vary. Some projects show no impact while others show significant improvements in attendance. Overall, if programmes are to have an impact on educational outcomes, then the causal pathway which links the intervention to getting a child into school or learning should be clearly defined and plausible.

4

Providing information

Providing information

Two different types of information can be provided to parents and children:

- **information about the quality of education.** In Bangladesh, the Campaign for Popular Education publicised information in 2001 about the poor skill levels of 11- and 12-year olds (UNESCO, 2011). In Pakistan, the Learning and Education Achievement in Pakistan Schools (LEAP) Project gave parents two report cards in 112 randomly selected rural communities, one detailing their child's test scores and ranking compared to other children and the other ranking schools in each village by performance (Andrabi *et al.*, 2009). Since 2005, the NGO Pratham in India has been producing an annual report on learning outcomes based on tests delivered through a household survey.[7]

- **information about the economic benefits of higher education through statistics or meeting good role models.** As part of the USAID-funded Ambassador Girls Education Programme, local women are chosen as mentors to coach girls through their studies and visit schools to share their life experiences and how education played a role in their success.[8]

How does providing information impact school outcomes?

Different types of information are expected to work in different ways.

Sharing information about the economic benefits of staying in school enables parents and students to make better-informed decisions. The theory is that, based on local experience, parents underestimate the returns to education, so the information will increase enrolment and attendance (Nguyen, 2009; Jensen, 2010).

Overall, information programmes were not found to have an impact on enrolments and attendance

Providing clear information about their children's educational attainment informs parents about the lack of learning in many schools, helping them hold education providers to account and demand improvements (Andrabi *et al.*, 2009). Such information may cause parents to switch schools, causing reduced public sector enrolments. Or it may result in effective efforts to improve school quality, thus improving learning outcomes. This causal chain assumes parents are able to use the information provided and that school management is open to pressures from parents.

[7] http://www.pratham.org/M-19-3-ASER.aspx
[8] http://www.ungei.org/infobycountry/247_324.html

In both cases, effects may be greater amongst better educated parents. Maybe they can understand the information. But more likely they are better positioned to do something with it, for example, afford school and successfully engage with school management.

Impact of information programmes

Overall, information programmes were not found to have an impact on enrolment and attendance. Amongst learning outcomes, the only significant impact was on language, which resulted from report card interventions in India and Pakistan.

In Madagascar, supplying parents with statistics about increased income from schooling increased school attendance and improved test scores in languages and maths, but only among children of parents who had previously underestimated returns from schooling. The opposite effect was seen in children of parents who had overestimated the effect (Nguyen, 2008). Given the overall low impact of these interventions, more needs to be understood about the circumstances under which they work. Banerjee (2008) argued that the failure of Indian programmes showed the need for additional interventions to be provided along with information.

Both of the interventions educating people about the economic benefits of schooling were cost effective. In Madagascar, the programme cost of an additional school year is US$2.30, and only US$0.04 for an additional 0.1 standard deviation in test scores. For those households in the upper half of the income bracket, the programme in the Dominican Republic increased school enrolment at the same rate as PROGRESA, at a fraction of the cost.

The Pakistan report cards were also cost effective. The cost of providing the cards to the whole population (US$1 per child) was similar to the drop in school fees in well-performing schools (US$3 per child in a third of schools). The cost of public school is twice as high as private school, but offers reduced quality, therefore suggesting that voucher schemes could be an effective programme to improve quality in both public and private schools.

Information programmes: conclusions

While theory suggests that providing information to parents on schooling can increase both enrolment and learning outcomes, the evidence in favour of the interventions is not strong, despite positive response from some interventions. More needs to be learned about how these interventions work because, if successful, they can be very cost effective.

5

Supply-side interventions

Supply-side interventions

New schools and infrastructure

The review identified a range of school infrastructure projects:

- Actual bricks and mortar, as well as text books and teachers, can be supplied. The World Bank built some 8,000 school pavilions in Ghana between 1988 and 2003, replacing the mud-lined structures with limited sustainability and lifespan, that communities were responsible for building (World Bank, 2004a);
- New schools can be set up in an existing local community building. UNICEF and other partners supported the establishment of schools in mosques or public halls in Afghanistan (UNICEF, 2011); and
- School facilities can be improved. The Child Friendly School Programme in Sri Lanka included constructing latrines, gardens and play areas in 30 schools in poor communities (UNICEF, 2011).

How improving infrastructure can improve education outcomes

Starting schools in communities with no schools reduces the travel time and increases enrolments by parents who were reluctant to send young children, or girls of any age, to schools located at a distance. Improving facilities may also encourage higher enrolment, for example, separate toilets for girls may encourage female enrolment (Amin and Suran, 2005). But it may be that some groups have cultural resistance to modern education. New schools alone will not overcome such constraints.

There may also be an effect on learning outcomes. For example, repaired classrooms mean that lessons can continue even when it is raining (World Bank, 2004a). Reduced journey time to school makes children less fatigued with more time to do homework. These effects may not be observed if the learning environment is otherwise poor, including high rates of teacher absenteeism.

Better infrastructure building has a positive impact on school attendance and enrolment and on maths and language test scores

Impact of infrastructure

Based on evidence from six studies, better infrastructure building has a positive impact on school attendance and enrolment and on maths and language test scores.

Establishing new schools can have a substantial impact on enrolments: (1) in Afghanistan, primary school enrolment increased by 42 per cent (Burde and Linden, 2009);

(2) new girls' schools in rural Pakistan increased female enrolment by 22 per cent, and a spill over effect of nine per cent higher enrolment for boys, who may have enrolled to escort their sisters to and from school (Kim *et al.*, 1998a); and (3) school enrolment increased by 20 per cent in Burkina Faso through the Burkinabé Response to Improve Girl's Chances to Succeed (BRIGHT) programme (Levy *et al.*, 2009). The success of these programmes disproves suggestions that parents in rural or remote areas are intrinsically disinterested in educating their daughters: if appropriate schooling is available nearby, girls flock to the classroom. Although the BRIGHT programme included other interventions, qualitative work with parents confirmed that having a school nearby was one of the main motivations for sending their child to school, and an equal number of parents in the control group said a long journey kept children away from school.

All new school projects had a greater impact on girls than on boys, including when there was no explicit gender focus. For example, the increase in enrolment in Burkina Faso was 23 per cent for girls compared to 18 per cent for boys. Girls may respond more positively to new schools since their initial enrolment is lower, giving more room for improvement. But it is also possible that girls are more sensitive to distance. In Afghanistan, boys and girls are equally likely to attend a school that is nearby. But once children have to travel more than 1.5 km, girls are ten per cent less likely to go to school than boys.

Attendance also increased as a result of new schools in Burkina Faso and from school rehabilitation in Georgia. Rehabilitation did not have this effect in Bolivia, where dropouts were also unaffected (Newman *et al.*, 2002).

Test scores improved in the two cases examining this outcome: (1) in Afghanistan, pupils in the new schools increased their maths and language grades by 1.2 standard deviations (with a larger effect for girls), dropping by 0.19 standard deviations for every additional mile the child walked to school; and (2) in Burkina Faso, in the BRIGHT programme, maths and French tests improved by 0.4 standard deviations. The very large effect in the case of Afghanistan reflects the fact that most of these children were not in school before the programme.

But are these interventions cost effective?

Few reports provide analysis of the cost effectiveness of these infrastructure projects, which must be a concern, as the cost of infrastructure is high. In Bolivia, the average school refurbishment was estimated at US$60,650, resulting in the cost of keeping a child in school being US$8.63-US$10.93 over four years. The full three-year BRIGHT programme, which cost US$12.9 million, resulted in similar test score improvements compared to other, possibly cheaper, programmes.

Infrastructure: conclusion

New schools and upgrading schools result in some of the greatest effects on enrolment, attendance or dropouts, as well as increased learning, of all the programmes examined in this report. These projects also succeed in reaching girls and boys living in remote areas, who are part of the last ten per cent of children who have been left behind in the recent positive progress in education.

Unfortunately, there is insufficient evidence to conclude how cost-effective these interventions are or what complementary interventions may be required for infrastructure projects to be successful.

Materials

Various resources can assist teachers and improve school quality:

- Books, chalkboards and writing materials can be provided
- Teachers can receive pedagogical instructions and guides, including learning to teach different languages;
- Computers with appropriate software can be integrated into school curricula to help children learn; and
- Specialised teachers can be introduced into a school or community to improve outcomes among a particularly vulnerable group.

Theory of change for materials

The provision of learning materials, such as textbooks, posters, flip charts and chalkboards, can help children follow along with a teacher's instructions. New materials can also help teachers with their lessons. New technology, such as computer-based learning materials, can lead to self-learning. When integrated into the everyday curriculum, they can become a useful, effective way of encouraging students to learn. Alternately, computer-based learning can be implemented in addition to the regular school day, and serve as an effective remedial activity.

Improving school quality with additional resources can also increase school enrolment by encouraging students to go to school so that they can use the new materials.

Impact of materials

Across all interventions, materials are found to have a positive impact only on maths test scores. The improvements in school quality from these programmes were not sufficient to obtain a significant impact on attendance.

In China, children played computer maths games for 40 minutes, twice a week, to supplement their regular maths lessons (Lai *et al.*, 2012). Maths scores improved by 0.14 standard deviations in just one term, with greatest improvements for children with the lowest scores initially, or with less-

educated parents. A computer-based project in Maharashtra, India, also improved maths scores, although the activities were oriented to English (He, 2007). Another programme in India, in which children in grade four played maths games on computers for two hours each week, also improved maths scores (Banerjee *et al.*, 2005).

Providing materials, either through new chalkboards and flip charts, new computers or new teachers, has some positive impact on test scores, but no effects are seen on school enrolment, attendance and progression

However, in Colombia, a programme that refurbished computers donated by the private sector and placed them in public primary and secondary schools, had no effects. Teachers received training from the local university, focusing on how to use the computers in Spanish-language classes, but teachers tended to use them however they wanted, without teaching, as per the programme design (Barrera-Osoria, 2009).

Additional teachers can also be effective at increasing test scores. In Vadodara and Mumbai, India, young women from the community were employed as *balsakhi,* meaning a child's friend, to give extra tuition to those pupils in grades three to four who had not managed to master basic skills. Around 15 to 20 children were taken out of the regular lessons to receive supplementary teaching for two hours each day (Banerjee *et al.*, 2005). The programme produced increases in test scores in the first year and second year for all children in the school.

Although the programmes overall did not affect other schooling outcomes, those programmes focusing on attendance, dropout and other test scores did achieve some success:

- Interventions that aimed to improve attendance were somewhat successful, but the strongest impacts were seen in Colombia (Barrera-Osorio and Linden 2009) and Kenya (Glewwe *et al.*, 2004). It is possible that the introduction of new resources into the classroom gave students an incentive to attend school so that they could access these materials.
- A dropout intervention programme in the Philippines significantly reduced dropouts. The programme supplied teachers in rural areas with multi-level teaching materials and provided training on how to pace lessons according to different learning abilities (Tan *et al.*, 1999).
- Language test scores improved in all but one computer-assisted learning programme (Lai *et al.*, 2011; He, 2009; Banerjee, 2005 [d]). But this was only in cases where computers were provided in addition to regular teaching. This may suggest that the effects are only of additional teaching hours and not of the actual computers.

Materials: conclusion

Providing materials, either through new chalkboards and flip charts, new computers or new teachers, has some positive impact on test scores, but no effects are seen on school enrolment, attendance and progression. One targeted dropout programme did have positive, significant impacts on dropout rates, but this is an isolated case.

Employing additional contract teachers reduces class size for all children and can offer more targeted tuition at a slower rate for those children falling behind. Training current teachers to adapt their style for these disadvantaged children through new pedagogical methods can also help.

Additional teaching resources

Interventions to improve school quality through additional teaching resources include:

- **providing extra teachers.** In Chile, the 900 Schools Programme provided extra teaching for 18 to 20-year olds from the local community who held after-school workshops for children lagging behind in grades three and four to reinforce school teaching, as well as boost self-esteem (Garcia-Huidobro, 2002).
- **providing financial incentives for teachers so that they teach better.** A programme in Andhra Pradesh in India offered teachers bonus payments based on the average improvement of their students' test scores (Muralidharan, 2007).
- **providing teachers with new resources and teaching aids.** In China, students in rural communities were given additional courses in maths using computers. The programme was implemented outside of regular school hours and was aimed at improving test scores (Lai *et al.*, 2012).

How do additional resources affect education outcomes?

Education systems in many developing countries are geared towards the stronger students and focus on end-of-year exams (Glewwe *et al.*, 2009). The expansion of primary education has raised the teacher-pupil ratio, and brought more marginalised children into the classroom from poor households with illiterate parents who struggle to keep up with the curriculum (Banerjee *et al.*, 2005; UNESCO, 2011). Employing additional contract teachers reduces class size for all children, and can offer more targeted tuition at a slower rate for those children falling behind. Training current teachers to adapt their style for these disadvantaged children through new pedagogical methods can also help.

Incentives can ensure that teachers are actually in the classroom and encourage them to help students learn by giving bonuses and salary increases when students do well. Linking financial incentives to teachers to students' academic performance assumes that increased effort by teachers will lead to increased learning by children. However, teachers may also be tempted to force weaker students to repeat grades or even to drop out to keep average exam scores high (Glewwe *et al.*, 2003).

Although primarily aimed at improving learning outcomes, providing additional teaching resources may also improve enrolment and attendance. Parents are more likely to send their children to school if they see an improvement in schooling quality or if children themselves are keen to attend and use computers. And if classes seem more worthwhile, and children are doing better at school, then they are less likely to play truant or drop out.

Impact of teaching resources

Teacher interventions have significant, positive effects on increasing school attendance and enrolment, decreasing dropouts and at improving maths and language scores.

There were positive impacts on enrolment. In Pakistan, teaching qualifications were lowered to allow local women with only eight years of education to teach, as part of the Community Support Process to set up new girls' schools in remote villages in Pakistan. There was a marked increase in enrolment among girls in this area. Prioritising the teacher's sex over her experience was seen as instrumental in encouraging girls to attend school, as parents preferred female teachers for their daughters (Kim *et al.*, 1998a). In India, financial incentives were used to encourage better teacher attendance in non-formal education centres in Rajasthan. These centres provided schooling in rural and remote areas and were staffed by para-teachers who were less qualified and who had lower salaries than official government teachers. Para-teachers received a flat salary of Rs500 if they attended fewer than ten days in a month, but received an additional Rs50 for every additional teaching day. The programme had positive effects on school enrolment (Duflo *et al.*, 2007).

Teacher interventions have significant, positive effects on increasing school attendance and enrolment and decreasing dropouts and at improving maths and language scores

The Rajasthan programme also had a positive effect on attendance, as did the Extra Teacher Programme in Kenya, where student absenteeism dropped by 11 per cent among primary school pupils taught by contract teachers (Duflo *et al.*, 2007). Higher attendance may have resulted from lower absenteeism amongst contract teachers, who were 30 per cent more likely to be in class than regular teachers. Contract teachers also covered the full curriculum and this greater effort may have given pupils themselves a greater sense of responsibility. The increased effort of contract teachers was driven by the need to renew their contract each year and the hope of graduating to a permanent civil service teaching position (Duflo *et al.*, 2009).

Dropout rates decreased overall

A programme in Kenya gave teachers of grades four through eight prize money, equivalent to 21-43 per cent of their monthly salary for the best performing classes, and for those with the strongest improvement. To discourage teachers from forcing dropouts or repetitions by weaker students, any child who did not take the test was automatically given a low grade (Glewwe *et al.*, 2003). Small, but positive, significant outcomes were seen. Similar results were seen in the Extra Teacher Programme also in Kenya and the Para-teachers in Rajasthan, India (Duflo *et al.*, 2007; 2009).

Maths and language outcomes improved, though global test scores (calculated from a non-overlapping set of studies) did not. Positive impacts followed these pathways:

- Increased attendance by both teachers and pupils in the Kenyan Extra Teacher Programme are the likely explanation of the positive impact on both maths and language scores. Greater teaching time may also have played a role in the positive impact of computer-assisted learning in China, as the classes were outside regular school hours.

- Computer-assisted learning in China (Lai 2011), Colombia (Barrera-Osorio *et al.*, 2009) and India (He *et al.*, 2007) may also have increased learning outcomes because the quality of instruction provided by the computer was higher, pupils engage, more avidly with computers or because teachers spent more time with the less able pupils, as the more able were able to be left unassisted with the computer learning package. Both studies show, that computers needed to be provided with appropriate software.
- Additional teachers may come from the community. The programme in India, which provided interactive learning materials, found that pupils did better when taught by local teachers than by non-local ones, including in maths although that was not a target subject. Local teachers may be more effective if there is a local language, because pupils are more comfortable with them, or the teacher is more sensitive to individual student's circumstances.

The studies on global test scores, which found no impact, were two teacher incentive programmes in Kenya (Kremer *et al.*, 2003 and Glewwe *et al.*, 2003) and multi-grade teaching in Cameroon (Hasler, 2012). Multi-grade teaching makes small schools in remote areas more viable, so the result of not affecting learning outcomes is a good result, as theory might suggest otherwise.

The failure of the Kenyan teacher incentive programmes shows that not all incentive programmes work. In one case, teachers did not attend school more often, did not give more homework and did not alter their teaching methods, but did hold more preparation classes for exams (Glewwe *et al.*, 2003). The other incentive programme paid teachers an attendance-based incentive scheme, but records were poorly kept, so the scheme may not have been properly applied (Kremer *et al.*, 2003). This latter finding is echoed in a study in India that found that head teachers gave the incentive of a bicycle to all teachers, regardless of whether they satisfied the attendance performance criteria or not (Banerjee *et al.*, 2005).

Costs and cost-effectiveness

In terms of extra teachers, a contract teacher in Kenya earned US$30 per month, whereas a regular teacher earned US$120. Yet pupils taught by contract teachers increased their test scores significantly and so were more cost-effective than regular teachers.

Teaching resources: conclusions

Interventions providing additional teaching resources had a high impact on the full range of education outcomes. Additional teachers and computer-assisted learning proved the most effective. The record of teacher incentives was unsatisfactory, apparently floundering partly on poor implementation.

School-based management

School-based management (SBM) programmes, which bring authority and accountability to the individual school level, can be defined by who has the power to make decisions, as well as the degree of decision-making (Barrera-Osorio and Linden, 2009). The underlying rationale is that local communities, notably parents, are better informed and more motivated to ensure good school performance than are government officials, who may focus on quantity rather than quality (Banerjee *et al.*, 2008).

Initiated in Australia in the 1970s, SBM has become a key component of education reforms in many countries in the developed world (Khattri *et al.*, 2010), such as Canada, Israel and the United States (Barrera-Osorio and Linden, 2009). A review of World Bank education programmes found that ten per cent of them supported SBM (Barrera-Osorio and Linden, 2009).

SBM provides support to either existing or new education management structures. Pratham's programme to re-energise village education committees in India is an example of the former (Banerjee, 2008), and the committees set up in Pakistan under the Community Support Process, an example of the latter (Kim *et al.*, 1999a). These structures are usually linked to a specific school, though in Madagascar, the Ministry of Education also introduced monitoring through district and sub-district structures (Nguyen, 2008b).

Support to SBM can include training and materials intended to increase the power of community members with respect to school management and an increased parental contribution in the running of the school. Mechanisms for achieving this shift in power are:

- **allocating funds for school improvement through school management committees, the use of funds often being restricted through either a positive list or a negative list.** The Quality Schools Programme in Mexico provided US$15,000 cash grants over five years to implement school improvement plans developed by parents and teachers in poor urban areas. Most of the funding had to be spent on school supplies and infrastructure, though in the final year, half was allocated for teacher and principal training programmes (Skoufias and Shapiro, 2006).

A very similar approach was adopted in World Bank-supported projects in both Cambodia and the Philippines (World Bank, 2004b; Yamauchi and Liu, 2011).

- **providing information on school performance relative to other nearby schools.** This was done in Madagascar and India (Barrera-Osorio and Linden 2009).

- **directly monitoring teacher performance, including having the power to hire and fire teachers.** Under the Extra Teacher Programme in Kenya, school committees were trained to evaluate the performance of contract teachers and made the decision whether to renew their contract at the end of the year (Duflo *et al.*, 2009). Under the Community Support Process in Pakistan, parents identified suitable local women to teach at the school and then monitored their performance (Kim *et al.*, 1999a). In Madagascar, the Associations of Parents of School Children raised funds to pay for extra community teachers, and they had a say in the hiring and firing of these new staff (Barrera-Osorio and Linden, 2009).

How local school empowerment affects learning

SBM can improve the quality of education by increasing parents knowledge about how their children's school is doing. This is possible by their involvement in school planning, combined with empowering parents with a say over resource allocation through school improvement grants and direct incentives to teaching, most notably parental involvement in hiring and firing decisions.

Local teachers and parents are more likely to know what is needed in their own school, and are more likely to care about whether schools offer quality education (Gertler *et al.*, 2008). Parent associations may also provide a channel for schools to raise additional resources to improve school quality.

These advantages may not be realised if local communities lack the skills or knowledge to effectively manage schools and may lead them to inappropriately micromanage teachers in the classroom (World Bank, 2004b).

Further, benefits to SBM may take time to materialise: an SBM programme in Colombia did not see improvements in test scores for around five to eight years (Barrera-Osorio and Linden, 2009).

Impact of SBM

Overall, SBM has a positive impact on learning outcomes, though this conclusion is based on few studies. Supporting evidence is given by overall positive impacts on both dropout and repetition, both of which are proxies for learning outcomes. Additionally, improved teacher performance led to increased attendance in Kenya but not Madagascar. In Mexico, parents spent more time assisting children with their homework when the community became more involved in school management.

Another programme in Mexico found benefits to be concentrated in better off schools in urban areas, with no gains in rural areas. Poorer parents are less able to contribute either managerial skills or finance to assist the local school. In Ghana, schools in the better-off areas can expect to receive ten times as much in parent-teacher association contributions as can schools in the least well off areas (World Bank, 2004a).

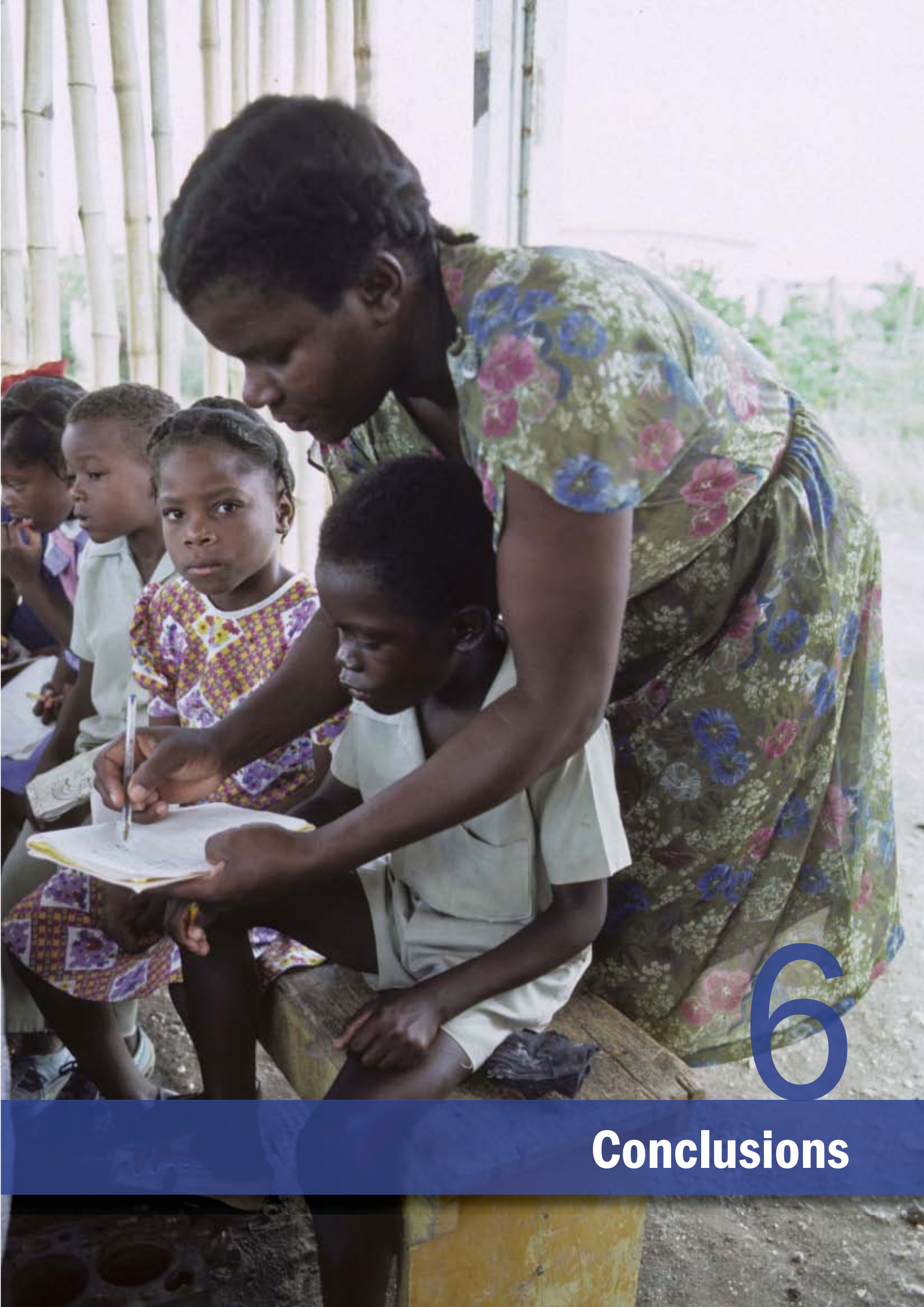
Overall, SBM has a positive impact on learning outcomes, though this conclusion is based on few studies.

However, in general, studies provide a weak evidence base for understanding the mechanisms through which SBM affects learning outcomes.

There is little evidence regarding school enrolment or attendance, and what there is suggests no impact. But these outcomes are not the primary purpose of SBM.

SBM: conclusion

The limited evidence available suggests that school-based management programmes improve test scores. Evidence is not available to know whether this improvement comes from parental involvement in school management or from additional resources from school management grants or funds raised by parents.



6 Conclusions

Conclusions

Impact: the overall assessment

Interventions aimed at getting children into school work. The overwhelming majority of studies find positive impacts on both enrolments and attendance, so the average treatment affect is clearly positive (see appendix 2).

And interventions aimed at getting children to stay in school also work. Although the average effect is weaker, overall studies assessing impact on drop out and progression found positive effects (see appendix 2).

Learning outcomes also improved. While there are fewer studies, the overall effects size for all four learning outcomes was positive, being strongest for maths and language, and weaker for global tests scores and 'other achievement' (see appendix 2).

However, the broad aggregation across all different interventions is not useful as a guide to policy. Of course, some interventions work better than others, and for many there is little evidence (see tables 1 and 2). These results are presented in the next section.

Which interventions are most effective?

In assessing intervention types we identified five evidence categories (see figure 2):

1) What works
2) What does not work
3) What is promising
4) What is not promising but could use more research
5) What we do not know (too little evidence)

Figure 2: Evidence categories of interventions

What works	When six or more studies pooled together had effect sizes that were positive and significant at the 10% level
What does not work	When more than six studies pooled together showed no significant impact
What is promising	When fewer than 3-5 studies pooled together showed significant, positive impact
What is not promising but could use more research	When 3-5 studies pooled together showed no significant impact
What we do not know	When fewer than two studies were available to assess impact

There is compelling evidence for the effectiveness of CCTs on school enrolment and attendance. Health interventions also had a significant, positive impact on school attendance. Providing new materials, namely computer-assisted learning tools, had significant, positive impacts on maths test scores.

The evidence shows that providing materials had no impact on school attendance or language test scores. The contrast between the impacts of materials on maths and language test scores may be due to the targeted nature of computer-assisted learning, which in many cases in this paper involved the provision of specific maths training. This evidence also counters the argument that providing materials works to draw more students into the classroom by providing an incentive.

Some interventions seem to not be effective because studies pooled together found no significant results. However, decisions about the effectiveness of these interventions should be made with caution, given the limited number of studies.

There were several promising interventions. Teacher resources, new school buildings, CCTs, early childhood development interventions, school-based management and school-feeding programmes all had significant positive effects on schooling outcomes, but more studies are needed to confirm these findings.

Design issues

A major challenge among these interventions is that the increase in students causes strain on the education system. Newly enrolled children often come from poorer or more disadvantaged backgrounds, with limited abilities in comparison with other classmates and are thusly less able to follow the curriculum.

Hence, test scores and other learning outcomes may fail simply because of the new, less able children joining the class. They may drag down the performance of the already-enrolled, either because of the disruption they cause, or simply as the teacher has to devote more time to them or go at a slower pace. But the evidence does not support this argument. There are no cases of learning outcomes being negatively affected by these interventions.

For the majority of interventions studied in this review, there is simply not enough evidence available to determine their effectiveness. Therefore, it is not possible to know if these interventions are effective. This highlights some key areas for further research in order to best inform policy and practice surrounding interventions to improve learning outcomes.

A final caveat is that few of the studies reviewed were carried out with difficult-to-reach populations. New approaches need be tried and tested for these groups.

Table 1: Summary of results tables

Outcome	What Works?	What Doesn't Work?	What's Promising?	Not promising but could look for further research	What we don't know
Enrolment/ Attendance	CCTs Health interventions (attendance)	Materials (attendance)	Teacher Resources (attendance) Buildings ECD (enrolment) School Feeding (enrolment)	Teacher Resources on global test scores SBM School Feeding (attendance)	Teacher Resources (enrolment) Health (enrolment) ECD (attendance) Materials (enrolment) Vouchers School Fees Providing Information
Progression, Repetition, Dropout			Teacher Resources (dropout) CCTs SBM (progression)	SBM (dropout)	Teacher Resources Health ECD Materials School Feeding Vouchers School Fees Providing Information
Test Scores	Materials (maths)	Materials (language)	Teacher Resources SBM (maths) School Feeding (maths)	Teacher Resources (global) Health (maths, language) CCTs (global) School Feeding (language)	Health (global) CCTs ECD Materials (global) SBM School Feeding Vouchers School Fees Providing Information

Table 2: Overall pooled effect sizes by outcome and intervention type

Interventions Type	Enrolment	Attendance	Dropout	Progression	Maths	Language	Global
Teacher Resources	0.233** 2	0.090*** 4	0.090** 3		0.292** 5	0.284** 5	-0.016 3
Buildings	0.403** 4	0.377** 3	0.419 2	0.201 1	0.505** 2	0.383** 2	
Health	0.291 1	0.216** 8	0.032 2	0.384*** 1	0.350 5	0.173 4	-0.032 1
CCT	0.217*** 16	0.198*** 8	0.111*** 4	0.165** 4	-0.018 2	-0.029 1	0.054 3
ECD	0.0198*** 3				0.420*** 2	0.514*** 2	0.020 1
Materials		0.047 8	0.216 2	0.000 1	0.160*** 10	0.204 9	0.112 2
SBM	0.082 3	-0.024 3	0.237 3	0.058** 3	0.227*** 3	0.118 2	0.195*** 1
School Feeding	0.156** 3	0.210 5	0.449*** 2	0.69*** 1	0.060 4	0 4	0.02 1
Vouchers	0.028 1				-0.121 2	-0.351 2	
School Fees	0.019 2	0.63*** 1			0.133*** 1		
Providing Information	0.031 2	-0.103 2	-0.007 2		0.402 2	0.048** 2	0.031 2
Pooled							

Note: The first figure is the effect size, and the second figure the number of studies *p,<0.1, **p<0.05, ***p<0.001

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World Bank (2011) *Learning for all: Investing in People's Knowledge and Skills to Promote Development.*

Appendix 1

Search strategy

The search strategy for the original systematic review was as follows:

Only evaluation studies that had the following characteristics were included.

(1) Assessed the impact of an intervention that included primary or secondary school outcomes (corresponding to Kindergarten-12th grade in the U.S. context or approximately age 5-18) relevant to the main research question.

(2) Used a randomized controlled trial, or a quasi-experiment with evidence of baseline control on a main outcome

(3) Were conducted in a country classified as a 'low- and middle-income nation' by the World Bank at the time the intervention being studied was implemented.

(4) Included at least one quantifiable main outcome measure of school enrolment, attendance, dropout or progression.

(5) Published or made available before December 2009, without regard to language or publication type.

(6) Included data on participants from 1990 or beyond.

Searches were carried out using an extensive list of key words. Studies were identified through the following mechanisms:

1. Electronic searches of bibliographic databases
2. Hand searches of relevant journals
3. Citation chasing
4. Contacting the 'informal college' of researchers in this area
5. Internet searches and specialised holdings

Of the 73 studies that were retrieved for Petrosino *et al.*, four were excluded from this Working Paper as they were not interventions whose main intention was education outcomes.

Additional studies included in the evidence presented in this working paper were identified through snowballing, hand searching of the main journals and working paper series publishing relevant papers, and the websites of the main organisations engaged in relevant research to identify studies that were published after 2009, and studies that focused explicitly on test scores.

Appendix 2

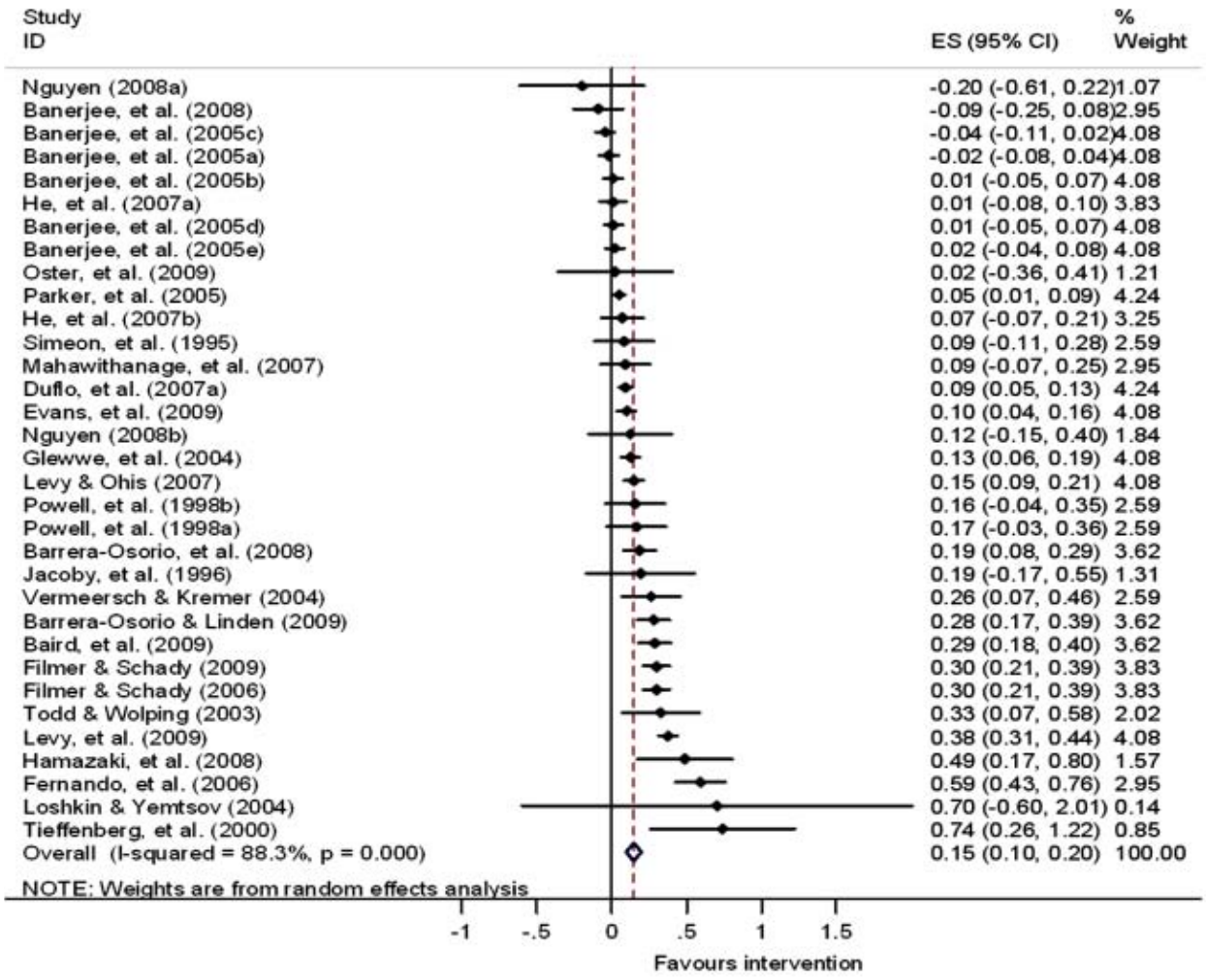
Impact: the overall assessment

A forest plot is a graphical representation of the studies included in, and results from, meta-analysis. Each horizontal line represents a single study, which is identified in the left-hand column. The length of the line represents the 95 per cent confidence interval of the effect estimate from the study. The mid-point of the line is the mean effect estimate for the study.

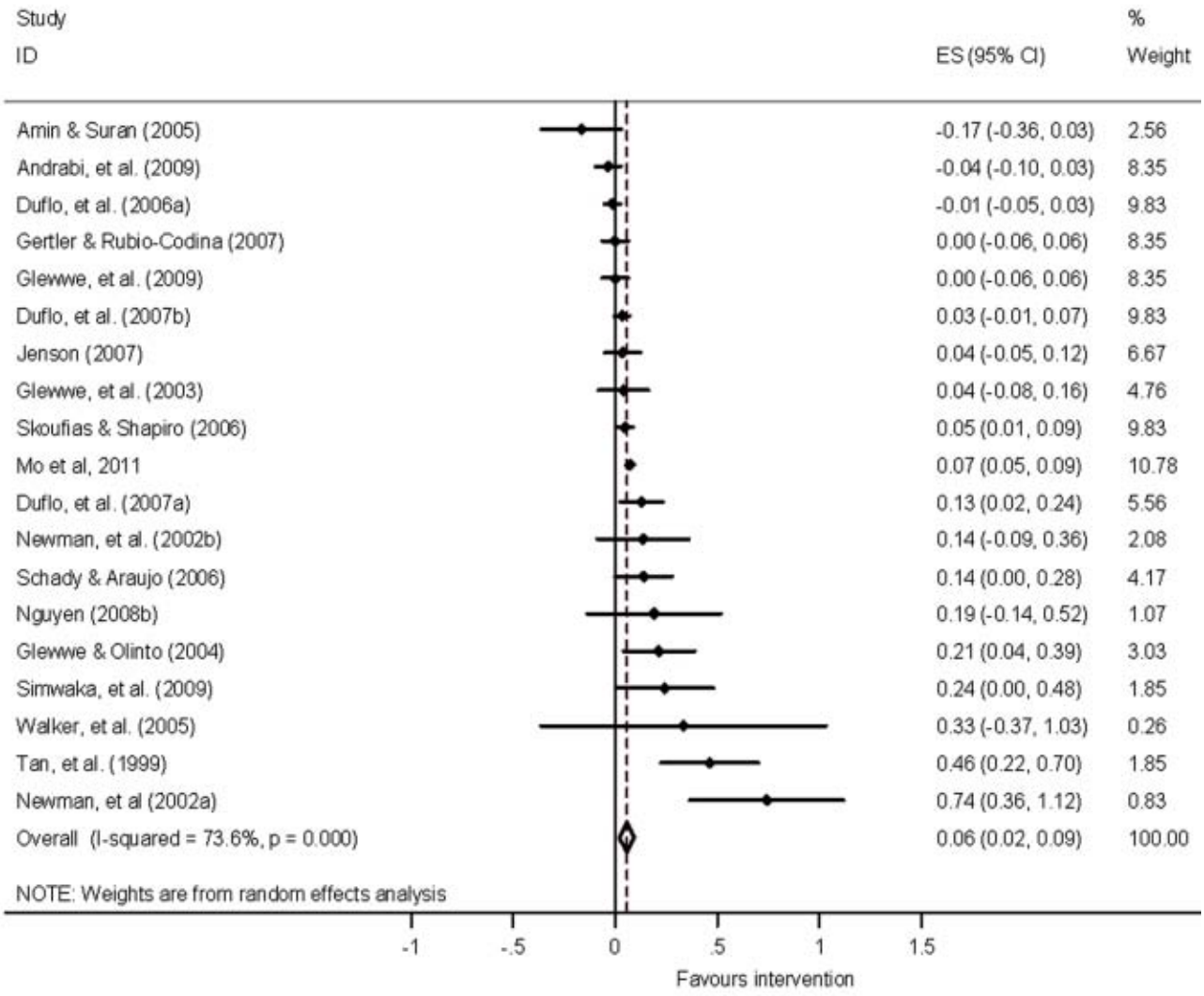
The vertical line corresponds to 'no effect' so may be drawn at either 0 or 1, the latter being used if study findings are reported as odds ratios. If the horizontal line for a study crosses the vertical line, that individual finds no significant effect from the intervention.

The diamond at the bottom of the plot represents the overall effect. The width of the diamond represents the 95 per cent confidence interval for the overall effect estimate. If the diamond does not cross the vertical line then the meta-analysis shows a significant effect from the intervention.

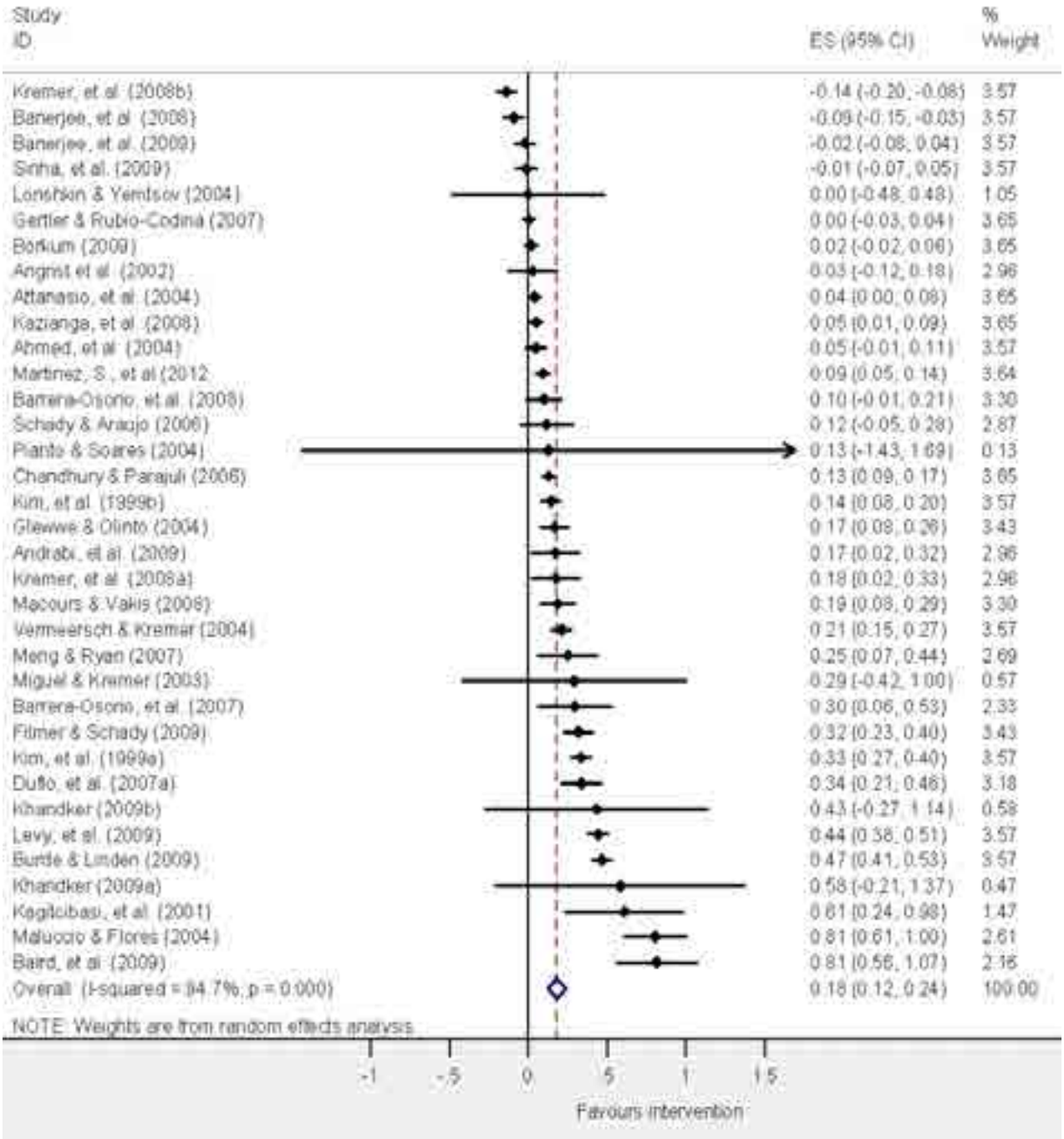
Attendance



Dropout


Study ID
ES (95% CI)
% Weight
Amin & Suran (2005) -0.17 (-0.36, 0.03) 2.56
Andrabi, et al. (2009) -0.04 (-0.10, 0.03) 8.35
Duflo, et al. (2006a) -0.01 (-0.05, 0.03) 9.83
Gertler & Rubio-Codina (2007) 0.00 (-0.06, 0.06) 8.35
Glewwe, et al. (2009) 0.00 (-0.06, 0.06) 8.35
Duflo, et al. (2007b) 0.03 (-0.01, 0.07) 9.83
Jenson (2007) 0.04 (-0.05, 0.12) 6.67
Glewwe, et al. (2003) 0.04 (-0.08, 0.16) 4.76
Skoufias & Shapiro (2006) 0.05 (0.01, 0.09) 9.83
Mo et al, 2011 0.07 (0.05, 0.09) 10.78
Duflo, et al. (2007a) 0.13 (0.02, 0.24) 5.56
Newman, et al. (2002b) 0.14 (-0.09, 0.36) 2.08
Schady & Araujo (2006) 0.14 (0.00, 0.28) 4.17
Nguyen (2008b) 0.19 (-0.14, 0.52) 1.07
Glewwe & Olinto (2004) 0.21 (0.04, 0.39) 3.03
Simwaka, et al. (2009) 0.24 (0.00, 0.48) 1.85
Walker, et al. (2005) 0.33 (-0.37, 1.03) 0.26
Tan, et al. (1999) 0.46 (0.22, 0.70) 1.85
Newman, et al (2002a) 0.74 (0.36, 1.12) 0.83
Overall (I-squared = 73.6%, p = 0.000) 0.06 (0.02, 0.09) 100.00
NOTE: Weights are from random effects analysis
-1
-.5
0
.5
1
1.5
Favours intervention

Enrolment


Study ID
ES (95% CI)
% Weight
Kremer, et al. (2008b) -0.14 (-0.20, -0.08) 3.57
Banerjee, et al. (2008) -0.09 (-0.15, -0.03) 3.57
Banerjee, et al. (2009) -0.02 (-0.08, 0.04) 3.57
Sinha, et al. (2009) -0.01 (-0.07, 0.05) 3.57
Lonshkin & Yemtsov (2004) 0.00 (-0.48, 0.48) 1.05
Gertler & Rubio-Codina (2007) 0.00 (-0.03, 0.04) 3.65
Berlkum (2009) 0.02 (-0.02, 0.06) 3.65
Angrist et al. (2002) 0.03 (-0.12, 0.18) 2.96
Attanasio, et al. (2004) 0.04 (0.00, 0.08) 3.65
Kazianga, et al. (2008) 0.05 (0.01, 0.09) 3.65
Ahmed, et al. (2004) 0.05 (-0.01, 0.11) 3.57
Martinez, S., et al (2012 0.09 (0.05, 0.14) 3.64
Barrera-Osorio, et al. (2008) 0.10 (-0.01, 0.21) 3.30
Schady & Araujo (2006) 0.12 (-0.05, 0.28) 2.87
Pianta & Soares (2004) 0.13 (-1.43, 1.69) 0.13
Chandhury & Parajuli (2006) 0.13 (0.09, 0.17) 3.65
Kim, et al. (1999b) 0.14 (0.08, 0.20) 3.57
Glewwe & Olinto (2004) 0.17 (0.09, 0.26) 3.43
Andrabi, et al. (2009) 0.17 (0.02, 0.32) 2.96
Kremer, et al. (2008a) 0.18 (0.02, 0.33) 2.96
Macours & Vakis (2008) 0.19 (0.08, 0.29) 3.30
Vermeersch & Kremer (2004) 0.21 (0.15, 0.27) 3.57
Meng & Ryan (2007) 0.25 (0.07, 0.44) 2.69
Miguel & Kremer (2003) 0.29 (-0.42, 1.00) 0.57
Barrera-Osorio, et al. (2007) 0.30 (0.06, 0.53) 2.33
Filmer & Schady (2009) 0.32 (0.23, 0.40) 3.43
Kim, et al. (1999a) 0.33 (0.27, 0.40) 3.57
Duflo, et al. (2007a) 0.34 (0.21, 0.46) 3.18
Khandker (2009b) 0.43 (-0.27, 1.14) 0.58
Levy, et al. (2009) 0.44 (0.38, 0.51) 3.57
Burde & Linden (2009) 0.47 (0.41, 0.53) 3.57
Khandker (2009a) 0.58 (-0.21, 1.37) 0.47
Kagitcibasi, et al. (2001) 0.61 (0.24, 0.98) 1.47
Maluccio & Flores (2004) 0.81 (0.61, 1.00) 2.61
Baird, et al. (2009) 0.81 (0.56, 1.07) 2.16
Overall (I-squared = 94.7%, p = 0.000) 0.18 (0.12, 0.24) 100.00
NOTE: Weights are from random effects analysis
-1
-.5
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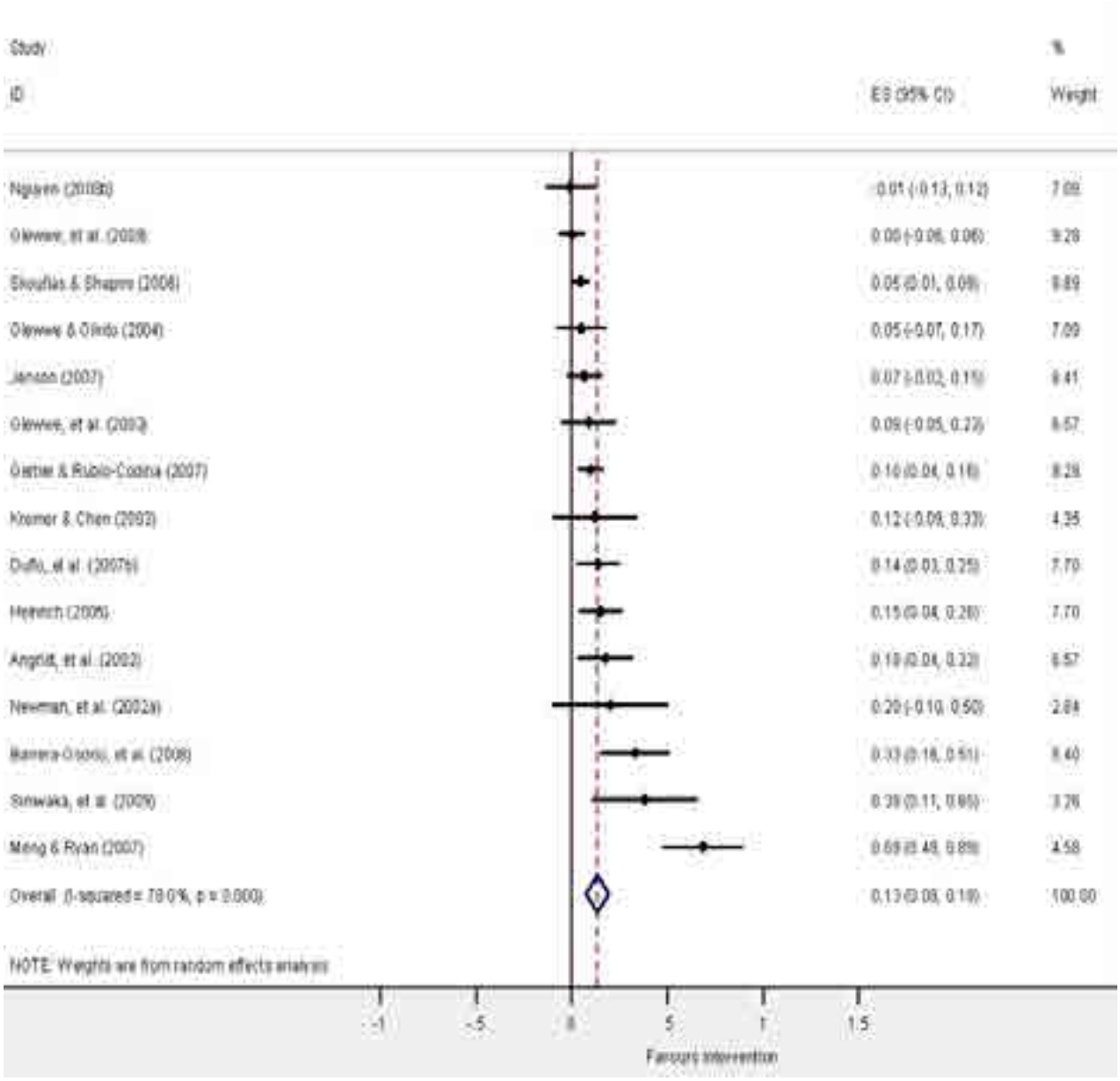
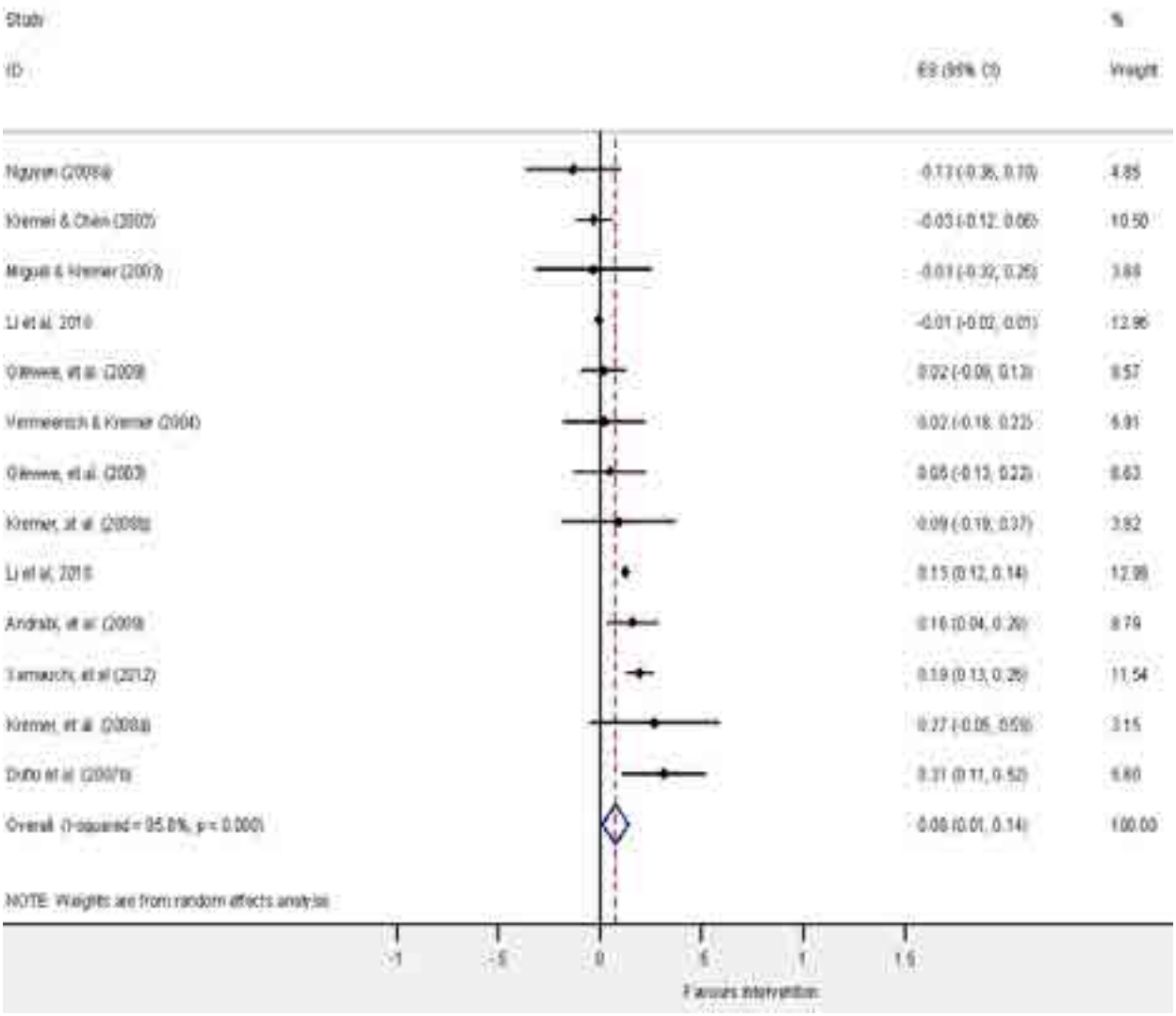
.5
1
1.5
Favours intervention

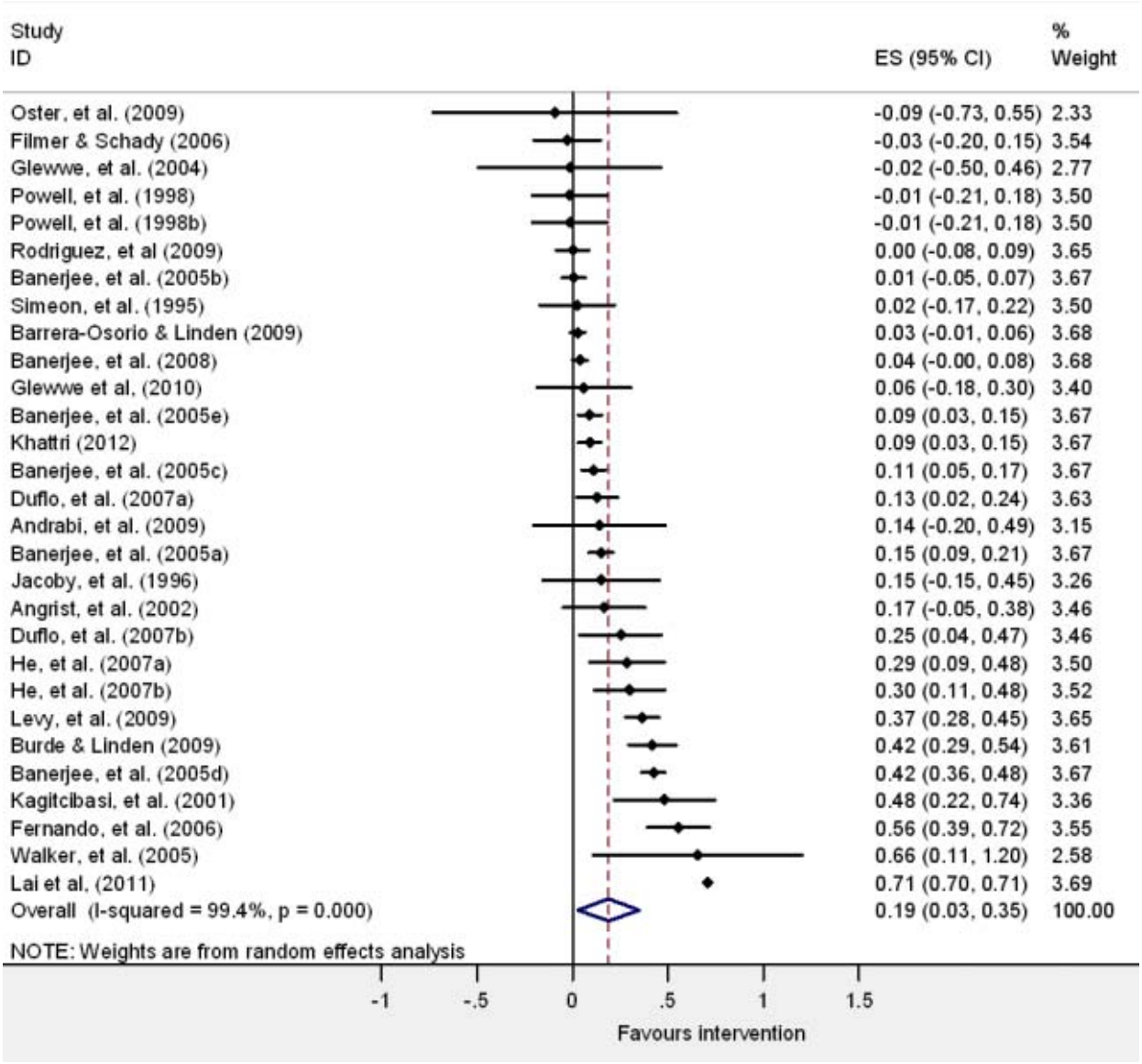
Progression



Global test scores



Language


Study ID
ES (95% CI)
% Weight
Oster, et al. (2009) -0.09 (-0.73, 0.55) 2.33
Filmer & Schady (2006) -0.03 (-0.20, 0.15) 3.54
Glewwe, et al. (2004) -0.02 (-0.50, 0.46) 2.77
Powell, et al. (1998) -0.01 (-0.21, 0.18) 3.50
Powell, et al. (1998b) -0.01 (-0.21, 0.18) 3.50
Rodriguez, et al (2009) 0.00 (-0.08, 0.09) 3.65
Banerjee, et al. (2005b) 0.01 (-0.05, 0.07) 3.67
Simeon, et al. (1995) 0.02 (-0.17, 0.22) 3.50
Barrera-Osorio & Linden (2009) 0.03 (-0.01, 0.06) 3.68
Banerjee, et al. (2008) 0.04 (-0.00, 0.08) 3.68
Glewwe et al, (2010) 0.06 (-0.18, 0.30) 3.40
Banerjee, et al. (2005e) 0.09 (0.03, 0.15) 3.67
Khattri (2012) 0.09 (0.03, 0.15) 3.67
Banerjee, et al. (2005c) 0.11 (0.05, 0.17) 3.67
Duflo, et al. (2007a) 0.13 (0.02, 0.24) 3.63
Andrabi, et al. (2009) 0.14 (-0.20, 0.49) 3.15
Banerjee, et al. (2005a) 0.15 (0.09, 0.21) 3.67
Jacoby, et al. (1996) 0.15 (-0.15, 0.45) 3.26
Angrist, et al. (2002) 0.17 (-0.05, 0.38) 3.46
Duflo, et al. (2007b) 0.25 (0.04, 0.47) 3.46
He, et al. (2007a) 0.29 (0.09, 0.48) 3.50
He, et al. (2007b) 0.30 (0.11, 0.48) 3.52
Levy, et al. (2009) 0.37 (0.28, 0.45) 3.65
Burde & Linden (2009) 0.42 (0.29, 0.54) 3.61
Banerjee, et al. (2005d) 0.42 (0.36, 0.48) 3.67
Kagitcibasi, et al. (2001) 0.48 (0.22, 0.74) 3.36
Fernando, et al. (2006) 0.56 (0.39, 0.72) 3.55
Walker, et al. (2005) 0.66 (0.11, 1.20) 2.58
Lai et al, (2011) 0.71 (0.70, 0.71) 3.69
Overall (I-squared = 99.4%, p = 0.000) 0.19 (0.03, 0.35) 100.00
NOTE: Weights are from random effects analysis
-1
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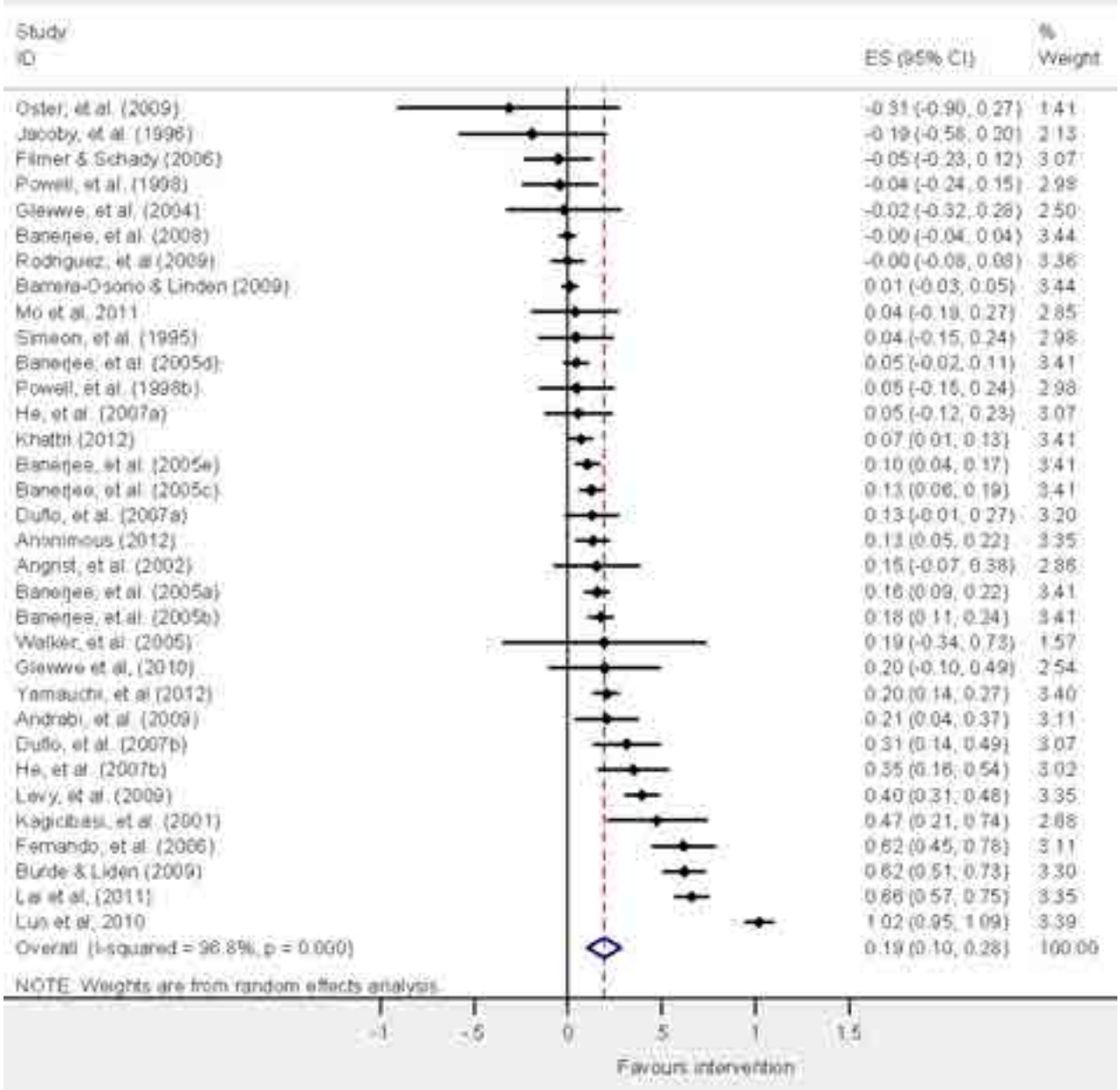
1.5
Favours intervention

Maths


Study ID
ES (95% CI)
% Weight
Oster, et al. (2009) -0.31 (-0.90, 0.27) 1.41
Jacoby, et al. (1996) -0.19 (-0.58, 0.20) 2.13
Filmer & Schady (2006) -0.05 (-0.23, 0.12) 3.07
Powell, et al. (1998) -0.04 (-0.24, 0.15) 2.99
Glewwe, et al. (2004) -0.02 (-0.32, 0.28) 2.50
Banerjee, et al. (2008) -0.00 (-0.04, 0.04) 3.44
Rodriguez, et al (2009) -0.00 (-0.08, 0.08) 3.36
Barrera-Osorio & Linden (2009) 0.01 (-0.03, 0.05) 3.44
Mo et al, 2011 0.04 (-0.19, 0.27) 2.85
Simeon, et al. (1995) 0.04 (-0.15, 0.24) 2.98
Banerjee, et al. (2005d) 0.05 (-0.02, 0.11) 3.41
Powell, et al. (1998b) 0.05 (-0.15, 0.24) 2.98
He, et al. (2007a) 0.05 (-0.12, 0.23) 3.07
Khattri (2012) 0.07 (0.01, 0.13) 3.41
Banerjee, et al. (2005e) 0.10 (0.04, 0.17) 3.41
Banerjee, et al. (2005c) 0.13 (0.06, 0.19) 3.41
Duflo, et al. (2007a) 0.13 (-0.01, 0.27) 3.20
Anonimous (2012) 0.13 (0.05, 0.22) 3.35
Angrist, et al. (2002) 0.15 (-0.07, 0.38) 2.86
Banerjee, et al. (2005a) 0.16 (0.09, 0.22) 3.41
Banerjee, et al. (2005b) 0.18 (0.11, 0.24) 3.41
Walker, et al. (2005) 0.19 (-0.34, 0.73) 1.57
Glewwe et al, (2010) 0.20 (-0.10, 0.49) 2.54
Yamauchi, et al (2012) 0.20 (0.14, 0.27) 3.40
Andrabi, et al. (2009) 0.21 (0.04, 0.37) 3.11
Duflo, et al. (2007b) 0.31 (0.14, 0.49) 3.07
He, et al. (2007b) 0.35 (0.16, 0.54) 3.02
Levy, et al. (2009) 0.40 (0.31, 0.48) 3.35
Kagicibasi, et al. (2001) 0.47 (0.21, 0.74) 2.68
Fernando, et al. (2006) 0.62 (0.45, 0.78) 3.11
Burde & Liden (2009) 0.62 (0.51, 0.73) 3.30
Lai et al, (2011) 0.66 (0.57, 0.75) 3.35
Lun et al, 2010 1.02 (0.95, 1.09) 3.39
Overall (I-squared = 96.8%, p = 0.000) 0.19 (0.10, 0.28) 100.00
NOTE: Weights are from random effects analysis
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Favours intervention

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White, H., 2009. *Theory-based impact evaluation,* Working Paper 3.New Delhi: International Initiative for Impact Evaluation (3ie)[Also available in French and Chinese.]

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