

# Reaching education targets in low and lower middle income countries: Costs and finance gaps to 2030 for pre-primary, primary, lower- and upper secondary schooling

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## Summary

This paper focuses on the achievement of universal preschool, primary, lower- and upper secondary education in low and lower middle income countries. It extends the background paper for the 2015 EFA Global Monitoring Report, which attempted to cost education targets up to the achievement of universal lower secondary education.<sup>2</sup> The inclusion of universal upper secondary education in a global costing exercise is relatively new<sup>3</sup> and reflects discussions at the Open Working Group on Sustainable Development Goals throughout 2014 and the ongoing intergovernmental negotiations leading up to the UN Summit in New York in September 2015. School enrolments have been increasing rapidly in most low and lower middle income countries in recent decades. This paper presents calculations how much it would cost if all children and adolescents were on track to have a complete education from preschool through upper secondary by 2030. In 2012, low and lower middle income countries spent an estimated 149 billion US\$ on education through secondary, of which 38 billion US\$ went to upper secondary. To achieve universal access and completion from preschool through upper secondary, expenditures from 2015-2030 would have to double to 341 billion US\$. Our calculations estimate that most of the expenditures would come from domestic public resources. The total estimated external finance gap is 39.5 billion US\$ on average from 2015-2030, of which 23.5 US\$ billion is for education through lower secondary and an additional 16 US\$ billion for upper secondary education. In lower middle income countries, external finances are needed to cover approximately 6 percent of the costs; in low income countries, external finances are needed for a much larger portion, namely, 42 percent, of the total costs. These results for the finance gaps are robust within 15 percent, even with varying assumptions regarding the projection parameters and data estimates. However, they are relatively sensitive to assumptions about the timing. Reaching the assumed targets by 2020 would increase the finance gap by two thirds. If the international community is not able to increase its commitments to supporting education progress in these countries, then the universalization of secondary education will be delayed until 2070 according to our estimates.

## 1 Introduction

In 2010, the Global Monitoring Report projected the costs of reaching the Education for All (EFA) goals by 2015 in 46 low income countries (UNESCO, 2010). The Report also calculated the external finance gap that would be left when assuming reasonable, but ambitious domestic spending. For these countries, the average annual external finance gap from 2008-2015 was \$25 billion, of which \$16 billion for preschool,

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<sup>2</sup> Wils A. (2015) Reaching education targets in low and lower middle income countries: Costs and finance gaps to 2030 <http://unesdoc.unesco.org/images/0023/002325/232560e.pdf>

<sup>3</sup> A least one other author made this calculation earlier. Binder (2006) calculated the costs of universal secondary in Cohen, Bloom, and Malin's book Universal Basic and Secondary Education. Binder, using a different methodology and data from 2002, concluded that to reach full secondary education, external assistance ranging from US\$ 4.5-13.6 billion was needed for low income countries; and US\$ 2.7-5.8 billion for lower middle income countries. Considering the higher GDP levels and costs in our projections, our projected finance gaps are within the same range as Binder's.

primary and adult literacy training and an additional \$9 billion for lower secondary. In the period from 2008 to 2011, external funding for basic education increased, and on average, national governments, have also increased the proportion of their GDP's that is devoted to public basic education. Still, for these countries, neither donor funding nor government spending was at the required levels to reach all of the Education for All goals.

Now, in 2015, a new set of global sustainable development goals including education targets is being set. The proposed new education agenda makes it timely to revisit the costing estimates. Although the post-2015 targets have not been set yet, the available evidence suggests that it is unlikely there will be a significant departure from the outcome document of the Open Working Group of July 2014. To assist in the discussion of the implications of those targets, a few different scenarios were run that show the sensitivity of costs and finance gaps to different assumptions, in particular to target years 2020, 2025, or 2030.

The targets for global education have expanded considerably over time, parallel with global expansions of schooling and a growing appreciation of the role of education in development. Less than a generation ago, basic education was considered just primary schooling (Jomtien 1990 and Dakar 2000 Education for All goals). In the past decade, our understanding of what constitutes basic education expanded to include lower secondary attainment (addition of lower-secondary to 2010 costing exercise). Most recently, the Incheon declaration on Education 2030 endorsed universal preschool, primary and secondary education as global targets. The education targets in this paper reflect these recent shifts.

The contribution of this exercise to the policy dialogue on post-2015 is to estimate:

- 1) how much it will cost to reach the defined education targets;
- 2) how much governments can realistically contribute to reaching those targets;
- 3) how large the gap is between costs and the budgets that needs to be filled by external resources; and
- 4) how sensitive the cost and gap estimates are to different assumptions about education targets.

The countries included in the exercise are 82 low- and lower middle income countries, as categorized by the World Bank in 2012.

This paper extends the background paper for the 2015 EFA Global Monitoring Report, which attempted to cost education targets up to the achievement of universal lower secondary education. It is organized as follows. Section 2 discusses the targets. Section 3 provides an overview of the structure of the model. Section 4 presents the assumptions and the results for the base scenario, in which the proposed targets are reached in 2030. The section also provides some indication of the sensitivity of the model results to some of the parameters. Section 5 includes some alternative scenarios – earlier achievement of the education goals; alternative finance gaps with faster re-allocation of budgets to education, and faster GDP growth. Section 6 concludes the paper.

## **2 Targets and assumptions**

The projections presented here are built around four main targets and assumptions. These are:

1. Universal pre-primary education of one year.
2. Universal primary and secondary completion for all children and adolescents.
3. Quality of preschool, primary and secondary education is raised to standards that are conducive to learning, with high rates of progression.
4. Equity of preschool, primary and lower secondary education supported by inclusive measures for marginalized children.

The final targets that support those outcomes to be realized are summarized in Table 1.

**Table 1. Main assumptions in terms of targets and cost parameters.**

|  | Measurable targets  | Initial value       | Target value | Target year         |  |
|--|---|---------------------|--------------|---------------------|--|
| 1. Pre-primary education               | a. Pre-primary gross enrolment ratio  | 37%                 | 100%         | 2030                |  |
| 2. Primary and secondary education     | a. Primary completion rate  | 70%                 | 100%         | 2030-a <sup>3</sup> |  |
|  | b. Lower secondary completion rate  | 50%                 | 100%         | 2030                |  |
|  | c1. Transition rate to upper secondary  | -                   | 100%         | 2030                |  |
|  | c2. Upper secondary completion rate   | 34%                 | 100%         | 2030+b <sup>3</sup> |  |
| 3. Quality of education                | a. Pupil teacher ratio <sup>1</sup>   | Pre-primary         | 26           | 15                  |  |
|  |   | Primary             | 35           | 29                  |  |
|  |   | Lower secondary     | 27           | 27                  |  |
|  |   | Upper secondary     | 23           | 27                  |  |
|  | b. Teacher salaries (as multiple of GDP per capita) <sup>1</sup>                                    | Primary             | 3.3          | 3.3                 |  |
| Lower secondary                        |   | 4.5                 | 4.2          |                     |  |
| Upper secondary                        |   | 5.1                 | 4.9          |                     |  |
| c. Share of non-salary recurrent costs |   | -                   | 25%          |                     |  |
| 4. Equity                              | a. Markup of per student costs to attract marginalized children (living on <US\$2/day) <sup>2</sup> | Pre-primary/primary | -            | 20%                 |  |
|  |   | Lower secondary     |              | 30%                 |  |
|  |   | Upper secondary     |              | 40%                 |  |

<sup>1</sup> The pupil teacher ratio and teacher salary multiples are negatively correlated to GDP per capita and so these targets depend on the target year and assumed GDP growth rates. The values here are for the base scenario and for all 82 countries together.

<sup>2</sup> The percentage of children living on <\$2 per day is linked to GDP per capita and declines as GDP per capita grows.

<sup>3</sup> It is not possible to reach the same targets for two different school levels in the same year – because it takes time for pupils to move up through the school grade hierarchy. In the base scenario, we start with the achievement of the lower secondary target of 100 percent completion in 2030. Working backwards, the target of 100 percent primary completion will have to be achieved by a years before 2030 (a being the duration of lower secondary). Working forward, the target for 100 percent upper secondary completion will be reached in 2030+b where b is the duration of upper secondary. We assume 100 percent transition to upper secondary in 2030.

## 2.1 Universal preschool access

One of the Dakar EFA goals related to expanding early childhood care and education. The need for this goal is undiminished and, if anything, the evidence of how much school readiness impacts a child’s entire educational career has only accumulated. For preschool, in this costing exercise, the target is assumed to be a gross enrolment rate of 100 percent by the target year.

Through the universal provision of preschool, it is assumed that children will be better prepared for primary school. Pre-primary education has been shown to be particularly important for less-privileged children. Preschool alone lowers the chances a marginalized child will not go to school by 35 percent; and lowers the chances that a marginalized child will fall behind in learning by another 35 percent (UNICEF, 2014). By providing preschool to all children, we improve the ability of these children to take fuller advantage of education opportunities available to them. Although preschool is a separate item in the scenarios, it is important to remember that its role is, in part, to improve learning through better school-readiness. As such, it is related to primary and lower secondary school quality outcomes.

## 2.2 Universal primary, lower and upper secondary education completion

As mentioned, the targets include universal primary, lower *and* upper secondary education. In terms of turning those targets into practice, we have to consider that a) all children must enter school *and* b) progression from one grade to the next has to be universal. Both of those sub-targets have to be attained some time *before* the target year to allow for the interval between starting school and reaching the end of primary of secondary.

As a specific example, to achieve universal lower secondary completion by 2030 in a country with a six-year primary cycle and a three-year lower secondary cycle, intake needs to be 100 percent by 2021 (2030 minus 9), and progression rates need to be near 100 percent – that means dropout rates are zero -- by the same year.

In most of the 82 countries included in this exercise, the official time interval between grade 1 primary and the last grade of upper secondary is 12-13 years.<sup>4</sup> This long period makes it unrealistic to assume full upper secondary completion by 2020 or 2030 in countries where universal primary had not yet been attained by 2015. To allow for the flows through all grades, the goals for primary, lower secondary, and upper secondary are staggered. The central goal is to have 100 percent lower secondary completion by the target year. An automatic corollary of that goal is that universal primary has to be attained a few years earlier. And finally, the goal for upper secondary is to have 100% transition rates into and through all upper secondary grades by the target year, rather than 100% competing.

In most low and lower middle income countries, primary and lower-secondary fall within mandatory education. In contrast upper secondary is not commonly within the age-range of compulsory schooling. Even among industrialized countries, upper secondary is not generally compulsory; in many highly educated industrialized countries, mandatory schooling ends at age 15 or 16, e.g. Switzerland, UK, Australia, Denmark, Japan, Austria, South Korea. There has been an ongoing trend to increase the age of compulsory schooling to include upper secondary schooling ages – in 2000 the upper age of mandatory school was 17 in only 16 percent of countries in the world; by 2013, it was 25 percent and includes many developing countries (UIS database accessed 4/10/15), and globally, the attainment of upper secondary has become increasingly prevalent.

Repetition is also considered. High repetition rates have been hard to eradicate in some developing countries. In principle, it is possible to achieve universal basic education with high rates of repetition but the costs of repetition are high, both in terms of children's time, and in terms of school resources. In the projections used in this costing exercise, it is assumed that quality improvements (discussed below) will help to bring repetition down to a level that minimizes such waste, while still allowing for some extra time for students who need it. The target level for repetition is a maximum of: the present repetition rates or 5 percent. This is in line with targets used for earlier global costing exercises. For many countries, reaching 5 percent repetition implies a significant drop.

In some lower income countries, these assumptions – universal intake and promotion with low repetition -- imply significant changes on four fronts: a) increases to intake rates and b) promotion rates, and concurrently, c) declines in dropout and d) repetition rates. In other countries, only one, two or three of these rates would have to change, while some countries, which have already achieved universal complete primary and/or lower secondary, will need no changes.

### 2.3 Education is raised to minimum standards conducive to adequate learning

Overall, there has been much measurable progress in access, but it has been more difficult to track changes in school quality. The EFA Global Monitoring Reports have found that in many developing countries, the quality of school, indicated by learning assessments, is far below that of industrialized nations. The overall *trend* has been difficult to determine.

Our understanding of how to improve school quality is incomplete, but there are a growing number of studies of interventions to rely on<sup>5</sup>. The assumptions in the costing exercise reflect some of the measurable and material inputs that have been found to be important. These are included as resources

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<sup>4</sup> It is 11 years in 13 of the 82 countries; and 10 years in 3 countries.

<sup>5</sup> See, for example, studies quoted in UNICEF (2014) and "Making Schools Work" by Bruns et.al. (2011)

and costs in the projections. There are a number of other, “soft” changes that do not necessarily have predictable costs associated with them, but are nonetheless essential to school quality. These are, for example: child-oriented teaching methods focused on skills; using languages that pupils understand; teachers making full use of class time and school days; responsible and responsive school management (possibly local). *It is assumed that these changes occur in addition to the measures that have explicit costs.*

The scenarios include the following assumptions to improve quality of education:

1. *Pupil-teacher ratios (PTR) to reach levels that have been shown to be necessary for a minimum standard of learning<sup>6</sup>.* By the target year, primary PTR will have a maximum of 40, but, in countries where income and domestic resources allow, lower levels are projected because it has been observed that as income and education resources rise, countries tend to provide more teachers and classrooms as a way to further enhance education quality (see section 3.4). The target PTR levels for secondary are lower, 30 pupils per teacher.
2. The provision of enough classrooms so that there is a classroom for every teacher (pupil classroom ratio = PTR). The assumed costs of classrooms include the purchase of furniture and annual maintenance of existing classrooms to maintain quality.
3. *Support the recruitment of talented and motivated teachers by providing adequate salaries.* Evidence shows that teacher quality is essential to learning. In many countries teacher salaries are below the average for jobs requiring a similar level of skills, and consequently it is difficult to recruit the best people to the teaching profession (UNICEF, 2010). For example, in Cambodia, the average teacher salary is *less than the average per capita income*. In other countries, teacher salaries are far above the skill-norm and/or teachers are protected even if they fail to show up for work or do not teach, implying money is wasted (UNESCO, 2014). Comparing countries at the similar level of GDP per capita, a primary school teacher is paid 6.3 times the average per capita income in Malawi but 2.5 times in the Central African Republic. Section 3.4 explains the assumptions regarding salaries in more detail.
4. *Provide sufficient learning materials and administrative support to manage school systems.* Recurrent expenditures need to cover purposes other than teacher salaries (e.g. materials, administration). In the present exercise, it is assumed that 25 percent of total recurrent expenditure should be directed to non-salary items by the target year.

A global data analysis shows that on average, pupil teacher ratios, salaries, and non-staff recurrent expenditures in upper secondary are very similar to those in lower secondary. The average pupil teacher ratio in upper secondary was only 5 percent lower than in lower secondary (UIS database accessed 3/31/15); the average upper secondary teacher salary was 18 percent higher than lower secondary teacher salary in 33 African countries (Pole de Dakar database, 2012); the non-staff recurrent expenditures are, on average equal to those in lower secondary (UIS database, accessed 4/13/15). To simplify the model specifications, the targeted upper secondary PTR and non-staff recurrent expenditure proportions are the same as for lower secondary; while the targeted upper secondary salary levels are 20 percent higher than lower secondary.

All of these inputs will have an impact on learning only if *better teaching methods can be adopted and if all teachers are in class teaching the full expected school hours*. As mentioned above, these changes are assumed although they are less a matter of budget and costs than the result of changes in policy, curriculum, training, and management.

## 2.4 Equity of education supported by inclusive measures for marginalized children

Finally, the scenarios assume that investments are made to ensure equity of education opportunities. In many developing countries, the assumption of full access to school, and learning for all can only be realized if there is *additional support for marginalized children*.

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<sup>6</sup> See, for example, the influential study “A Chance for Every Child” by Bruns et.al. (2003).

Although many countries have programs in place to support marginalized children (the costs of which are included in present education budgets and aid), the fact remains that many marginalized children are not in school or are falling behind in learning. For those children, additional support beyond present programs is needed. Examples of effective interventions to support marginalized children are: transfers to reduce access barriers (food, free uniforms, tuition support, etc.); mother-tongue instruction in regions where children do not speak the majority or school language; remote or mobile schools for hard-to-reach children; health interventions against illness (malaria, worms); treatment and hearing aids for hearing impairment; treatment and lenses for visual impairment; special education programs for children with untreatable disabilities; and effective schools in refugee camps for children escaping conflict.

## 2.5 Financing to reach the education goals

The scenarios assume that domestic budgets *plus* external resources are sufficient to cover the costs of education expansion. The main source of funding is domestic budgets, but in a number of countries, even with assumptions about higher public funding of education, finance gaps remain. *If the external funding is not available to cover these finance gaps, the education paths projected will not be possible.*

The scenarios assume that national governments back up the efforts to reach universal and quality education with a high priority for education in the public budgets. For countries, that already spend 6 percent of the GDP or more on education, we assume that this level is maintained. For countries that spend less (whether due to low tax revenue or low prioritization of education within the budget), tax revenue and the budget share are assumed to increase at a decreasing rate (up to a maximum of 30 and 20 percent respectively)<sup>7</sup>. The average tax revenue growth rate for this group of countries has been 0.44 per annum in the past.

Within the education budget, the share of pre-primary, primary and lower secondary education is assumed to remain constant. However, if, at any point, the budget in one level exceeds the costs, the model can allow shifts of that excess to another education level with a shortage. The user can select whether to allow this budget shift to occur. In the scenarios discussed in this paper, these shifts are allowed.

**Table 2. Assumed annual changes to public education budgets**

|                              | Annual increment<br>Standard | Annual increment<br>High |
|------------------------------|------------------------------|--------------------------|
| Tax-to-GDP rate              |                              |                          |
| <b>&lt;0.100</b>             | 0.500%                       | 1.000%                   |
| <b>0.100-0.125</b>           | 0.438%                       | 0.875%                   |
| <b>0.125-0.150</b>           | 0.375%                       | 0.750%                   |
| <b>0.150-0.175</b>           | 0.313%                       | 0.625%                   |
| <b>0.175-0.200</b>           | 0.250%                       | 0.500%                   |
| <b>0.200-0.250</b>           | 0.188%                       | 0.375%                   |
| <b>0.250-0.350</b>           | 0.125%                       | 0.250%                   |
| Share of education in budget |                              |                          |
| <b>&lt;0.100</b>             | 0.50%                        | 1.000%                   |
| <b>0.100-0.125</b>           | 0.44%                        | 0.875%                   |
| <b>0.125-0.150</b>           | 0.38%                        | 0.750%                   |
| <b>0.150-0.175</b>           | 0.31%                        | 0.625%                   |
| <b>0.175-0.200</b>           | 0.25%                        | 0.500%                   |

<sup>7</sup> See assumptions used in the EFA Global Monitoring Report 2013/14 (UNESCO, 2014 table 2.2)

In many countries, in particular low income countries with high population growth, even such concerted domestic effort to raise revenue is not enough to provide quality education for all. The model computes the *scenario finance gap* – the difference between the costs of progress towards the goals and the domestic budgets. This is the amount of financing that will need to be raised from sources other than the public budget – be it as official development assistance, non-state organizations, or other sources. The *scenario finance gap* is a residual of the costs and budget. As the domestic budget increases, or, as costs decline, the finance gap declines.

## 2.6 Differences between 2010 and 2015 global education costing exercises

In broad terms, this costing exercise is similar to the one presented in the 2010 Global Monitoring Report. However, based on insights and information compiled since that Report, there are a few adaptations in the present version. In summary, these are:

- 1) All children are assumed to attend a year of preschool; in the 2010 report only the costs of marginalized children attending preschool were included.
- 2) The target outcome is 100% primary and upper secondary completion. In the 2010 report, only universal primary and lower secondary enrolment were considered.
- 3) Teacher salaries are related to GDP per capita in a dynamic fashion based on trend analysis of global data. The target teacher salary multiple (salary as a multiple of GDP per capita) is inversely correlated with GDP per capita using an equation based on global data. In the 2010 report the target teacher salary multiple was static: 4.5 for sub-Saharan Africa and 3.5 elsewhere.
- 4) The proportion of children marginalized is assumed to be equal to the proportion of the population living on less than \$2 a day; in the 2010 projections it was equal to the illiteracy rate of young adults. The poverty rates decline as GDP per capita grows following a historically observed relationship<sup>8</sup>.
- 5) Additional subsidies for marginalized children are assumed, but only for the estimated proportion of marginalized children who were *not* completing primary and lower-secondary school in the benchmark year. It is not necessary to provide *additional* subsidies for *all* marginalized children because some marginalized children are able to complete different education levels already today with the existing system of services. In the 2010 projections additional subsidies were assumed for *all* marginalized children while assumptions had also been made on the cost of cash transfers.
- 6) Second chance literacy programmes are included only for young adults age 15-24, essentially to provide those youth who did not have an opportunity to complete enough primary to acquire basic reading skills with a second chance. The target for youth literacy is 100 percent. In the 2010 model literacy programs were costed for all adults in order to reduce adult illiteracy by 50 percent. Data on the cost and efficacy of youth and adult literacy programs is highly uncertain; data is very spotty. In the new model, the user can vary the cost of the complete adult literacy program as a multiple of the cost of a year of primary schooling. The 2010 exercise estimated the cost of universal adult literacy at 1.3 percent of the total cost of achieving the basic education target. In the current exercise, computations about second chance literacy programs (for youth who were not projected to complete enough years of schooling prior to the target year) also suggested that the costs would be very low compared to the overall costs of education through secondary.

## 3 Description of the projection model

This section briefly describes the key aspects of the model used to make those calculations, respectively pupils; expenditures; budget and gap; and PTR and teacher salaries.

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<sup>8</sup> In 2012, for each additional percent increase in GDP per capita, the percentage living on <\$2 per day was 0.2 percent lower (regression based on data for GDP per capita and poverty from World Bank database).

### 3.1 Intake, completion and number of pupils

The projected expenditures are a function of the number of pupils, the percent of private pupils and the costs per public pupil. Pupils are projected by grade using a common spreadsheet method that takes account of pupil progress through grades over time, based on promotion ( $pr$ ) and repetition rates ( $r$ ); with incoming first grade pupils determined by the gross intake rates ( $GIR$ ) and the school entry-age population ( $Pent$ ). Specifically, the equations are:

$$\begin{aligned} \text{For grade 1: } P_{1,t} &= GIR_t * Pent_{t,t} + P_{1,t-1}r_{1,t-1} \\ \text{For grades beyond 1: } P_{g,t} &= P_{g-1,t-1}pr_{g-1,t-1} + P_{g,t-1}r_{g,t-1} \end{aligned}$$

The subscripts 1 and g designate grades and t designates the year. The model computes the intake, promotion, and repetition rates by grade over time such that the target level of completion of lower secondary is reached exactly by the target year, and the trend of completion is linear from the benchmark year to the target year. The transition rates from primary to lower secondary are treated in the same way as promotion rates. The transition rates into upper secondary and between grades in that level are assumed to be 100 percent by the target year.

The projections of pupils provide a proxy for completion rates, namely, the gross intake rates to last grade of the school level. These numbers often differ from actual completion measured by household surveys as educational attainment (people who have reached complete primary or lower secondary or higher). We assume that by the target year, both gross intake to last grade and actual completion meet at the target level, and that both approach the target in a linear fashion.

For the costing, only publicly funded pupils ( $Pp$ ) are considered. The percentage of publicly ( $pf$ ) funded is projected to reach 90 percent if the benchmark level is below 90 percent; and to remain constant if the benchmark level is above 90 percent. This follows the 2010 costing exercise. The approach to the target percent publicly funded is linear from the benchmark year ( $t=b$ ) to the target year ( $t=t$ ):

$$\text{If } t < tg: Pp_t = P_t * \left( pf_{t-1} + \frac{pf_{t=t} - pf_{t=b}}{tg-b} \right) \text{ and if } t \geq tg: Pp_t = P_t * pf_{tg}$$

### 3.2 Expenditures

The *basic expenditure function* of the model is the sum of two types of expenditure, namely recurrent and infrastructure:

$$E = E_r + E_i$$

*Recurrent costs*,  $E_r$ , are calculated for preschool, primary and lower and upper secondary education separately. The biggest component of recurrent costs is teacher salaries. These are simply the product of the number of teachers (the number of public-funded pupils divided by the pupil teacher ratio) and the average teacher salary. The PTR and teacher salaries themselves follow the trajectory described in section 3.4. The salary costs are multiplied by: one plus material cost as a percent of salary costs. The target percentage for non-salary costs is set externally in the scenarios (the target value is 25 percent of overall recurrent costs in all of the scenarios, as described above). These recurrent costs, in turn are multiplied by: one plus costs for marginalized as a percent of other recurrent costs. The percentage of costs for marginalized children is equal to the percentage of marginalized pupils who receive additional subsidies times the additional costs per marginalized student. The base subsidies for each marginalized student are set by the user as a percentage of other recurrent costs. Together, the entire equation for recurrent costs in each school level is:

$$E_r = \frac{Pp * S}{PTR * (1 - mt)} * (1 + mg)$$

where:  $S$  is the average salary;  $Pp$  is the number of public funded pupils;  $PTR$  is the pupil teacher ratio;  $mt$  is the percent of non-salary costs;  $mg$  is the percent of expenditure for marginalized children<sup>9</sup>.

*Infrastructure expenditure,  $E_i$*  (for the construction of new classrooms, furniture and durable materials such as blackboards, and the maintenance of existing classrooms) is calculated as follows: New classroom construction need is equal to the desired number of classrooms,  $K_d$  (assumed to be equal to the number of teachers needed) minus existing classrooms,  $K_e$ , which is the number of classrooms in the previous year depreciated according to the lifetime of classrooms ( $K_{e,t} = K_{e,t-1} * \frac{lf-1}{lf}$ ). The new classroom need,  $(K_d - K_e)^\sim$ , is spread over three years, with the tilde signifying the smoothed value. The cost for each classroom is equal to: the base construction cost,  $C$ , enhanced by a multiple for durable furnishings and materials,  $f$ . Maintenance costs are equal to the number of existing classrooms times assumed maintenance costs,  $Mt$ . Like recurrent costs, infrastructure costs are calculated for preschool, primary, lower, and upper secondary schooling separately:

$$E_i = C * (K_e - K_d)^\sim * (1 + f) + K_e * Mt$$

The projected trends for the components of the model – pupils, salary, PTR, etc. – are assumed as per the targets and assumptions described in the previous section.

### 3.3 Budget and finance gap

The function for the domestic public budget on education is equal to the revenue raised in tax,  $T$  (itself the product of the tax rate and GDP,  $t * Y$ ) and the proportion of public budget for education,  $e$ , and the proportion of the education budget for each level of education,  $l$ . The government raises revenue through other means than taxes, so to get an accurate measure, the total public budget is adjusted for other public revenues using the observed ratio of actual expenditure on education vs. tax times the proportion of the budget for education,  $r$ :

$$B = Y * t * e * l * r$$

The components of this equation are assumed to increase as described in the previous section. If, due to changes over time, the budget in a particular level exceeds costs, the model can adjust by shifting this surplus to another education level.

Finally, the *scenario finance gap* is equal to the difference between the domestic budget and the expenditures:

$$G = E - B.$$

The *scenario finance gap* shows how much additional funding is needed to achieve a particular trajectory of education growth for all (in quantity and/or quality). It is different from thinking about how much it would cost to provide quality education for all children today versus the present budget – we could call that an *absolute finance gap*. The absolute gap is useful as a measure of how far a country is from education targets at this point in time; it does not provide guidance on how the country can move towards the targets.

<sup>9</sup> It is possible to set the subsidy rate for preschool/primary vs. lower secondary separately. In the base scenario it is 20 percent for primary and 30 percent for lower secondary.

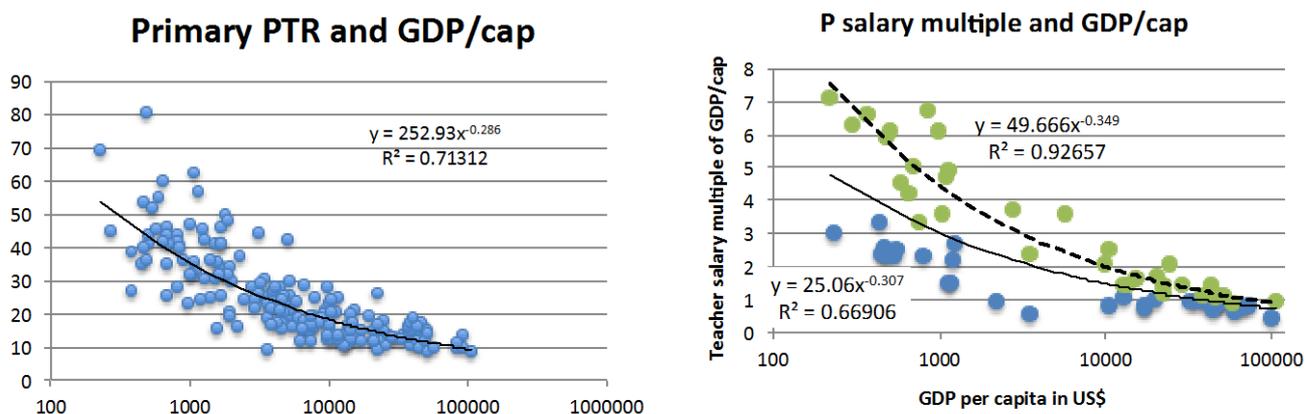
### 3.4 Calculation of PTR and teacher salaries

PTR and teacher salaries vary considerably within poorer countries. In the set of 82 countries projected, the PTR in primary ranges from 6.3 in Georgia to 80.1 in Central African Republic. In countries with lower average incomes, PTR tends to be higher, probably reflecting a scarcity of human and financial resources. Primary teacher salaries, standardized as a multiple of GDP per capita, range from a multiple of 7.4 in Somalia, to 0.5 in Myanmar. Similar ranges exist for the salaries of lower and upper secondary school teachers. Poorer countries tend to have higher multiples – probably because the skills required for teaching are scarcer and command higher premiums. Wils and Ingram (2011) noted the association of PTR and teacher salaries with GDP per capita in their EFA projections based on historical trends.

Figure 1 shows the correlation of GDP with PTR (left-hand figure) and teacher salaries (right-hand figure) using data from Pole de Dakar and the World Bank Development Indicators database most recent years. The solid lines in each figure show the overall trend within the data using an exponential function<sup>10</sup>. The second, dotted line in the right-hand salary graph shows a higher trend for *only those countries that lie above the average salary-income trend*.

In the scenarios, it is assumed that in each country, as GDP per capita grows over the projection period, the PTR will approach the international trend line by the target year; and the teacher salaries will approach the “better half” international trend line by the target year. Filtering the salary trend to include only the better-paying countries allows us to improve overall average teacher quality by shifting many of the salaries upwards, in particular for countries where teachers are presently under-paid. This results in primary teacher salaries averaging 3.4 times the GDP per capita 2030 in the base scenario.

**Figure 1. Pupil teacher ratios and teacher salaries correlated with GDP per capita in 2012 or most recent year, all countries for which data is available.**



### 3.5 Data

The data used for the projections are from many international and national sources. International data are used where available; national sources where they are not; and if no national sources could be found, estimates were made based on other countries in the region or computations based on other national data, in that order of preference.

<sup>10</sup> The exponential function results in the best fit to the data as compared to linear, power, logistic or polynomial functions. The specification of the function for PTR is  $PTR = 510 * Y^{-.346}$ . The function for teacher salary, all countries, is  $S = 60 * Y^{-.378}$ . The function of teacher salary, only including the countries above the average trend, is  $S = 332 * Y^{-.43}$ . Y in all three equations is GDP per capita PPP.

The international sources consulted are as follows:

- Percentage of cohort who enter primary, complete primary and complete lower and upper secondary: WIDE database from the EFA Global Monitoring Report, or as computed from gross intake to last grade of each level based on enrolments.
- Enrolments, repeaters, preschool gross enrolment rates: UIS online database
- Expenditure, pupil teacher ratios, percent private enrolment: UIS online database
- GDP, GPD per capita, poverty headcount (percent living on <\$2 a day): World Bank Development Indicators database
- Tax revenue: IMF
- Official development assistance: EFA Global Monitoring Report data tables for 2012 based on the OECD DAC Creditor Reporting System.
- Teacher salary and construction costs – Pole de Dakar database, calculations based on number of teachers and expenditures on salaries, and national sources.
- Population: World Bank Health Nutrition and Population Statistics database.

The international data provided the majority of the information used in the model. Where it was not available, national data were sought. Most of the national data comes from official reports, many of them found on the planipolis website ([planipolis.iiep.unesco.org](http://planipolis.iiep.unesco.org)). The data sources are documented in the model available at the EFA Global Monitoring Report website.

## 4 Results for base scenario with target year 2030

All of the scenarios made for this paper assume the same set of objectives described in section 2. Furthermore, the scenarios assume that GDP growth rates up to 2016 follow IMF projections and after that converge to a long-term average growth rate of five percent; and that population growth follows the “Medium” scenario of the United Nations. The scenarios differ with regards to the speed at which the goals are reached; and the rate at which government spending for education expands.

This section describes the base scenario. In this scenario:

- The education goals are reached by the target year 2030;
- Public expenditure for education expands along the lines of the ‘standard’ scenario described in Table 2.

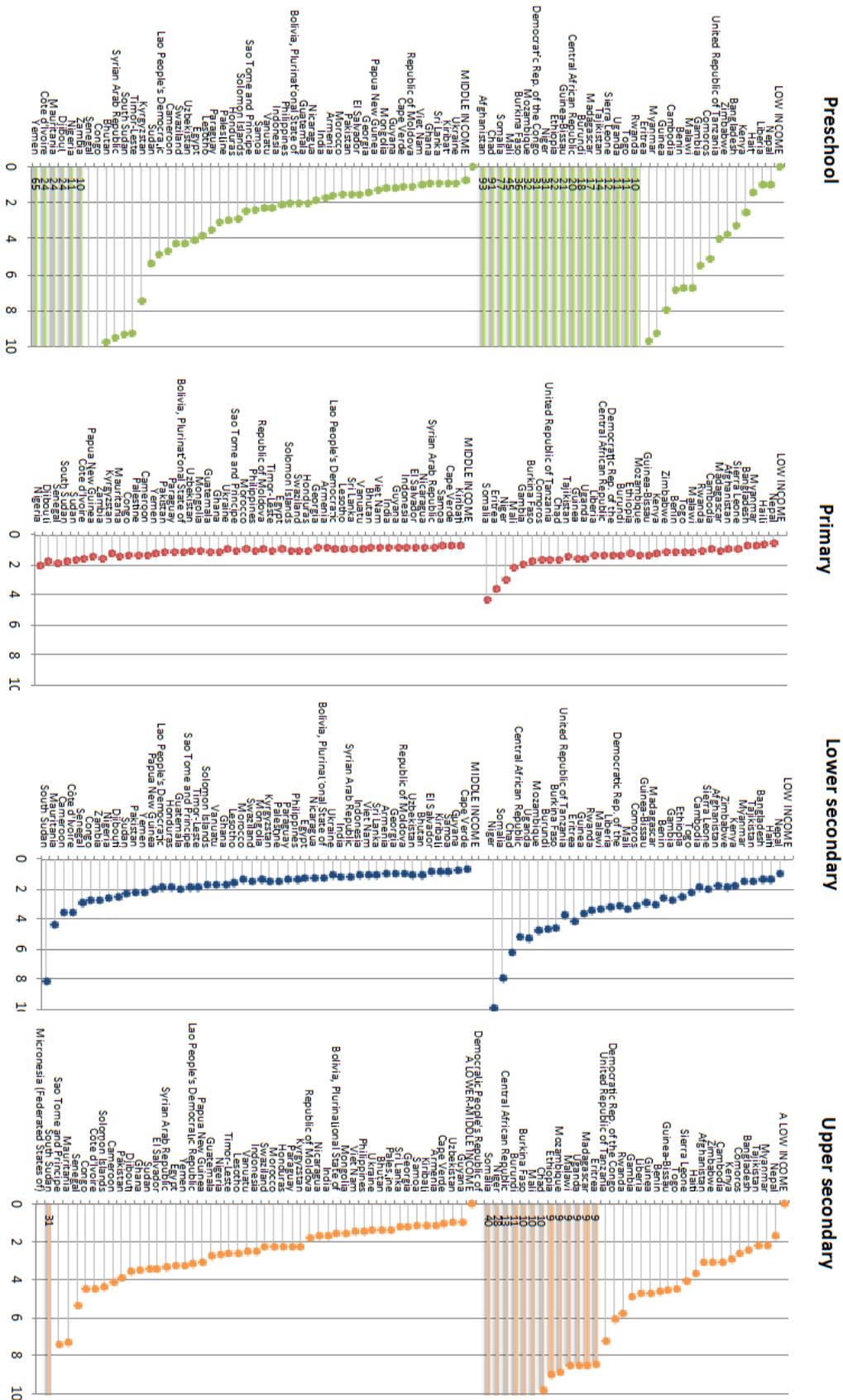
This section describes a selection of the results of the base scenario, starting with some observations about projected growth in the number of pupils and per pupil expenditure. These factors together drive expenditures. The section continues with a discussion of costs. The section concludes with a discussion of the budget available to meet those costs from domestic sources and what is needed from external sources.

### 4.1 Projected increase in numbers of pupils, by country

In the base scenario, all children go to preschool, and complete primary and lower – and upper secondary school. By 2030, the gross intake rate to the last grade of lower secondary is equal to 100%, and the transition to upper secondary is also 100%. In many countries, this assumes significant changes in repetition and dropout rates, in transition rates to lower secondary, as well as intake rates to preschool and primary school. One outcome of this effort is growth in the number of pupils. Figure 2 shows the number of pupils in 2030 in preschool, primary, lower secondary and upper secondary school relative to the benchmark level in 2012.

- *High pupil growth is needed in the preschool level.* Only a small group of lower income countries already have high preschool access, including Liberia, Nepal, Ghana, Ukraine, Guyana, and Sri Lanka. Most countries would need to supply multiples of the present number of preschool places – the average increase is by a factor of 20 in low income countries and by a factor of 6 in lower middle income countries. This demands enormous commitment.

Figure 2. Projected number of pupils with universal preschool, primary, lower secondary and upper secondary education, 2030 relative to 2012



- *The growth in the number of pupils at the primary level is low in most countries – in a sizeable minority it is even negative* (i.e. below 1 in Figure 2). Only six countries would need to double or more the number of primary pupils – Gambia, Mali, Niger, Eritrea, Somalia and Nigeria. In roughly one quarter of the countries, the number of primary pupils would decline, and in another quarter, the increases in the number of primary pupils are smaller than 20 percent. The relatively stable numbers among primary pupils mask changes in the *make-up* of pupils by grade. There are considerable *shifts* in many countries as the numbers of repeaters in lower grades are replaced by pupils in the upper grades of primary school following the goal of faster and more universal progression.
- *Growth in lower secondary school pupils is, as expected, higher than for primary school in most countries.* On average, the number of lower secondary pupils more than *doubles* in low income countries. In contrast, in many lower middle income countries, growth in lower secondary school pupils is more moderate, and the average is a 39 percent increase in the number of pupils by 2030.
- *Growth in upper secondary school pupils is high.* The relative projected increase in the number of upper secondary pupils by country is shown at the bottom of Figure 2. In half of the lower middle income countries, the number of upper secondary pupils is projected to increase by a factor of two to four. In a few outlying low income countries the number of upper secondary pupils will need to increase by a factor or more than ten. Is this feasible?

A brief review of increases in the number of upper secondary pupils from 2000-2012, using international data from UIS, shows that in these twelve years, the number of upper secondary pupils doubled or tripled in many countries. In all of the countries of Central Asia, East Asia and the Pacific, the Arab States, South Asia, and in Latin America, the increases of upper secondary pupils are not higher than the growth rates that have been seen recently, in the period 2000-12. On that basis the projections for these countries may be considered reasonably achievable. The upper secondary projections for countries in Sub-Saharan Africa look quite different. Out of the 41 Sub-Saharan Africa counties, only 10 would require *less* than a quadrupling of upper secondary students to approach universal upper secondary by 2030. These countries are: Cape Verde, Comoros, Djibouti, Ghana, Kenya, Lesotho, Nigeria, Sudan, Swaziland, and Zimbabwe. Eight countries would need to increase students by a factor of 10 or more. Such increases are challenging, at least.

#### 4.2 Growth in per pupil expenditure, by country

Access, measured in the number of pupils, forms one half of the education expenditure equation; the other part of universal education concerns costs to provide quality and equity – measured by the pupil teacher ratio, teacher salaries, expenditures on materials, classroom construction, and support for marginalized children. As a – rough – measure of quality and equity increases, Figure 3 shows the per pupil expenditure levels in 2030 in preschool, primary, lower and upper secondary, relative to the per pupil expenditure in 2012.

In terms of unit costs, the greatest increases are necessary in preschool and primary. In a sizeable minority of countries, the expenditures per pupil would need to rise by a factor of six in preschool and a factor of four in primary school. A part of that increase is due to growing GDP per capita. But even when unit costs are viewed as a percent of GDP per capita, they would need to double in most low income countries in both preschool and primary. This means that at present, the foundation of education, the early years, tends to be the most under-funded in poor countries.



On the other hand, to attain the basic quality assumed in lower and upper secondary, the unit costs require much less change. At the upper secondary level, per pupil expenditure relative to GDP per capita is projected to remain the same, or decline in many countries. There are no particular regional patterns although there are large differences between countries. In those countries, where the upper secondary expenditures relative to income are projected to stay roughly the same, problems related to the quality of learning and teaching are not so much caused by under-investment as they are a result of organization, management, curriculum, and teaching methods or styles, and low learning achievement in early grades. In a minority of countries it appears there is under-investment in terms of money spent per pupil, even at the upper secondary level. In these countries, we see a doubling of per upper secondary pupil expenditures. These are Sierra Leone, Central African Republic, Afghanistan, Myanmar, and Sri Lanka.

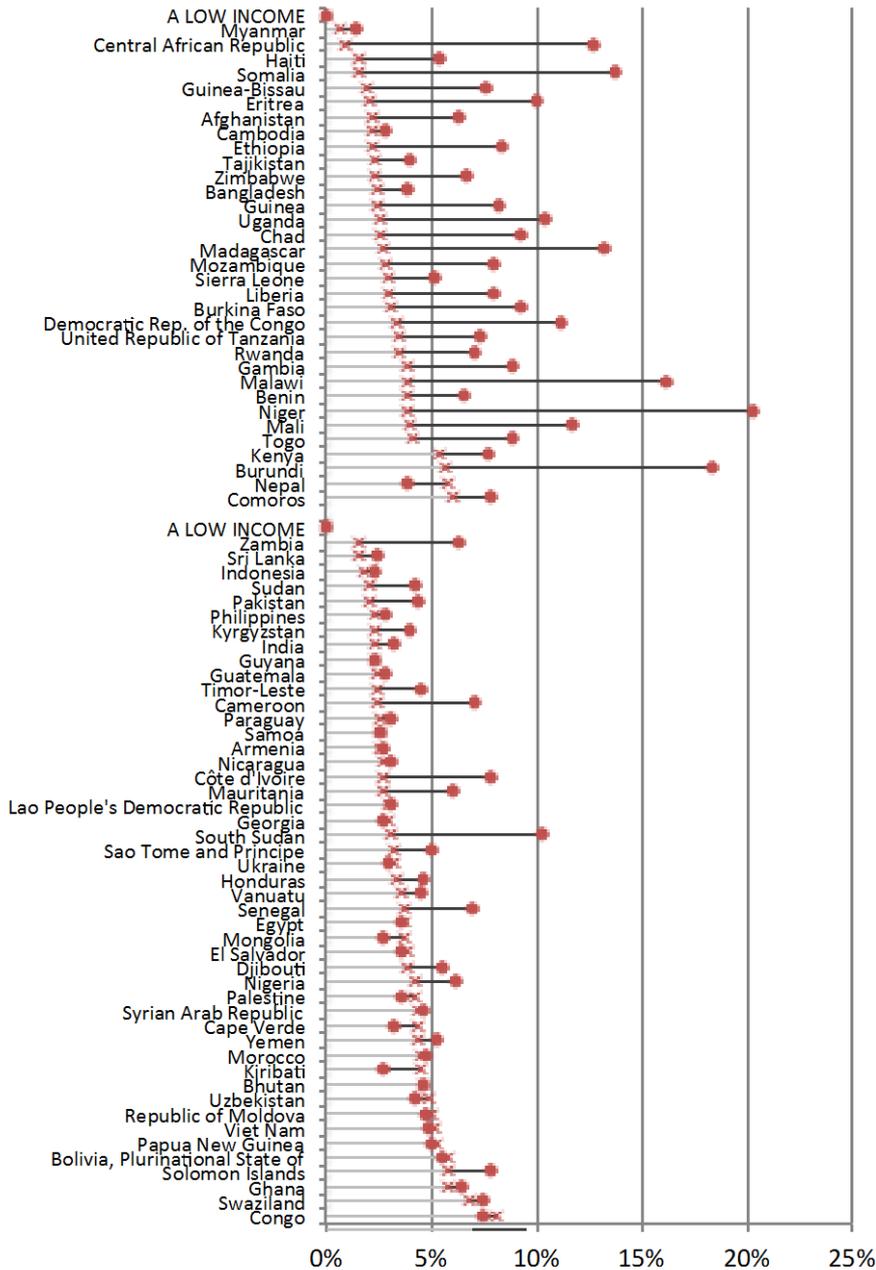
### 4.3 Changes in overall expenditures, by country

Together, the product of the number of pupils and per pupil expenditure makes our projections of total education expenditures over the period. Figure 4 shows the estimates of how much countries were spending on education in 2012 and how much they are projected to be spending in 2030 as percent of GDP.

- *Most low income countries need to spend a larger portion of their GDP on basic education* in order to meet the targets – a combination of having more pupils, lower pupil teacher ratios, better salaries for teachers, more materials, more classrooms, and support for marginalized children.
- There are a few low income countries that already spend significantly on basic education – e.g. Nepal and Kenya – where the relative increases are smaller. Some of these countries receive significant external support today and the projections assume these levels of support remain in place at least for the projection period.
- *In ten low income countries, the projected education expenditures in 2030 would take 10 percent or more of GDP* – Burundi, Central African Republic, Eritrea, DRC, Madagascar, Malawi, Mali, Niger, Somalia, and Uganda. These outcomes are the combined result of a) low starting point; b) high rates of poverty / marginalized children; and c) very high population growth. In order to come close to achieving the education targets, these countries need very high levels of external support.
- *The majority of lower middle income countries would not significantly increase spending on basic education (as a portion of GDP) in order to reach the envisioned goals by 2030.* Many of these countries already have near universal primary and lower-secondary completion. Our projections would imply a shift in resource allocation.
- *A small minority of lower middle income countries will need to roughly double relative spending on basic education to reach the goals by 2030.* These include Cameroon, Côte d'Ivoire, Mauritania, Pakistan, Sudan, South Sudan, and Zambia. Although India and Nigeria do not need to double the proportion of GDP for basic education, they contribute substantially to the global growth of basic education expenditure due to their very large populations.
- In Sub-Saharan Africa, upper secondary expenditures as a portion of GDP are projected to be significant -- 2.6 percent of GDP on average, ranging from 0.8 percent in Cape Verde to 5.7 percent in Burundi. The reasons for these high expenditure levels are multiple: lower GDP per capita means higher salaries relative to average income; greater needs to subsidize marginalized children; high number of pupils relative to the population; large capital investments because upper secondary is starting from a very low base. In these countries there would need to be enormous commitment to upper secondary in order to achieve the base scenario targets, as well as to achieving the universal basic education levels that precede universal upper secondary. These are the same countries where basic education expenditures are also projected to be very high, as a proportion of GDP. Together, the projected costs for basic education and upper secondary are up to 15-20 percent of GDP in a few countries. High population growth is a main determinant of the very high projected expenditure needs. Indeed, it is

questionable whether the high levels of education envisioned in this scenario are compatible with the extremely high fertility rates observed today. The envisioned levels of education growth may only be possible if child birth rates fall significantly at the same time.

Figure 4. Base scenario, expenditures for preschool, primary, lower secondary and upper secondary, as a percentage of GDP in 2012 and projected in 2030.



#### 4.4 Summary of the results at the global level

At the global level, the situation of education in poorer countries, when all of the defined education targets are achieved, would be in many respects very different from what we see today. In particular, the number of preschool and secondary school pupils is much larger than at present, and the quality of education – approximated by inputs like teachers and materials – is substantially better. In some countries, many more marginalized children receive support. The higher quality is reflected in greater per pupil expenditures, and

overall, the expenditure on basic education will rise substantially. Table 3 shows a selection of the projected outcomes, namely, the number of pupils, per pupil expenditure, and overall expenditure, at the aggregated level. The numbers are slightly different from similar tables in the previous costing exercise (UNESCO, 2015a and Wils, 2015). These differences are due to updates in the data and small changes to the model specifications including the ability to shift resources between education levels. The differences do not change the conclusions drawn from the projections in the earlier publications.

Overall, the number of preschool and upper-secondary school pupils increases by a factor of 2.5 to reach the target levels by 2030; the number of lower secondary pupils increases by one-half; and the number of primary school pupils increases only by 13 percent, roughly in keeping with population growth. The number of primary students gains little in low income countries as a group, from 128 to 163 million; and in lower middle income countries from 291 to 313 million. The most ambitious gains are in low income countries: for preschool pupils the rise is from 4 to 28 million, a seven-fold increase; and upper secondary pupils increase more than four-fold from 18 to 82 million. Lower-secondary school pupils more than double from 29 to 70 million in low income countries, while they rise by 40 percent in lower middle income countries.

**Table 3. Summary results of projections**

|  | All        |                 | Low income |                 | Lower middle income |                 |
|--|------------|-----------------|------------|-----------------|---------------------|-----------------|
|  | 2012       | 2030            | 2012       | 2030            | 2012                | 2030            |
| <b>Number of pupils (public and private), in millions</b>            |            |                 |            |                 |                     |                 |
| Preschool  | 31         | 85              | 5          | 28              | 26                  | 57              |
| Primary  | 418        | 476             | 127        | 163             | 290                 | 313             |
| Lower secondary  | 155        | 242             | 29         | 70              | 125                 | 172             |
| Upper secondary  | 105        | 266             | 18         | 82              | 87                  | 184             |
| <b>Public expenditure per pupil, weighted average, US\$ per year</b> |            |                 |            |                 |                     |                 |
| Preschool  | 258        | 854             | 117        | 421             | 286                 | 1069            |
| Primary  | 195        | 403             | 70         | 197             | 250                 | 510             |
| Lower secondary  | 301        | 536             | 144        | 284             | 339                 | 639             |
| Upper secondary  | 751        | 675             | 394        | 367             | 823                 | 811             |
| <b>Total costs average annual, bln US\$ *</b>                        |            |                 |            |                 |                     |                 |
|  | 2012       | 2015-30 average | 2012       | 2015-30 average | 2012                | 2015-30 average |
| Preschool  | 4.8        | 31.2            | 0.4        | 4.4             | 4.4                 | 26.8            |
| Primary  | 68.1       | 129.4           | 7.3        | 19.9            | 60.8                | 109.5           |
| Lower secondary  | 38.0       | 81.8            | 3.6        | 11.6            | 34.5                | 70.2            |
| Upper secondary  | 37.7       | 97.1            | 3.1        | 14.5            | 34.5                | 82.7            |
| Second-chance youth literacy programs                                | 0.0        | 0.3             | 0.0        | 0.1             | 0.0                 | 0.2             |
| <b>Total</b>   | <b>149</b> | <b>340</b>      | <b>14</b>  | <b>50</b>       | <b>134</b>          | <b>290</b>      |
| <b>Scenario finance gap, bln US\$</b>                                |            |                 |            |                 |                     |                 |
|  | 2012       | 2015-30 average | 2012       | 2015-30 average | 2012                | 2015-30 average |
| Preschool, primary, lower secondary and second-chance                | <b>5.7</b> | <b>23.5</b>     | 1.4        | 13.2            | 4.3                 | 10.3            |
| Upper secondary  | <b>3.4</b> | <b>16.0</b>     | 0.6        | 7.8             | 2.8                 | 8.2             |
| <b>Total</b>   | <b>9.1</b> | <b>39.5</b>     | <b>2.0</b> | <b>21.0</b>     | <b>7.1</b>          | <b>18.4</b>     |

\*Total costs are not equal to the product of students and the weighted average expenditure per pupil because a) total public costs exclude private pupils and b) the total costs are computed by multiplying pupils and expenditure per pupil *by country* and summing the results

The number of pupils forms one part of the education expenditure equation; the second part is *per pupil expenditure*<sup>11</sup>. These are shown in the second section of the Table 3. Note that even without any quality changes, absolute per pupil expenditures will increase *as GDP per capita grows*. In the period 2012-2030, the GDP per capita is projected to double.

Overall, per pupil expenditures will have to increase three-fold in preschool across all countries from an average of \$258 per pupil annually to \$854 and the expenditures per primary school pupil rise from \$195 to \$403, more than doubling. These changes are mostly the result of assuming lower pupil teacher ratios,

<sup>11</sup> Weighted by the number of pupils in each country.

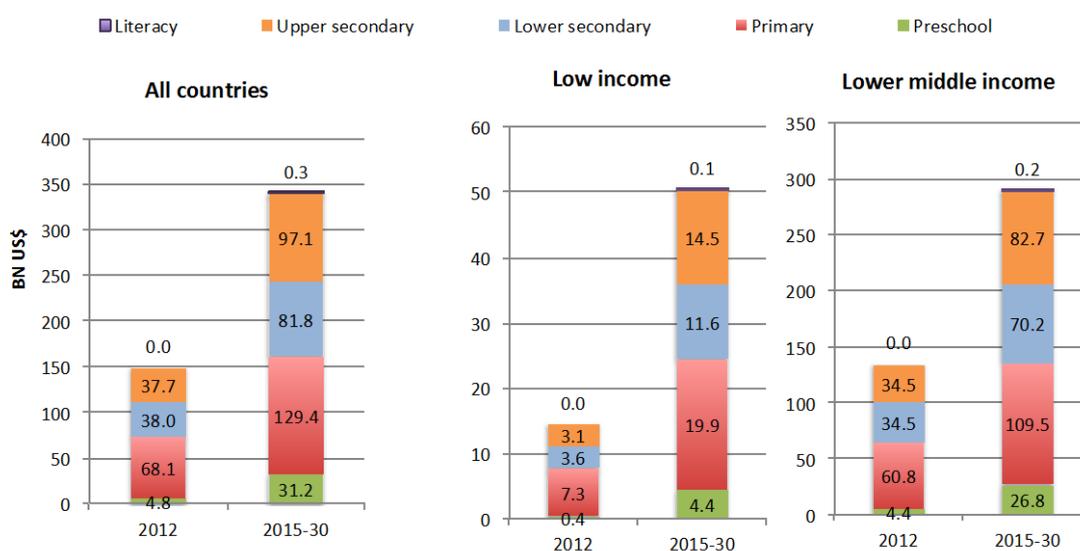
especially for preschool; and higher (and equal) teacher salaries in both levels.<sup>12</sup> Per pupil expenditures in lower-secondary will need to almost double from \$301 to \$536. The average unit costs for upper secondary students are projected to *fall* from \$751 in 2012 to \$675 in 2030. Much of this change is due to slight rises in pupil teacher ratios, which are quite low in upper secondary in many poorer countries.

Together, increases in pupil numbers and per pupil expenditures mean that *considerably more will need to be spent on education than is the case today*. The overall expenditures on preschool, primary and lower secondary education are projected to rise from approximately US\$ 111 billion annually in 2012 to an annual average of US\$ 243 billion in the period 2015-2030. In addition, expenditures in upper secondary are projected to rise from US\$ 38 billion to US\$ 97 billion. Increased expenditure is necessary across the board in preschool, primary *and* secondary education, and in low income countries *as well as* lower middle income countries – although the relative magnitude of the increases is bigger in low income countries.

It is notable that, within the total budget for education, the low income countries make up a relatively small portion – only US\$ 50 billion of the average total costs in 2015-2030 compared to US\$ 290 in lower middle income countries.

Figure 5 shows that expenditure increases are needed across the board in all three levels of education, and in both low and lower middle income countries. Preschool costs, which are negligible today, will need to rise to a notable portion of expenditures. The costs for secondary (lower and upper together) today are less than those for primary education; by 2030 in the scenario, these will increase to become the largest section of education expenditures.

**Figure 5. Expenditures by education level and country group, 2012 and 2015-2030 (projected average)**



#### 4.5 Financing the education expansion

In *total*, education expenditures for schooling through secondary expand by US\$ 191 billion from the 2012 levels to the average levels for 2015-2030 (from US\$ 149 to US\$ 340 billion). In low income countries, the expenditure increase from US\$ 14 billion to US\$ 50 billion average annually; and in lower middle income countries, the increase is from US\$ 134 billion to US\$ 289 billion annually. Where will the additional funds come from?

<sup>12</sup> The target maximum pupil/teacher ratio for preschool is assumed to be half of that for primary school. Salaries for preschool teachers are assumed to be the same as for primary school teachers.

In the projections, the projected cost has four components:

- 1) Initial budget – how much countries are already investing;
- 2) GDP growth;
- 3) Higher domestic allocation to education – in many countries, the budget share of education rises;
- 4) External funding.

GDP growth is assumed following IMF projections up to 2016 and then a user-set long-term economic growth rate is used (an assumption of five percent is used for the base scenario results). The assumptions on domestic allocation to education were described in section 2.5. External funding is *assumed as the residual between costs and increased domestic public funding*.

Figure 6 shows the proportion of costs that will come from each of these components. For all countries as a group, 41 percent of future need is already available in the present domestic budgets (excluding ODA)<sup>13</sup>; an additional 37 percent of the expenditure will come from economic development – higher GDP levels and tax revenues; and 10 percent will come from re-allocation of public budgets to education, via higher government expenditure. In total, public domestic resources are projected to supply \$300 billion, annually from 2015-30 on average. The remainder, 12 percent, will need to come from external finances.

It is notable that the higher domestic resource mobilization and/or greater spending on education within the government budget makes up a small part of the overall funding growth *particularly in lower middle income countries*. This means that *on average* many countries are already investing significantly in education, with limited scope for further expansion. The assumed increases in budgets apply only to countries that are presently under-spending on public education relative to their income-group peers. Overall, low income countries are expected to increase the share their national income allocated to education (up to upper secondary level) by 50% from 2.6% in 2012 to 3.9% in 2030.

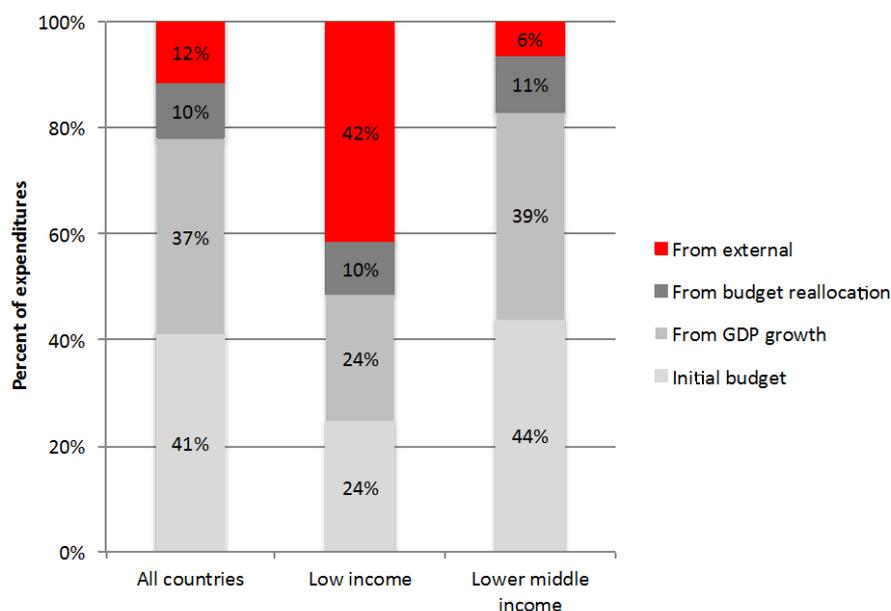
**Table 4. Projected public expenditure on education (excluding post-secondary) as share of GDP**

|                     | Public expenditure | Pre-primary | Primary | Lower secondary | Upper secondary | Total |
|---------------------|--------------------|-------------|---------|-----------------|-----------------|-------|
| All                 | 2012               | 0.1%        | 1.5%    | 0.8%            | 0.6%            | 3.0%  |
|                     | 2015-30 (average)  | 0.2%        | 1.7%    | 0.9%            | 0.8%            | 3.6%  |
|                     | 2030               | 0.3%        | 1.8%    | 1.0%            | 0.9%            | 3.9%  |
| Low income          | 2012               | 0.0%        | 1.4%    | 0.7%            | 0.5%            | 2.6%  |
|                     | 2015-30 (average)  | 0.1%        | 1.9%    | 0.8%            | 0.7%            | 3.5%  |
|                     | 2030               | 0.2%        | 2.1%    | 0.8%            | 0.8%            | 3.9%  |
| Lower middle income | 2012               | 0.1%        | 1.6%    | 1.0%            | 0.7%            | 3.3%  |
|                     | 2015-30 (average)  | 0.3%        | 1.6%    | 1.0%            | 0.8%            | 3.7%  |
|                     | 2030               | 0.4%        | 1.6%    | 1.0%            | 0.9%            | 3.9%  |

There are notable differences in the external finance needs of the low income versus the lower middle income groups of countries. The external finance gap is projected to be split roughly evenly between low income and lower middle income countries. It is projected to rise over time, with a peak around the target year for reaching education targets. Note that *after reaching the targets external finance needs stabilize*.

<sup>13</sup> Because all ODA is excluded from the initial domestic budget in this graph (it is included in external financing portion of this graph) the initial *domestic budget* is smaller than the initial *costs* shown in Table 3. As a result, the percent coming from the initial domestic budget (41 percent for all countries together) is lower than initial costs divided by projected costs (149/339 = 44 percent).

**Figure 6. Allocation of cost increases 2015-2030, for preschool, primary, lower- and upper secondary, by source of funding.**



Although the absolute external finance needs are similar for the low- and the lower middle income group; in relative terms, low income countries will be far more dependent on external support. In this group, 42 percent of the total future expenditure has to be provided by external finances. The total average external finance needed for 2015-2030 for low income countries is US\$ 21 billion dollars.

For lower middle income countries, external finance is less important overall, contributing only 6 percent of the total cost. The total average annual external finance needed for lower middle income countries for 2015-2030 is US\$ 18 billion dollars. Almost half of that amount is projected to be needed for just one country – Nigeria<sup>14</sup>.

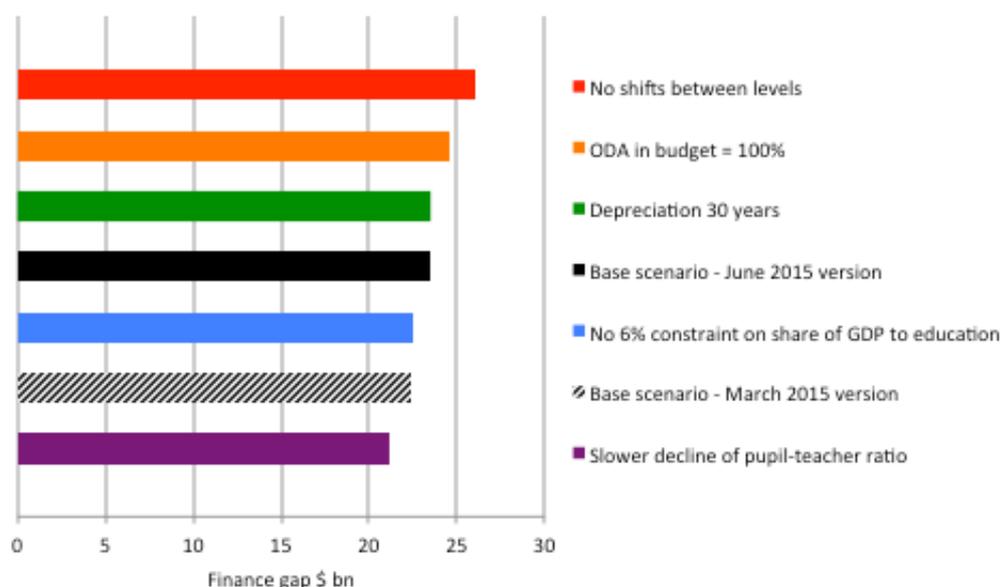
Finally, it is useful to note that geographically, the finance gap is highly unequally distributed. By 2020, almost the entire scenario finance gap is concentrated in Sub-Saharan Africa, a combination of lower GDP per capita levels in the region and high population growth.

#### 4.6 Sensitivity to assumptions within the base scenario

As with all projections and simulations, the projected values are based on particular assumptions as well as on estimates of initial data which can be imprecise and in need of updating. It is useful to have some insight into the margin of uncertainty. Figure 7 shows some alternatives for the finance gap in the base scenario – on the costs up to universal lower secondary completion – with variations in some of the technical parameters (for example, whether resources can shift between levels of education; whether aid is reflected in the budget etc.), and, for comparison, the projected finance gap with earlier version of the model (Wils, 2015). The variations are within a realistic range. Overall, the sensitivity of the model results to changes in the parameters is moderate – the outlying values for the finance gap are US\$ 21 and 26 billion, within 15 percent of the US\$ 23.5 billion finance gap projected in the base scenario.

<sup>14</sup> Many financial data for Nigeria are not available and regional values were used. It is possible that the financial gap for Nigeria is substantially different than estimated. The projected value is a best estimate with available data.

**Figure 7. Alternative outcomes for the finance gap in the base scenario with variations in some of the technical parameters used.**



## 5 Alternative scenarios

The base scenario described above assumes the costs of education according to the 2030 deadline of the United Nations post-2015 Sustainable Development Goals (SDGs). As an alternative, it is useful to compare the outcomes with a few other scenarios. In this section, the base scenario with the 2030 target is compared to five alternative scenarios.

1. *A very early target 2020.* A highly ambitious scenario with a target year of 2020. This scenario is closest to the costing projections made in 2010, five years ago. In the 2010 costing exercise, the target year was 2015 with 2008 as the start year; in this scenario, the target year is 2020 with 2013 as the start year.
2. *A later target 2025.* An ambitious scenario to achieve basic education priorities before the 2030 deadline - perhaps enabling governments to focus on broader SDG education objectives.<sup>15</sup>
3. *Constrained external finance.* In this scenario, external assistance as a percent of GDP remains constant. To meet this finance constraint, the education target year has to be moved back to 2070.
4. *Faster budget shifts.* The shifts in government budgets to allocate more of GDP to public education follow a moderate path, what the EFA Global Monitoring Report called a “low” scenario. In an alternative version, a “high” scenario is implemented, which essentially doubles the rates of re-allocation of public finance.

The alternative scenarios are summarized in Table 5.

The changed assumptions affect both the costs and the domestic budgets, and as a consequence the scenario finance gaps. A summary of the different scenario gaps is shown in Figure 8. The figure shows three panels for 1) all countries together, and 2) for low income countries and for 3) lower middle income countries separately.

<sup>15</sup> In the first two scenarios not all children could feasibly complete lower secondary as the length of the basic cycle exceeds the ten years between 2015 and 2025. Under this scenario, it is targeted that all children are at least transitioning to lower secondary, with complete rates of progression.

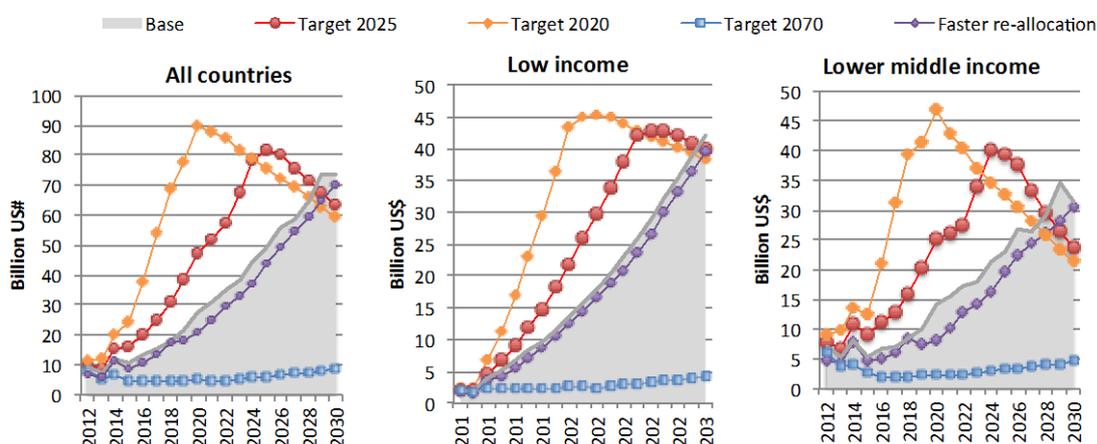
**Table 5. Basic assumptions of three alternative scenarios.**

|                          | Base 2030 scenario                           | Target 2020 scenario    | Target 2025 scenario    | Constrained external finance scenario | Faster re-allocation scenario           |
|--------------------------|--|-------------------------|-------------------------|---------------------------------------|---|
| Targets assumption       | All education targets reached in 2025        | Targets reached in 2020 | Targets reached in 2025 | Targets reached in 2070               | As base scenario                        |
| GDP growth assumption    | GDP growth after 2016 converges to 5 percent | As base scenario        | As base scenario        | As base scenario                      | As base scenario                        |
| Budget shifts assumption | “Standard” government budget shift scenario  | As base scenario        | As base scenario        | As base scenario                      | “High” government budget shift scenario |

The grey areas represent the base scenario, with the target year 2030. The external finance gap for the base scenario with the 2030 target year rises from approximately US\$ 10 billion in 2012, to US\$73 billion in 2030. Three scenarios in the figure show the external finance gaps if the target years are moved: ten years forward, to 2020; and five years forward to 2025; several years back as a result of constrained external finance; and if governments reallocate GDP to education more quickly.

- Moving the target date forward by ten years, to 2020 (orange line) results in large cost increases. This is because the scenario a) assumes a much more rapid construction of classrooms, as well as quality and equity adjustments, but also b) provides less time for GDP growth and budget reallocation to absorb a part of the increased costs. Overall, the external finance needed from 2015-2020 with the Target 2020 scenario is 72 percent higher than with the target 2030 base scenario.
- If the target is moved forward to 2025 (red line), the annual funding gap increases by 37 percent compared to the 2030 base scenario.
- In a scenario with constrained external finance (blue line) – a business as today approach whereby external assistance remains roughly constant – reaching the targets will be moved back to 2070. This scenario presents, in stark form, the penalty for not acting with more assertiveness to make education for all an international priority.
- The scenario with faster re-allocation of GDP to public education (purple line) leads to an external finance gap that is 13 percent lower than the base scenario. The impact of faster domestic budget growth on the external finance gap is small – beyond the base scenario assumptions of domestic budget growth, not much will be gained by further pressuring most governments.

**Figure 8. Scenario finance gaps according to alternative scenarios**



Overall, the different scenarios roughly converge around 2030 (except delayed progress). That is because these scenarios all end up with the same levels of education attainment, and approximately the same ultimate budget allocation, but differ only in the speed with which those levels are approached. *None of the alternatives explored offers a pathway that allows low and lower middle income countries to finance quality education for all from only domestic resources within the coming 15 years.*

## 6 Concluding remarks

The financing of education for all children remains an achievable, but, with business as usual, an elusive objective. Education for all children by 2030 is achievable if we assume:

- moderate GDP growth;
- moderate changes to a domestic re-allocation of funds to public education at historical rates;
- an increase of official development assistance and other external sources for education from less than US\$10 billion today to US\$ 24 billion annually for preschool through lower secondary and an additional US\$ 16 billion for upper secondary in the period 2015-30.

Such an increase of international development assistance for basic education may appear difficult to achieve. In this light, a few practical considerations are important.

First, when measured in contrast to other international investments, it is clear that in any scenario of international funding, US\$39 billion remains a small share of overall investment in poorer countries.

Second, it is possible to prioritize the external funding to the countries that need it most. The external finance needs of the poorest, low income countries, for example, are US\$ 21 billion annually including upper secondary. The education systems in these countries stand to gain the most from external funds helping them to reach universal education goals.

Third, it is important to consider the costs of *delaying or not achieving* the education targets, in terms of loss of human welfare.

There are substantial costs to trying to achieve education for all at a faster pace, say by 2020. The total external funding needed in this scenario is US\$ 59 billion annually from 2015-2020<sup>16</sup>.

An important scenario included in this paper is the one in which the international community *fails to increase funding for education*. In earlier costing exercises, this alternative was not considered. As an exercise, this scenario is enlightening, because it shows starkly, the consequences of failing to act. If the international community fails to increase funding for education in lower income countries, this will affect poorest countries the most. In these low income countries, to achieve the targets set out here by 2030, almost one third of basic education spending needs to come from external sources.

We did not find any acceptable scenario under which substantial international support for basic education could be eliminated or reduced in the next decade. The achievement of education targets is in the interest of the global community, but *it is also only possible with a global effort that includes contributions from everyone.*

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<sup>16</sup> This faster paced scenario is similar, in its timing and results, to the costing projections published by the GMR in 2010. Those projections, made for low income countries only and excluding upper secondary, estimated that US\$ 25 billion would be needed annually from 2008-2015 to achieve the targets by 2015. By including lower middle income countries and upper secondary, the external gap is approximately doubled.

## References

Bruns, Barbara, Alain Mingat, and Ramahatra Rakotamalala. 2003. A chance for every child. World Bank.

Brun, Barbara, Deon Filmer, and Harry Anthony Patrinos. 2011. Making Schools Work. World Bank.

UNESCO, 2010. Reaching the Marginalized: EFA Global Monitoring Report 2010. UNESCO, Paris France

UNESCO, 2014. Teaching and Learning: Achieving Quality for All. EFA Global Monitoring Report 2014. UNESCO, Paris France

UNICEF. 2010. Protecting salaries of frontline teachers and health workers. Social and Economic Policy working briefs. April 2010. UNICEF Policy and Practice

UNICEF, 2014. The investment case for basic education in low- and middle-income countries.

Wils, Annababette and George Ingram. 2011. "Universal Basic Education: A Progress-based Path to 2025". FHI360, Washington, DC

UIS. 2011. International Standard Classification of Education ISCED 2011. UIS. Montreal, Canada.

UNESCO, 2015a. EFA Global Monitoring Report 2015: Education for all 2000-2015: Achievements and Challenges. UNESCO, Paris, France.

UNESCO, 2015b. Pricing the right to education: The cost of reaching new targets by 2030. EFA Global Monitoring Report Policy Paper 18, March 2015. UNESCO, Paris, France.

Wils, Annababette. 2015. "Reaching education targets in low and lower middle income countries Costs and finance gaps to 2030". Background report for EFA Global Monitoring Report 2015: Education for all 2000-2015: Achievements and Challenges. UNESCO, Paris, France.