

How long will it take to achieve universal primary and secondary education?

Technical background note for the Framework for Action on the post-2015 education agenda

May 2015

This note is a contribution of the EFA Global Monitoring Report team to the Framework for Action document for the post-2015 education agenda, which will be discussed at the World Education Forum in Incheon, Republic of Korea. It is based on and extends a background paper to the 2015 EFA Global Monitoring Report (Lange, 2015).

Introduction

This short paper uses evidence from recent household surveys to project future trends in primary, lower secondary and upper secondary education completion rates in low and middle income countries. The results of this projection exercise indicate how long it is likely to take for universal completion to be achieved at each respective level of education for different groupings of countries. The analysis seeks to inform on-going discussions around the feasibility of achieving the currently proposed global education targets by 2030.

In addition, as in the case of the MDGs, there is some confusion regarding the relationship between, on the one hand, global targets and, on the other hand, targets that would apply to the circumstances of individual countries. In principle, according to one of the architects of the MDGs, such confusion should not exist:

“Global targets apply at the global level. Unfortunately, the global MDG canon has turned them into yardsticks for measuring and judging performance at the national level. Hence the MDG debate suffers from misplaced concreteness. Interpretation of the MDGs as one-size-fits-all targets neglects the historical background of each country (...) Performance can be measured by absolute or relative benchmarks. Both are valid but neither gives a complete picture. Most MDGs are expressed in relative terms, such as reducing poverty by half (...) Since proportional changes tend to be inversely related to the initial situation, the misinterpretation of the MDGs as one-size-fits-all targets puts the least developed and the low income countries at a disadvantage. Global goals and targets were earlier expressed in either absolute terms or as combined relative and absolute benchmarks.”

Source: Vandemoortele and Delamonica, 2010.

In other words, global targets were mistakenly considered as applicable to individual countries as well. This should be avoided in the development of the post-2015 agenda. And yet there is an expectation that the global target framework be used as a basis to develop consistent national targets as part of an accountability process. This note therefore also aims to inform a discussion about target setting at the level of individual countries and country groups.

The two sections that follow describe the data sources and main results. A concluding section discusses some caveats and tentative implications.

1. Data and indicators

The analysis in this note is based on data from the Demographic and Health Survey, Multiple Indicator Cluster Survey, and national household surveys from 78 of the 142 low- and middle-income countries, which represent 88% of the total population. The surveys were carried out between 2008 and 2013 (see Annex 1). These surveys are also used for the World Inequality Database in Education (www.education-inequalities.org).

Three indicators are considered, namely the fraction of a cohort that has completed primary, lower secondary and upper secondary school respectively. In the remainder of this note, the three completion rate indicators refer respectively to the three-year age group of individuals who were 3-5 years older than the official age of entry into the last grade of the respective education level. For example, in the case of primary education, if the official age of entry into the last grade of primary school is 11 years, the completion rate is calculated over the age group 14 to 16 years.¹ The reason is that in many countries late entry means that the completion rate does not peak until well after the official expected graduation age.

Ideally, historic completion rates would be available through surveys for every country and every year. In the absence of such data, a retrospective / pseudo-cohort approach is followed to re-create the evolution of completion rates. In other words, if the primary education completion rate in year t is calculated over the age group 14 to 16 years, the completion rate for year $t-1$ is calculated over the age group 15 to 17 years and so on. This approach leads to potential selectivity problems. For example, more educated people have a higher life expectancy and may be over-represented in older cohorts, although this problem is partly overcome by focusing only on cohorts going back no more than 20 years where differential mortality rates are too small to bias the results. Conversely, more educated people have a higher chance of emigrating to high income countries and may be under-represented in older cohorts, although this bias is also small and can be safely ignored.

A source of potentially more serious bias is the fact that children enrol in school late and/or tend to repeat grades in relatively large numbers in some countries. As a result, for example, they have not reached the final grade of primary even by the age of 14. The completion rate therefore appears to be slowing down at the younger ages, when in fact all that is captured is delayed completion of an education level. For that reason, observations for up to three of the most recent years are trimmed if they are lower by at least three percentage points relative to the maximum level observed to prevent an artificial bias from being introduced. The estimation for the three completion rates is based on a balanced panel of observations from the period 1992-2008 for these 78 countries.

2. Results

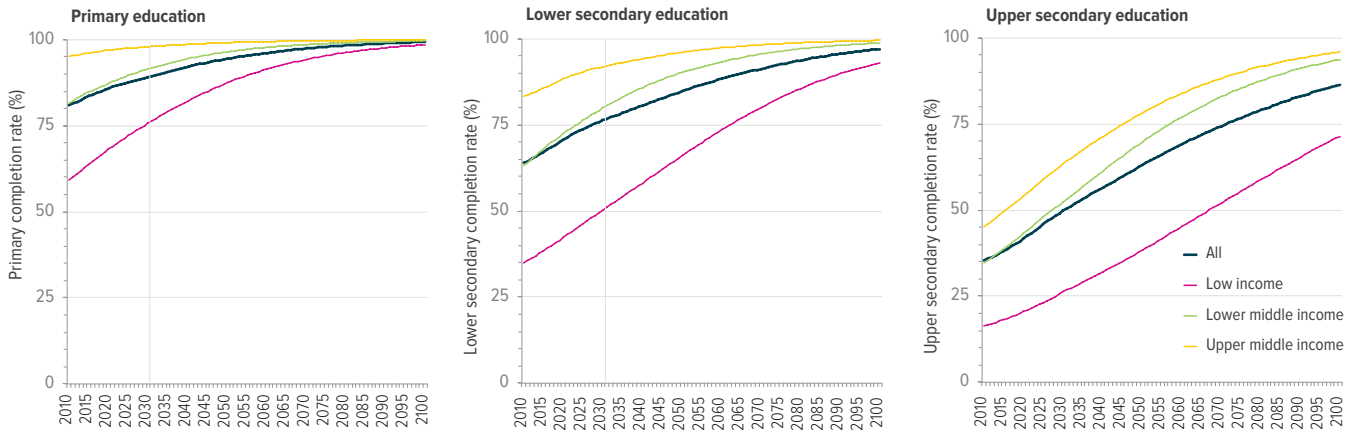
Annex 2 presents the methodology. The model allows the average transition speed towards universal primary, lower secondary and upper secondary completion to be calculated. This is done by regressing the transformed indicator on time and on a complete set of country fixed effects. The resulting estimates are 0.050 for primary completion, 0.046 for lower secondary completion, and 0.039 for upper secondary completion, and are highly significant. This means that countries that have a primary completion rate close to zero have on average a cohort-on-cohort change of about 5 percent. We can use this estimate to plot the average transition curve (**Figure 1**).

1. The relevant age group for calculating the lower (upper) secondary completion rate would be 17 to 19 years (20 to 22 years) if the official age of entry into the last grade of lower (upper) secondary school were 14 years (17 years).

2. http://esa.un.org/wpp/ASCII-Data/ASCII_FILES/WPP2012_DB04_POPULATION_ANNUAL.CSV

FIGURE 1

Projected completion rates by country income group and level, 2010-2100



Four curves are plotted for each of the three completion rates over the period 2010-2100 according to the World Bank country income group classification (June 2013): low income countries, lower middle income countries, upper middle income countries, and all low and middle income countries. Results are weighted with the projected population until 2100 for each country using the World Population Prospects (2012 Update) of the United Nations Population Division.² As the share of today’s low income countries in the total population is expected to grow, the average for all low and middle income countries is pulled closer to the low income country average from 2030 onwards.

TABLE 1

Projected completion rates (2015, 2030 and 2050) and year of achieving 95%-97% completion rates

	Primary				Lower secondary				Upper secondary			
	Low income	Lower middle income	Upper middle income	Low & middle income	Low income	Lower middle income	Upper middle income	Low & middle income	Low income	Lower middle income	Upper middle income	Low & middle income
2015 (%)	64	85	96	84	39	68	86	67	18	39	50	38
2030 (%)	76	92	98	89	50	80	92	76	26	52	63	50
2050 (%)	87	96	99	94	66	90	96	85	38	70	78	63
95%	2073	2042	2010	2053	after 2100	2067	2044	2086	after 2100	after 2100	2094	after 2100
97%	2085	2054	2021	2066	after 2100	2079	2056	2100	after 2100	after 2100	after 2100	after 2100

The following table summarises the results (Table 1). Neither universal lower secondary nor universal upper secondary will be reached by 2030 at recent rates of progress. For example, it is projected that across low and middle income countries, the lower secondary completion rate will be 76% in 2030, while a rate of 95% will only be achieved in the 2080s. Likewise, it is projected that across low and middle income countries, the upper secondary completion rate will be 50% in 2030, while a rate of 95% will not be achieved before the end of the century. This should not come as a surprise. High income countries are still far from achieving universal upper secondary completion education rates. For example, among the 28 European Union countries, only 79% of 20-24 year olds

3. <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tps00186&plugin=1>

attained upper secondary education in 2010.³ Annex 3 presents the equivalent results broken down by region (which only apply to low and middle income countries in the respective regions).

Note that the results are somewhat pessimistic for two reasons. First, the projected completion rates refer to the above-mentioned (older) age groups. In practice, the primary completion rate of 14-16 year olds is achieved four years earlier if problems of late enrolment and repetition are overcome; and, in fact, the completion rate refers to the cohort of individuals born 15 years earlier. In other words, the projected primary completion rate in 2030 for all low and middle income countries will be: 87% for those aged 14-16 in 2030; 89% if the cohort completes their education in time (i.e. by age 11); and 92% for those children born in 2030.

Second, the results exclude high income countries: if the calculations include the latter, then these targets will be achieved at the global level a few years earlier than indicated above.

3. Discussion

The above results suggest that the currently proposed targets are too optimistic given recent rates of progress. The unfinished business, i.e. universal primary education, will be achieved at best only in the early 2050s. A completion rate of 95% in lower education secondary will be reached at best in the late 2080s, while the Open Working Group Target 4.1 of universal upper secondary education will not be achieved this century in low and middle income countries.

Nevertheless, it is important to keep in mind some limitations of these indicative projections. First, as mentioned above, the projections are based on recent trends; they are not forecasts. Yet, these countries have seen some major changes since 2000 and are called upon to intensify their efforts after 2015. These projections may not be capturing the effects of the most recent changes and do not capture the anticipated changes post-2015; therefore they should be seen as the baseline scenario, in other words a picture of how completion rates will evolve if nothing else changes.

Second, the projections are based on a very simple model. They are, in effect, linear projections based on a particular transformation of completion rates. This model (i) accounts well for historical rates well and (ii) has some theoretical basis embedded in the human capital approach (Clemens, 2004). However, the model may not be capturing important non-linearities, for example in the relationship between income and schooling (i.e. if the income elasticity of demand for schooling is context-specific, households more likely to face credit constraints may exhibit a higher elasticity).

Last but not least, projecting current low rates in some countries to a point beyond 2050 is highly uncertain. Nevertheless, they do put into perspective the level of ambition embedded in the agenda under discussion. For example, they raise the question of what level of mobilisation will make it possible to bring forward the achievement of universal lower secondary education by 60 years.

The projections also highlight that achieving a global target and achieving national targets are two issues that should be treated separately. For example, the achievement of a lower secondary education completion rate of 76% in low and middle income countries by 2030 on average is compatible with the fact that one in four of these countries will have completion rates below 50%.

The household surveys used as sources in this note are not always recognised by the respective governments as their official source of information on educational progress. More work would be needed at the country level to cross-check these results with other sources of information.

This brief note shows that in deciding how different countries should contribute to reaching the global target, two parameters will need to be taken into account. First, countries follow an S-shaped path to universal completion; therefore a simple relative target (e.g. halve the proportion of the cohort who do not attain, say, lower secondary education) will not be fair. Second, the overall influence of low income countries on the chances of achieving a global target will grow, as their share of global population will grow disproportionately; therefore, demographic projections will need to be taken into account.

REFERENCES

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Annex 1: Sources

COUNTRY	SURVEY	YEAR
Afghanistan	MICS	2010
Albania	DHS	2008
Argentina	EPH	2012
Armenia	DHS	2010
Bangladesh	DHS	2011
Belarus	MICS	2012
Belize	MICS	2011
Benin	DHS	2011
Bhutan	MICS	2010
Bolivia, P. S.	DHS	2008
Bosnia and Herzegovina	MICS	2011
Brazil	PNAD	2012
Burkina Faso	DHS	2010
Burundi	DHS	2010
Cambodia	DHS	2010
Cameroon	DHS	2011
Central African Republic	MICS	2010
Chad	MICS	2010
China	CHNHS	2009
Colombia	DHS	2010
Congo	DHS	2011
Costa Rica	MICS	2011
Côte d'Ivoire	DHS	2011
D. R. Congo	MICS	2010
Ecuador	ENEMDU	2013
Egypt	DHS	2008
Ethiopia	DHS	2011
Gabon	DHS	2012
Ghana	MICS	2011
Guatemala	ENCOVI	2011
Guinea	DHS	2012
Guyana	DHS	2009
Haiti	DHS	2012
Honduras	DHS	2011
India	NSS	2011
Indonesia	DHS	2012
Iraq	MICS	2011
Jamaica	MICS	2012
Jordan	DHS	2012

COUNTRY	SURVEY	YEAR
Kazakhstan	MICS	2010
Kenya	DHS	2008
Kyrgyzstan	DHS	2012
Lao PDR	MICS	2011
Lesotho	DHS	2009
Madagascar	DHS	2008
Malawi	DHS	2010
Maldives	DHS	2009
Mali	DHS	2012
Mexico	ENIGH	2012
Mongolia	MICS	2010
Morocco	HYS	2009
Mozambique	DHS	2011
Nepal	DHS	2011
Nicaragua	ENMV	2009
Niger	DHS	2012
Nigeria	DHS	2013
Pakistan	DHS	2012
Palestine	MICS	2010
Peru	DHS	2012
Philippines	DHS	2008
Rwanda	DHS	2010
Sao Tome and Principe	DHS	2008
Senegal	DHS	2010
Serbia	MICS	2010
Sierra Leone	MICS	2010
South Africa	GHS	2013
Suriname	MICS	2010
Swaziland	MICS	2010
Tajikistan	DHS	2012
TFYR Macedonia	MICS	2011
Timor-Leste	DHS	2009
Togo	MICS	2010
Tunisia	MICS	2011
U. R. Tanzania	DHS	2010
Uganda	DHS	2011
Ukraine	MICS	2012
Viet Nam	MICS	2010
Zimbabwe	DHS	2010

Annex 2: Methodology

All three completion indicators are bounded between zero and one. In order to account for floor and ceiling effects, the logistic growth (or S-shaped) model is estimated (e.g. Meyer et al., 1992; Clemens, 2004). For example, progress towards education indicators is more difficult to achieve, and therefore slows down, the closer a country gets to universal completion (e.g. getting the last children to complete primary education)⁴.

This logistic growth-model is based on two-parameters:

$$y_t = 1 / (1 + e^{-\beta(t-a)})$$

where β determines the slope of the S-shaped function and a its point of inflection. The greatest changes in absolute terms are observed when $y_t = 0.5$. Taking the derivative of with respect to t yields:

$$dy/dt = \beta y_t(1 - y_t) \Leftrightarrow (dy/dt)/y_t = \beta(1 - y_t)$$

Changes in relative terms are approaching zero as $y_t \rightarrow 1$. In what follows, β is referred to as the transition speed but is actually the rate at which the indicator changes initially, when y_t is close to zero. A uniform transition speed was imposed across countries. Re-arranging the first equation, replacing $-\beta a = \alpha$, a country-specific intercept, and adding the error term, we obtain:

$$-\ln [(1 - y_{it})/y_{it}] = \alpha_i + \beta_t + \varepsilon_{it}$$

where i and t are subscripts referring to countries and years respectively. The left hand-side maps from the unit-interval, on which the indicator is defined, onto the real line. This motivates the introduction of country-fixed effects α_i : introducing a country-specific intercept is equivalent to shifting the regression line for each country horizontally, accounting thus for country-specific levels of educational completion at a given point in time. If y_{it} is interpreted as the probability that a member of cohort t attains, for example, primary education, then the left hand-side of the equation can be interpreted as minus the logarithm of the inverse odds of attaining a particular level of education. Coefficient estimates can thus be interpreted as the change in this quantity as the variable changes by one unit. In particular, β can be interpreted as an estimate of the annual percentage change in the odds⁵.

4. While the ceiling effects for primary and lower secondary education have been observed for richer countries and is therefore safe to assume that a similar path will be followed by poorer countries, it is not entirely certain that the same will be the case for upper secondary education, as no country has achieved universal completion so far.

5. In some cases, completion rates are very close to one. For that reason, weights were applied $w = y(1 - y)$, which gave little weight to observations close to zero or one and maximum weight to observations on rates around 0.5.

Annex 3: Results by region

FIGURE A1

Projected completion rates by region and level, 2010-2100

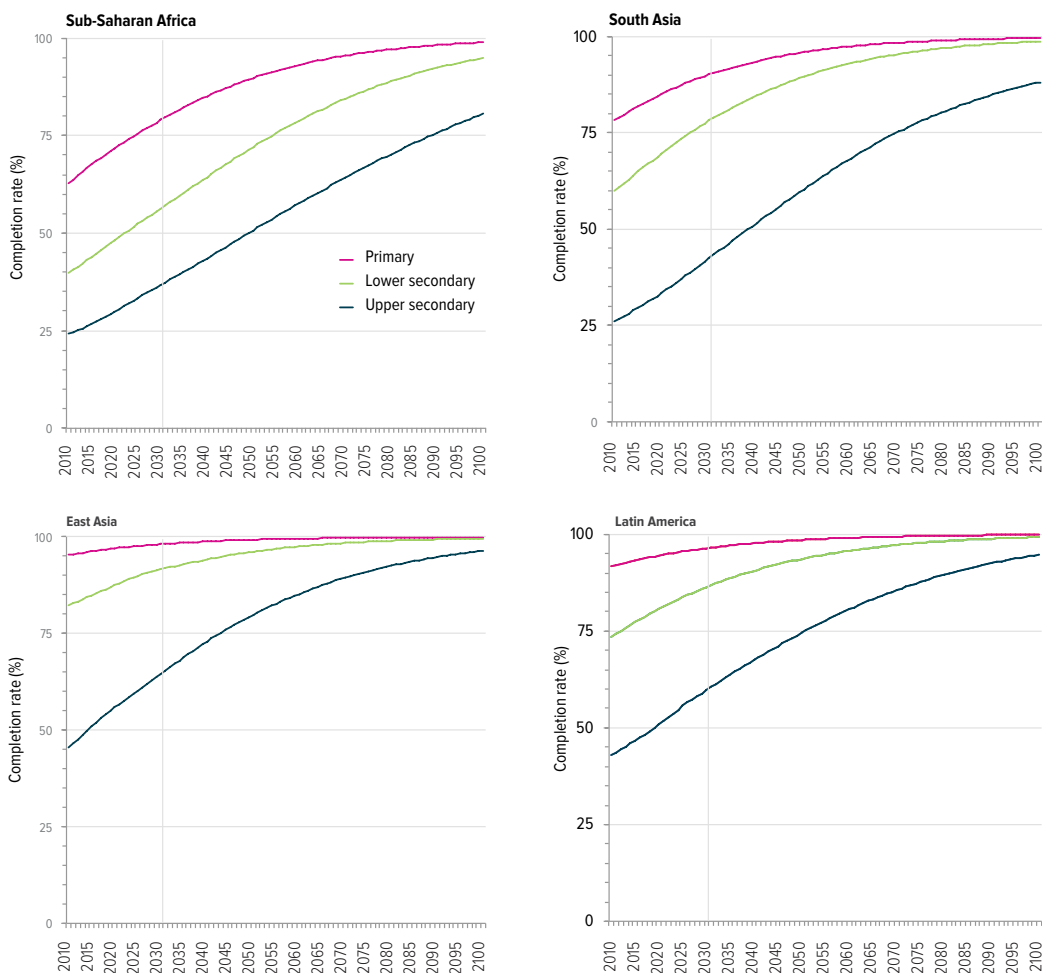


TABLE A1

Projected completion rates (2015, 2030 and 2050) and year of achieving 95%-97% completion rates

	Primary				Lower secondary				Upper secondary			
	Sub-Saharan Africa	South/ West Asia	Latin America/ Caribbean	East Asia/ Pacific	Sub-Saharan Africa	South/ West Asia	Latin America/ Caribbean	East Asia/ Pacific	Sub-Saharan Africa	South/ West Asia	Latin America/ Caribbean	East Asia/ Pacific
2015 (%)	68	82	93	96	44	65	77	85	27	30	47	51
2030 (%)	79	90	96	98	56	78	86	92	37	43	60	65
2050 (%)	90	96	99	99	72	90	94	96	51	60	75	80
95%	2068	2046	2023	2006	after 2100	2068	2056	2044	after 2100	after 2100	after 2100	2091
97%	2079	2057	2034	2020	after 2100	2080	2068	2056	after 2100	after 2100	after 2100	after 2100

Note: The estimates are representative of the low and middle income countries in each region. In the case of East Asia and the Pacific, they are therefore not inclusive of high income countries such as Australia and Japan.