

Education Attainment in the Middle East and North Africa

Success at a Cost

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Abstract

This paper reviews the experience of the Middle East and North Africa region in education attainment over the past four decades (1970–2010). It documents the following main findings: (a) all countries in the region experienced significant improvements in educational attainment over this period; (b) most countries in the region did better in this regard than comparators that had roughly the same education stocks in 1970; (c) collectively, the region achieved a

greater percentage increase in education than other regions; (d) the region's better performance was in part because of higher rates of public spending on education, better food sufficiency status, and a lower initial stock of education in 1970 in comparison with most other developing country regions; and (e) the region had among the lowest payoffs to public spending in terms of increments in education stock; the impressive advance in education was achieved at high cost.

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Education Attainment in the Middle East and North Africa: Success at a Cost

Farrukh Iqbal and Youssouf Kiendrebeogo

Key words: Middle East, education, food adequacy, public spending, economic development

JEL: H520, I250, O150, O530

This paper reviews the experience of the Middle East and North Africa (MENA) region in increasing education attainment over the 40 year period between 1970 and 2010. It is organized in four sections. In Section A, we provide an overview of the region's experience with education attainment during 1970-2010. In Section B, we measure the performance of 15 MENA countries against countries that had similar levels of education stocks in 1970 and show that most MENA countries have done better than their comparators in increasing education stocks over time. In Section C, we compare across geographical regions using population weighted averages. We find that the regional picture is consistent with that suggested by the country-specific experience in that MENA has performed better than other developing country regions. Finally, in Section D, we attempt to cast more light on the sources of MENA's better performance through econometric analysis. We explore the extent to which such factors as income growth, public spending on education, opportunity costs, food sufficiency, urbanization and initial endowments of education have affected the growth of education among developing countries. We find that initial endowments and public spending are the two most important determinants of rising education stocks and contribute the most to MENA's edge over other developing regions. We also find that the number of additional years of education obtained per dollar spent was low in MENA compared to most other regions.

A. Rising Education Attainment in MENA

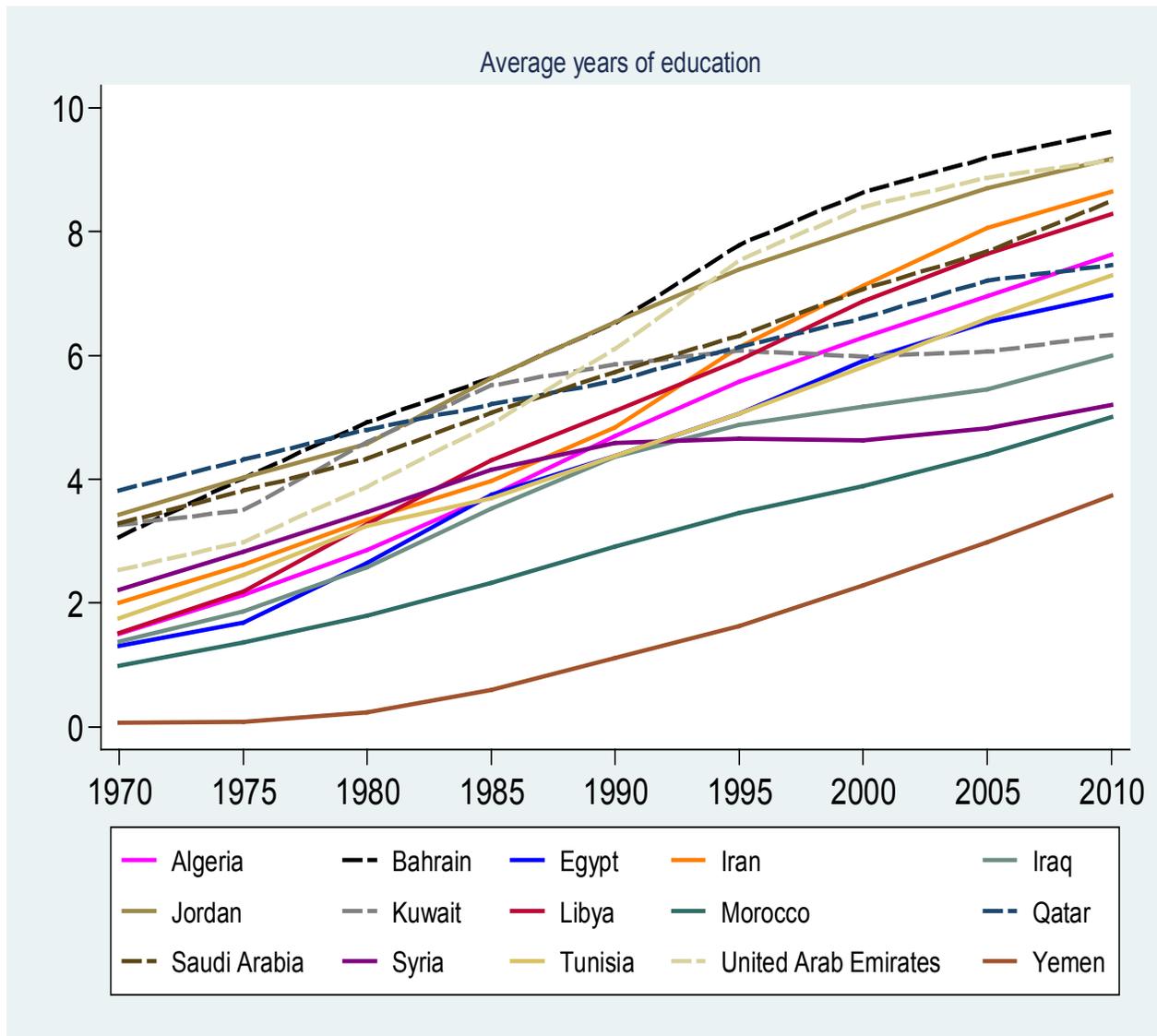
Barro and Lee (2013) have recently conducted another valuable exercise to improve global estimates of years of schooling completed by adults above the age of 15. They use observations from censuses, surveys, and enrollment rate sources to establish a consistent time series for the period 1950-2010. The Barro-Lee data set is convenient for tracking the evolution of education attainment in individual MENA countries and conducting international comparisons.

Figure 1 below shows how the stock of education has evolved in 15 MENA countries for which we have data for the period 1970-2010.¹ Highlights include the following:

- There was great variation among MENA countries in 1970 with regard to the stock of education, ranging from a low of 0.06 years per person in Yemen to a high of 3.8 years in Qatar.
- All 15 MENA countries experienced an increase in education attainment over time. However, some did better than others. This inter-country variation in performance suggests that country circumstances, institutions and policies played a role in enhancing education achievement.
- Variation in education stock increased over time. The gap between the country with the lowest education stock in 2010 (Yemen, with 3.7 years) and the highest (Bahrain, with 9.8 years) was higher than the lowest-highest gap in 1970.

¹ The 15 countries are listed in Figure 1. The Barro-Lee dataset does not include data for Oman, Lebanon and Djibouti, countries which are classified as part of the Middle East and North Africa Region in World Bank databases.

Figure1: Evolution of education attainment in MENA, 1970-2010



B. Country-Specific Performance in Comparative Perspective

To identify country-specific success we should compare each country’s performance over time with that of relevant others. How should we pick the relevant others?

One way to do so is to ensure that all comparators start at the same starting line. This can be done by selecting as relevant comparators all the other countries in the world that had an education stock close to that of the MENA country of interest in 1970. We have done this by selecting comparators that fall within a band of 5%; in some cases, this does not yield at least four comparators so we have widened the band beyond 5%. The specific level of the band and the names of the relevant comparators are shown in the country charts presented in Annex 1.

Table 1 summarizes the results. Key findings include the following:²

- Seven MENA countries performed the best in their categories. While several of these were hydrocarbon rich countries, some were not. For example, the high achieving set includes the Arab Republic of Egypt and Jordan. And Kuwait, which has been an oil rich country for many decades, had the worst performance relative to four comparators.
- Five MENA countries had the second best performance in their categories. Yemen and Morocco are in this set though they are normally thought of as education underachievers within the region because their stock of education is not as high as that of other MENA countries. The present methodology highlights the value of comparing relative to a starting point rather than comparing only at a given point in time. While the latter shows prevailing gaps among countries, the former provides a better measure of policy effort and achievement over time.

Table 1: Category wise performance of MENA countries for change in education stock (1970-2010)

Best in category	Among best two in category
Bahrain	Algeria
Egypt	Morocco
Iran	Saudi Arabia
Iraq	Tunisia
Jordan	Yemen
Libya	
United Arab Emirates	

Table 2 takes another cut at the comparative performance question. It ranks MENA countries by how well they did in terms of percentage improvements in education stock during the past four decades. The table contains some remarkable results:

- Four MENA countries (Yemen, Libya, Egypt, and Morocco) are in the top 10 globally by this measure. While this is due in part to the fact that the percentage change measure favors countries with low education stocks to begin with, the performance of these countries must be judged very impressive when combined with the information from Table 1 that they also outperformed many other countries with similarly low stocks of education in 1970.
- All but two MENA countries rank within the top half of the global distribution. The two outliers are Qatar and Kuwait, which had relatively high stocks of education to begin with.

² For Oman and Lebanon, which are not in the Barro-Lee dataset, other sources of information can be used to classify relative performance. Using percentage improvement in secondary school enrollment rates, for example, we find that Oman ranked best in its category while Lebanon failed to feature in the top three ranks in its group.

Table 2: Rank order of MENA countries by percentage increase in years of schooling (1970-2010)

Country	Years of Schooling (1970)	Years of Schooling (2010)	Absolute Increase	Percentage Increase (%)	Rank (N=145)
Yemen, Rep.	0.06	3.7	3.6	6053.5	1
Libya	1.5	8.2	6.7	444.9	6
Egypt	1.3	6.9	5.6	433.9	8
Morocco	0.9	5.0	4.0	408.5	10
Algeria	1.5	7.6	6.1	405.1	11
Iraq	1.3	5.9	4.6	335.1	17
Iran	2.0	8.6	6.6	331.3	19
Tunisia	1.7	7.2	5.5	314.6	21
United Arab Emirates	2.5	9.1	6.6	261.2	26
Bahrain	3.0	9.6	6.5	213.2	33
Jordan	3.4	9.1	5.7	167.2	45
Saudi Arabia	3.2	8.4	5.2	158.3	47
Syrian Arab Republic	2.2	5.2	2.9	135.6	57
Qatar	3.8	7.4	3.6	95.0	75
Kuwait	3.2	6.3	3.0	94.0	78

C. Regional Performance in Comparative Perspective

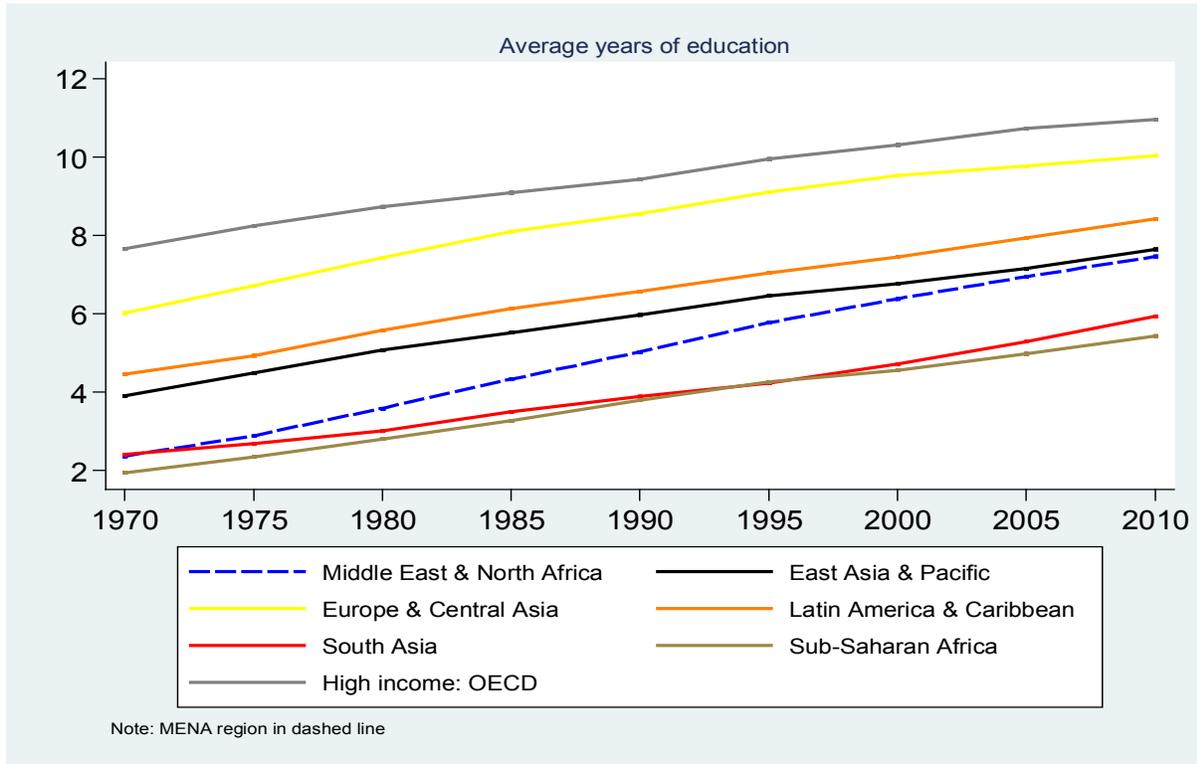
We now look at cross-regional data to see how the MENA region performed as a whole in comparison with other regions. Table 3 provides population weighted averages for education stock for each of the developing country regions (see Annex 2 for list of countries included in each region) and the high-income OECD group of countries for the period 1970-2010. The table shows that the greatest percentage increase in education stock (239%) occurred in the MENA region. This result is consistent with the country-specific comparisons reported in the previous section.

Table 3: Average years of schooling by region and over time

	1970	1980	1990	2000	2010	Increase (%) 1970-2010
Middle East/ North Africa	2.1	3.3	4.8	6.1	7.2	239.0
East Asia/Pacific	3.9	5.0	5.9	6.7	7.6	95.7
Europe/Central Asia	6.0	7.4	8.5	9.5	10.0	66.5
Latin America/Caribbean	4.4	5.5	6.5	7.4	8.4	89.2
South Asia	2.4	3.0	3.8	4.7	5.9	145.6
Sub-Saharan Africa	1.9	2.7	3.7	4.5	5.4	180.4
OECD	7.5	8.6	9.3	10.2	10.9	44.8

Figure 2 graphs regional data for education attainment at five-year intervals between 1970 and 2010. The figure shows that the MENA region was clustered at the low-stock end with South Asia and Sub-Saharan Africa in 1970 but diverged from this cluster over the next 40 years. By 2010, it had converged with the East Asia region and narrowed the gap with the Latin America and Caribbean region. In doing so, it experienced the fastest rate of stock growth among all regions over the past four decades.³

Figure 2: Evolution of education attainment across regions, 1970-2010



D. Sources of Comparative Performance: An Econometric Approach

What accounts for the better comparative performance of the MENA region? From the general literature we know that such factors as income, public spending on education and measures of the opportunity cost of education are plausible determinants of the demand for and supply of education. When considering changes over time, it is important also to consider the initial level of education from which a country starts. The rationale for these factors is further discussed below.

Initial level of education: It is natural to expect that, all other things being equal, a country that has a high level of education to begin with will find it difficult to increase this rate further while countries with lower rates will find it easier to do so. Indeed, for some measures of education, such as net primary or

³ Similar performance by the MENA region is also found for the period 1960-2000 by Glewwe and Kremer (2006) using an earlier version of the Barro-Lee dataset.

secondary enrollment rates, there are ceilings of 100% to contend with.⁴ For the measure we have adopted here, namely, years of education completed by adults over 15, there is no formal ceiling but the fact remains that, once a large fraction of a population has received, say, secondary education, it is harder to get further increases in the average level of education. On the other hand, it could be argued that countries with low levels of education to begin with may be too poor to address their education needs and so may find it harder to increase education levels, suggesting the presence of a “poverty trap” phenomenon. Which pattern prevails will depend on whether or not we are able to control for variables that reflect the availability and use of public and private resources to attain more education.⁵

Growth of income: The average growth of per capita income is relevant because it proxies for (a) the availability of private resources to spend on education and (b) provided there is an effective tax system, the availability of public resources with which to build schools, hire teachers and pay for related education inputs. All other things being equal, the faster income grows in a country, the faster one might expect it to increase education attainment. The measure used in the regressions below is the average growth rate during 1970-2010 of income per capita in 2005 PPP dollars.

Children’s health: The effective demand for education may also be affected by such factors as children’s health. Children who are less healthy for any reason are likely to be absent for more days from school, to repeat grades and to drop out at higher rates and earlier ages. An important determinant of children’s health is likely to be their food intake. In the empirical work reported below, we use the prevalence of undernourishment in the general population to proxy for children’s health status.⁶ This measure is available in the World Development Indicators (WDI) database starting from 1991 and so the average value for the period 1991-2010 is used in the empirical analysis.

Public spending on education: This is a more direct measure of public resources devoted to increasing education inputs. We expect higher levels of spending to be associated with higher levels of education attainment. This is expected to be of special relevance to the MENA region because most countries there had adopted a model of publicly financed and delivered provision of education by the 1960s and continued to implement this model into current times. Lebanon is possibly the only MENA country where the private sector has historically had a more prominent role than the public sector in education services. In the regressions that follow, we use the level of public spending on education per capita per year (in 2005 PPP dollars) averaged over 1990-2010.

⁴ Sometimes gross enrollment rates of above 100% are encountered. This means that the numerator (number enrolled) exceeds the denominator (number of children in the relevant age group). This can happen when children above the relevant age group remain among the enrollees because they are repeating grades or are returning to school after an absence.

⁵ The relationship could also be modelled as an S-shape curve capturing the idea of slow rates of change at very low and very high levels of education and faster rates of change in between (see Clemens et. al, 2007 for a discussion.) We have not pursued this idea in this paper.

⁶ The measure refers to the proportion of the population whose food intake is insufficient to meet minimum dietary energy requirements continuously. The statistical methodology note in the WDI database describes the data as measuring “food deprivation based on average food available for human consumption per person, the level of inequality in access to food, and the minimum calories required for an average person.”

Employment opportunities for children: Whether a family decides to allow a child to get additional years of schooling depends in part on the opportunity costs of education at each successive year. In general, these costs increase with the scope for employment among children of school-going age. For example, where there are many opportunities for children to be employed and it is culturally acceptable for children to work, one would expect this to decrease the desire among families to send their children to school. Thus, countries where a larger fraction of children are employed are also likely to be countries with a slower rate of improvement in education attainment.⁷ We use the rate of child employment (among children between 7 and 14 years of age) averaged over 1970-2010 as a measure of opportunity cost.

Urbanization may also serve as a proxy for opportunity cost to the extent that urbanized areas are likely to have higher school density and offer easier transportation options to get to school. Another possible role of urbanization may come from the supply side. Higher rates of urbanization allow more children to be accommodated in a given number of schools and also more schools to be built from a given budget.

The results of the regression analysis are provided in Table 4 and regional averages of the included variables are shown in Table 5.

Results of Regression Analysis

The results of the estimation (see Table 4) show that the initial level of education stock in 1970 has by far the strongest effect on the attainment of education over the next four decades. The standardized coefficient for this variable is -0.73 which implies that countries with an education stock that was one standard deviation less than the sample average in 1970 increased their stocks by 73% more than the average by 2010. The negative sign on the initial level of education shows that convergence or catch-up has occurred and the “poverty trap” scenario has not played out. Countries with low initial education stocks have moved faster over time to increase their stocks compared to those with higher initial stocks.

The results also show that public spending on education is a significant and positive determinant of education attainment.⁸ The higher the public spending on education per capita, the higher is education attainment. Food intake or health status also matters: the worse the undernourishment of the population, the smaller the improvement in education attainment. In terms of economic significance, however, the effect of initial endowment is much stronger than either of these two variables.

Opportunity costs are not statistically significant in our results: neither child employment nor urbanization is consistently significant. Per capita income growth is not significant either. The latter result is consistent with the lack of robustness for this variable in the previous literature. For example, Gupta et al. (2002) report a significant positive association between gross secondary enrollment rates

⁷ For example, Goldin and Katz (1997) show that variations in the availability and wages of manufacturing sector jobs were among the factors that explain differences in the rate of secondary school graduation among US states over the period 1910-1940. Manufacturing sector jobs competed with the desire to spend additional years in high school at this early stage in the evolution of education in the US.

⁸ Similar results obtain in regressions using alternative measures such as the ratio of public spending on education to total budgetary spending.

and per capita income but not for gross primary and secondary rates taken together. Baldacci et al. (2008) find current per capita income to be a significant and positive determinant of primary and secondary gross enrollment rates but not in all of the models they run.⁹ It is possible that the lack of significance of the income growth variable is due to collinearity with the public spending variable. One would expect countries experiencing higher income growth to also experience higher levels of public spending in general.

Table 4: Determinants of change in education stock among developing countries

Independent variables	
Ln initial education stock in 1970	-0.732*** (0.061)
Real GDP per capita growth	4.36e-03 (0.015)
Public spending on education per capita	0.064** (0.026)
Undernourishment	-6.83e-03** (3.40e-04)
Child employment rate	2.12e-03 (2.82e-03)
Urbanization	1.21e-03 (1.28e-03)
Constant	1.405*** (0.179)
N	72
Adjusted R-squared	0.892

Notes: The dependent variable is the natural logarithm of the change in education stock (1970-2010). Standardized coefficients are reported with heteroskedasticity-robust standard errors in parentheses. Asterisks denote significance levels as follows: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Sources of the MENA performance edge: The first part of this paper provided evidence to show that the MENA region had performed better than other regions in raising education stock. The regression results give us some leads as to where to look for the sources of the MENA comparative edge since they identify the factors that are most important in determining the change in education stock over time. Table 5 compares regions in terms of the main independent variables used in the regression analysis. This shows that the MENA region had among the lowest values for initial education and undernourishment and the highest value for public spending on education. By combining the information about which variables are significant with information about regional averages for these variables, we can make pairwise comparisons between MENA and other regions.

For example, when we compare MENA with East Asia, the main source of the better performance of MENA is its much lower initial education stock (2.3 years versus 3.9 years). On the other hand, this

⁹ It should also be noted that our empirical model differs from most of the literature in that we are estimating the determinants of the *change* in education stock rather than the *level* at a given point in time. Goldin and Katz (1997) come closest to the method adopted here. In some of their regressions, they define the dependent variable as the *change* in high school graduation rates across US states during different sub-periods between 1910 and 1938. However, their income measure remains a *level* (per capita wealth) variable. They find a significant positive association between per capita wealth and secondary school graduation rates.

source of advantage does not apply when we compare MENA’s performance with that of Sub-Saharan Africa since the latter had an even lower education stock (of 1.9 years) to begin with. In this case, MENA’s performance edge comes mostly from higher levels of public spending on education and better levels of undernourishment.¹⁰

Table 5: Cross-regional differences in sample averages of determinants of schooling

Regions	Per capita real growth (%)	Average years of schooling in 1970	Education spending per capita per year	Child employment (%)	Undernourishment (%)	Urbanization (%)
MENA	2.3	2.3	252.3	10.4	7.0	55.3
EAP	2.9	3.9	74.8	10.6	15.6	32.6
ECA	1.9	6.0	197.4	10.1	7.8	61.3
LAC	1.7	4.4	219.6	8.1	11.8	71.3
SA	3.1	2.4	8.4	8.0	21.9	25.9
SSA	0.5	1.9	37.3	33.5	27.5	30.0
Sample	1.8	3.2	79.2	20.1	19.7	41.7

Two additional observations may be made regarding MENA’s experience. Since we have data on public spending levels, we can calculate the increase in education stock per dollar spent. This is shown for 12 individual MENA countries as well as for regions in Table 6. It is clear from this that MENA achieved a low payoff: the education stock in MENA increased by 2.02 years over the 40-year period between 1970 and 2010 for every \$100 spent per capita per year. This is well below the payoff achieved by such regions as South Asia, Sub-Saharan Africa and East Asia, though somewhat better than that achieved by Latin America. Individual MENA countries also do not perform well on this measure, the best rank achieved being 40 by Yemen. It would appear then that the increase in education stocks in MENA countries described in earlier sections of this paper were achieved at comparatively high cost. In addition, one should note that the quality of education achieved leaves much to be desired. The limited though growing body of comparative data on education quality shows most MENA countries clustered towards the bottom of the global distribution with scores below those to be expected on the basis of their per capita income levels (World Bank, 2013, p.172). While the challenge of building schools and getting children into them has been met successfully, that of converting all this schooling into productive learning remains to be met in the future.

¹⁰ Technically, these comparisons are being made in terms of predicted values rather than actual values.

Table 6: Rank order of MENA countries by increase in education stock during 1970-2010 per \$100 of public spending on education per capita per year

<i>Country</i>	Increase in education stock per \$100 per capita per year	Rank (N=114)
Yemen, Rep.	3.38	40
Egypt	3.36	41
Syria	3.22	42
Jordan	3.22	43
Morocco	2.58	47
Iran	2.45	48
Tunisia	1.79	59
Algeria	1.46	66
United Arab Emirates	0.84	77
Bahrain	0.83	78
Kuwait	0.19	94
Qatar	0.18	97
<i>Region</i>		
MENA	2.02	
EAP	4.94	
ECA	2.02	
LAC	1.82	
SA	41.7	
SSA	9.38	

Note: For individual countries, data are taken for the years closest to 1970 and 2010 if not available for the specific years themselves.

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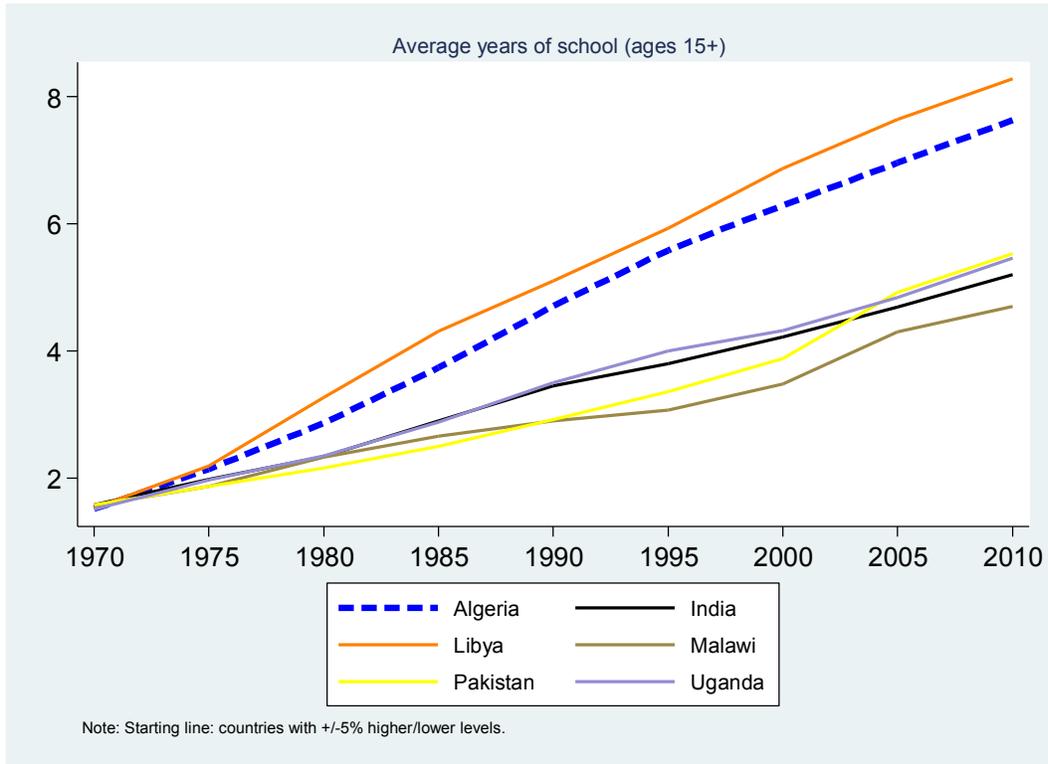
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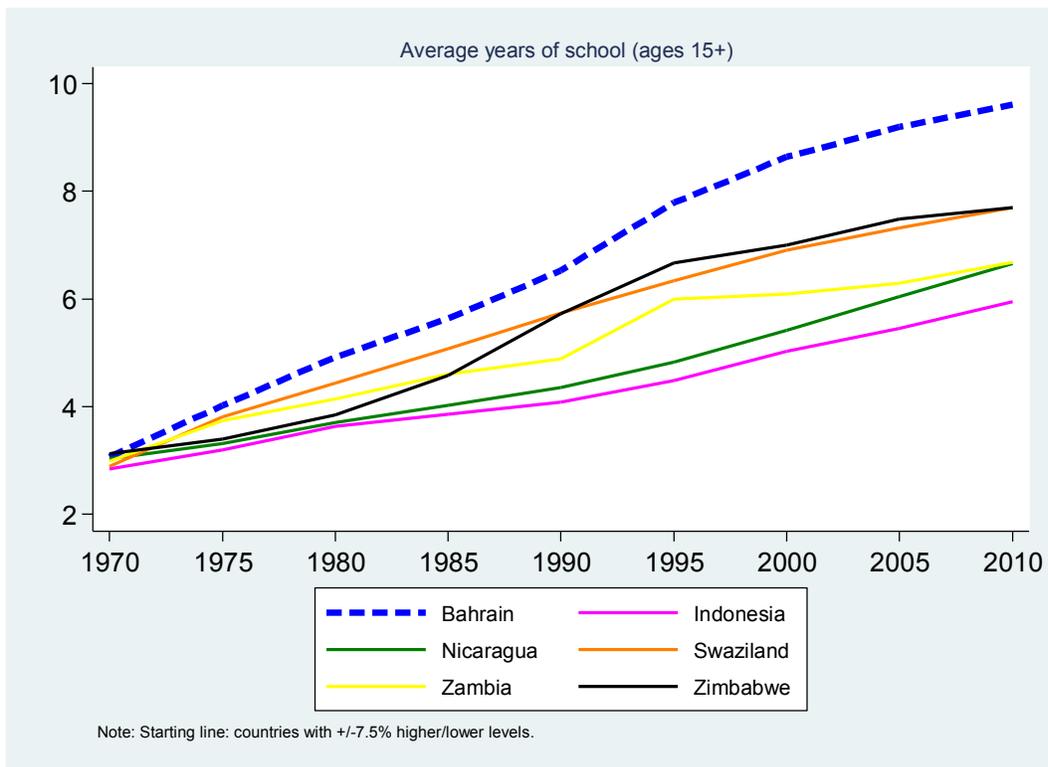
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Annex 1: Country charts showing evolution of schooling in relation to comparators

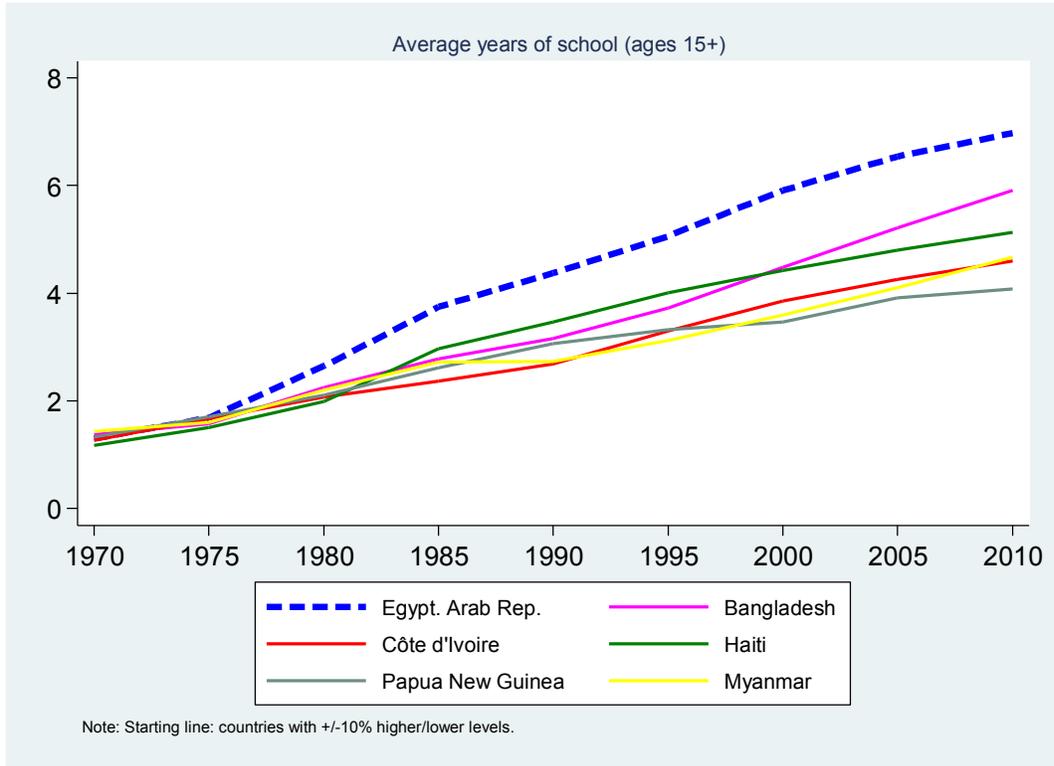
Algeria



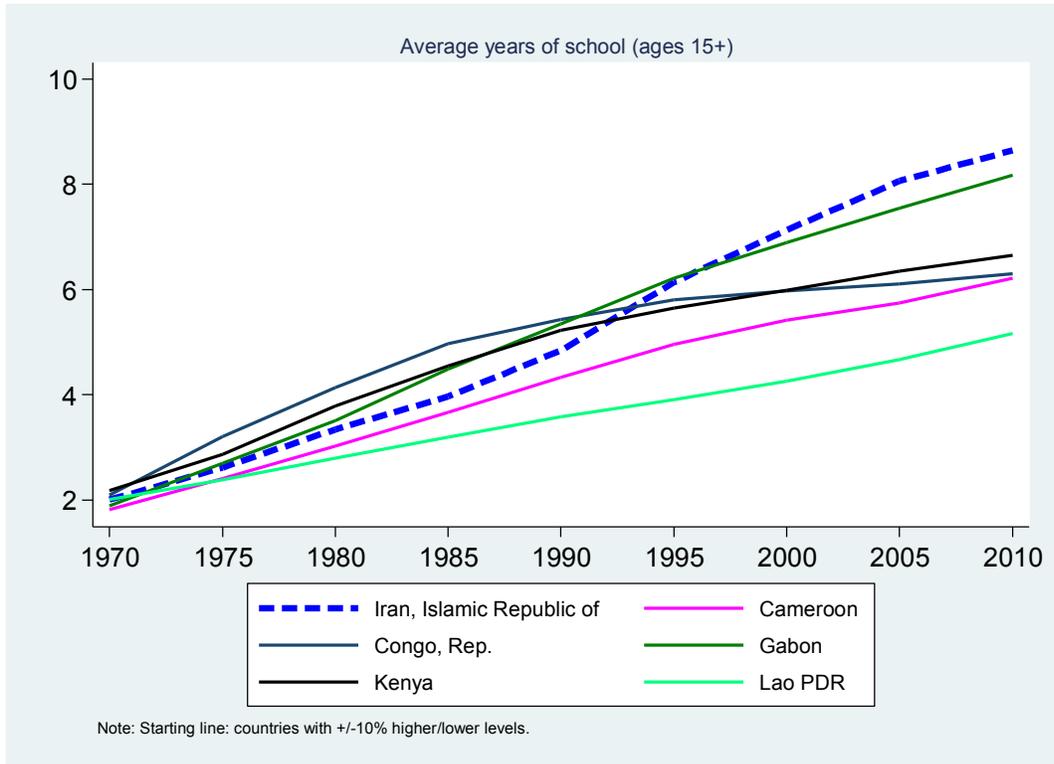
Bahrain



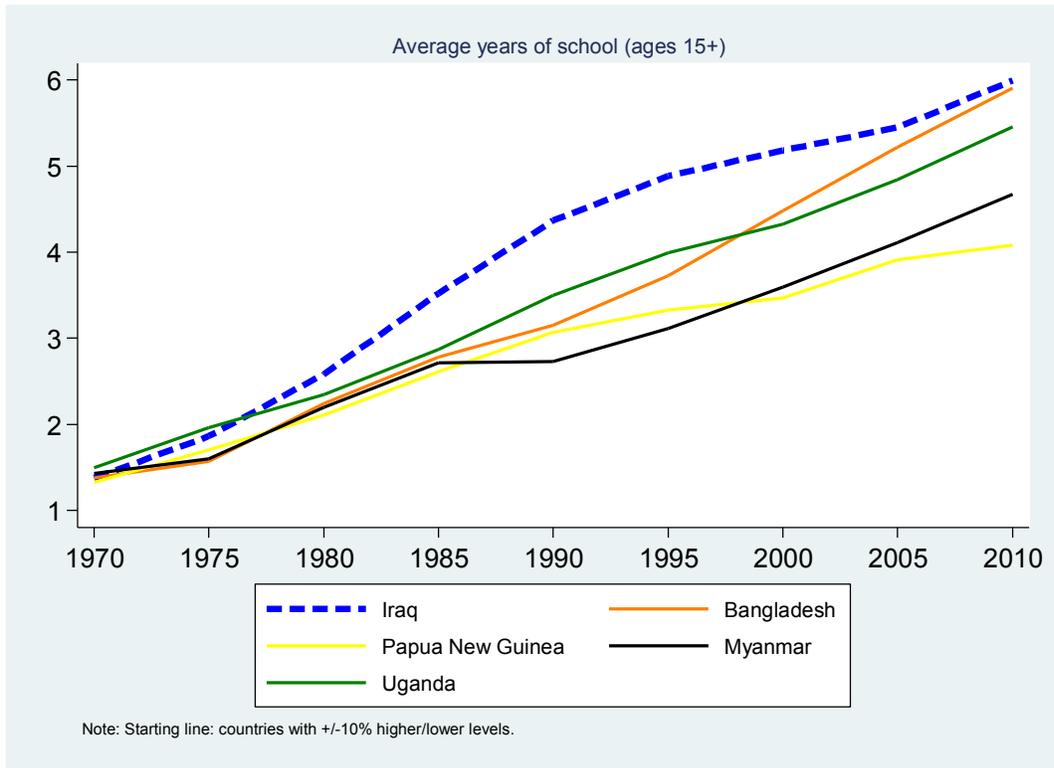
Egypt, Arab Rep.



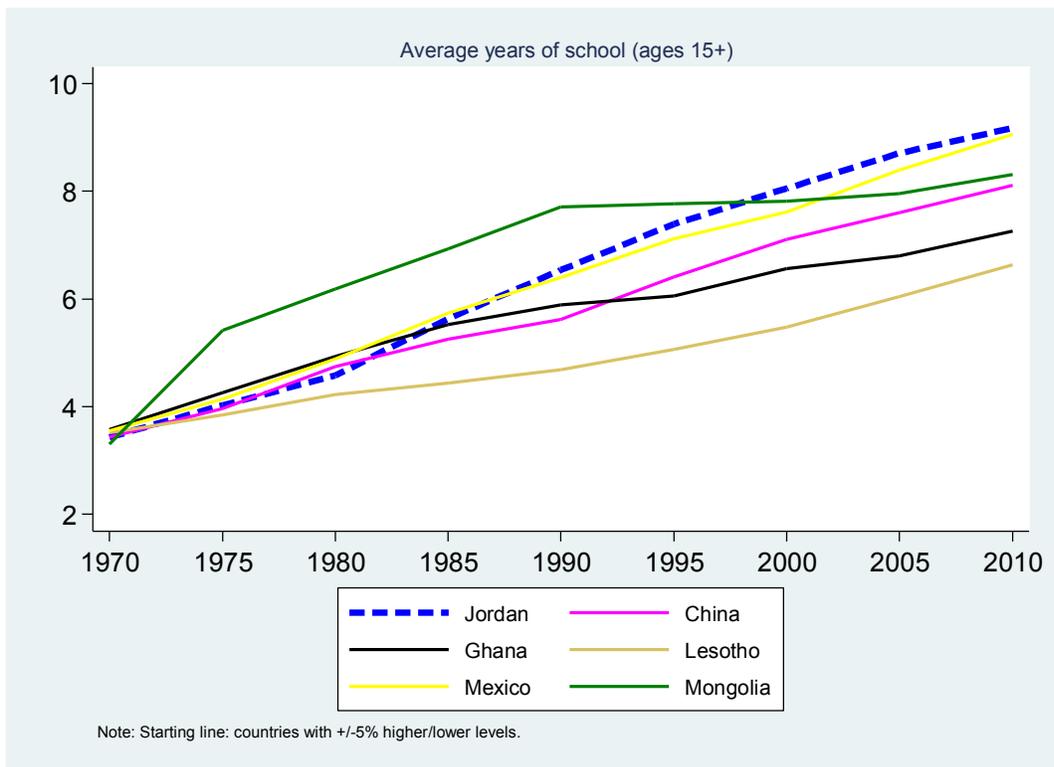
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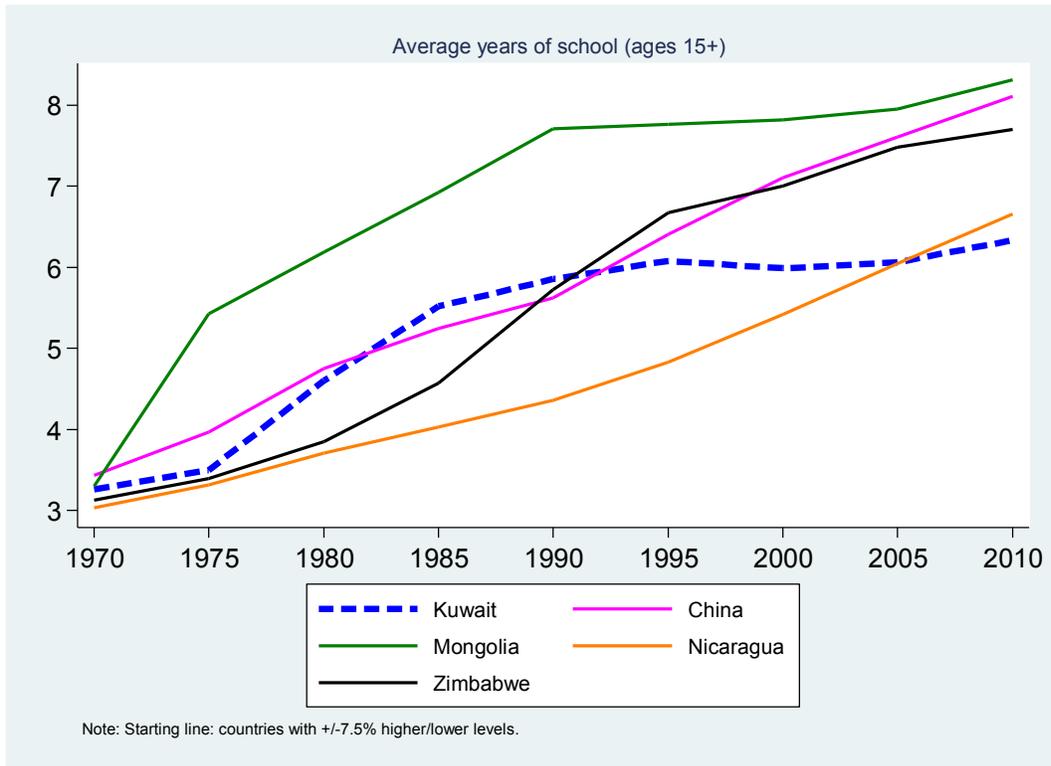
Iraq



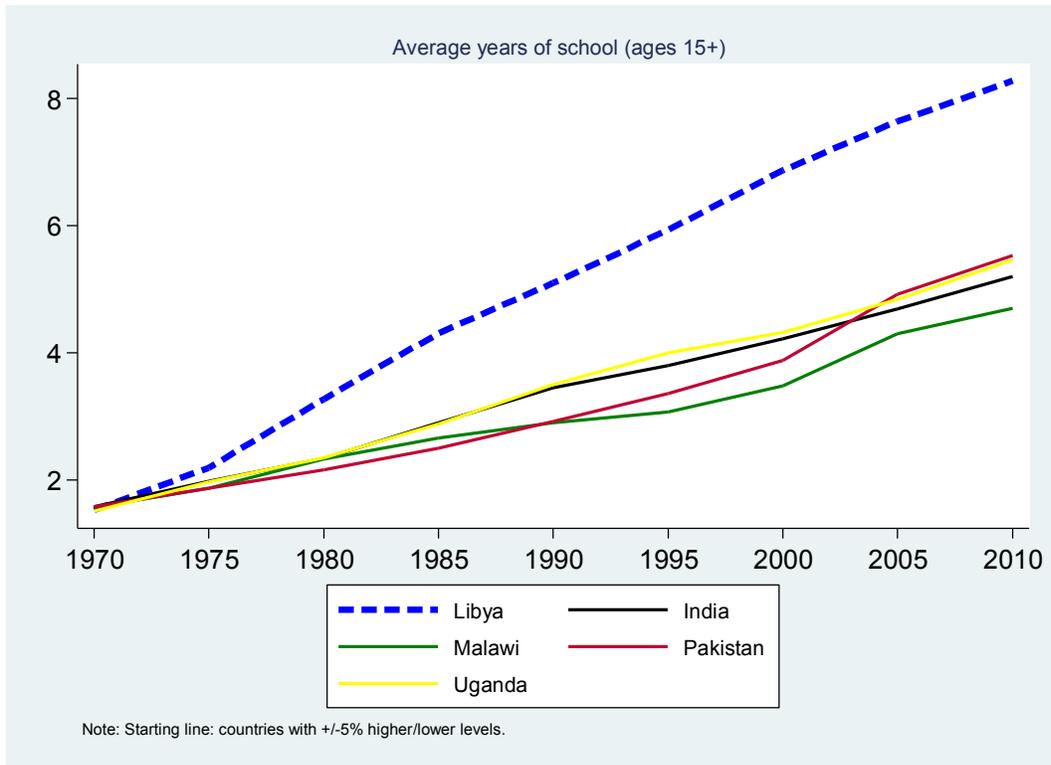
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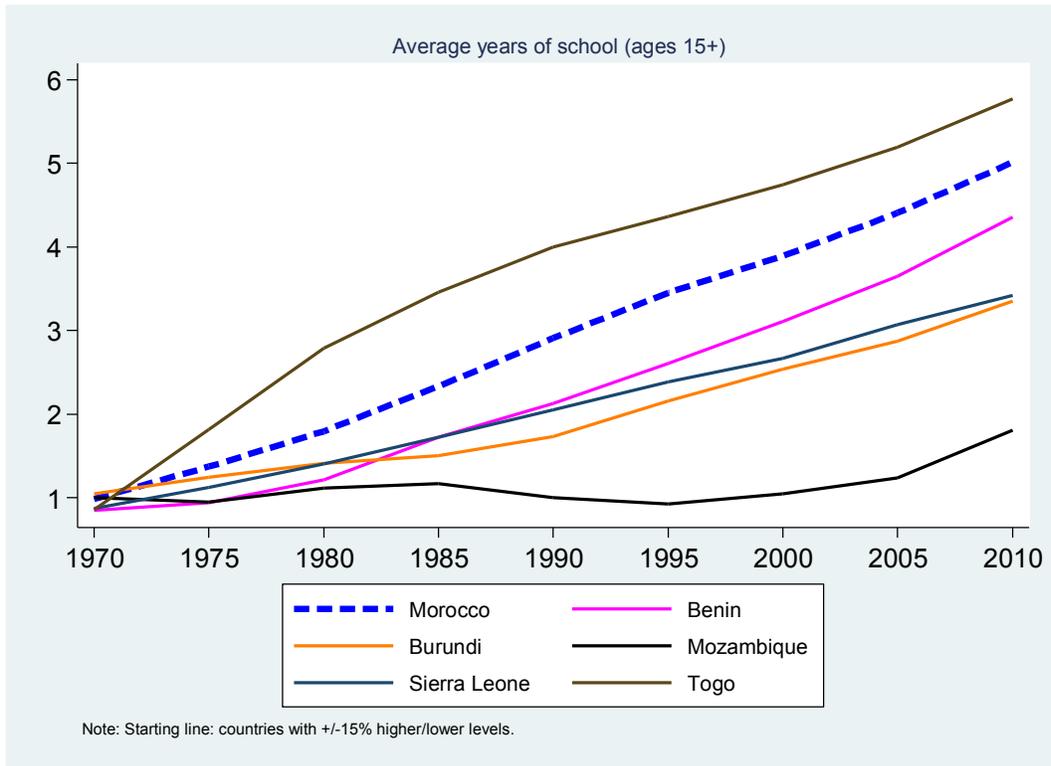
Kuwait



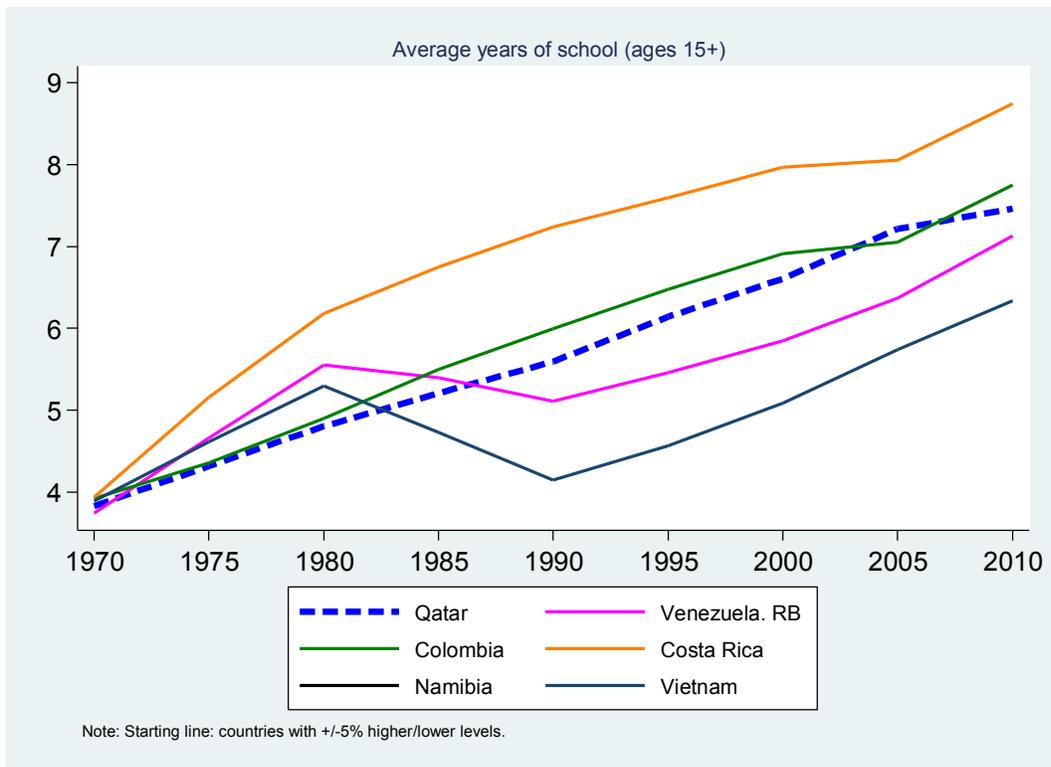
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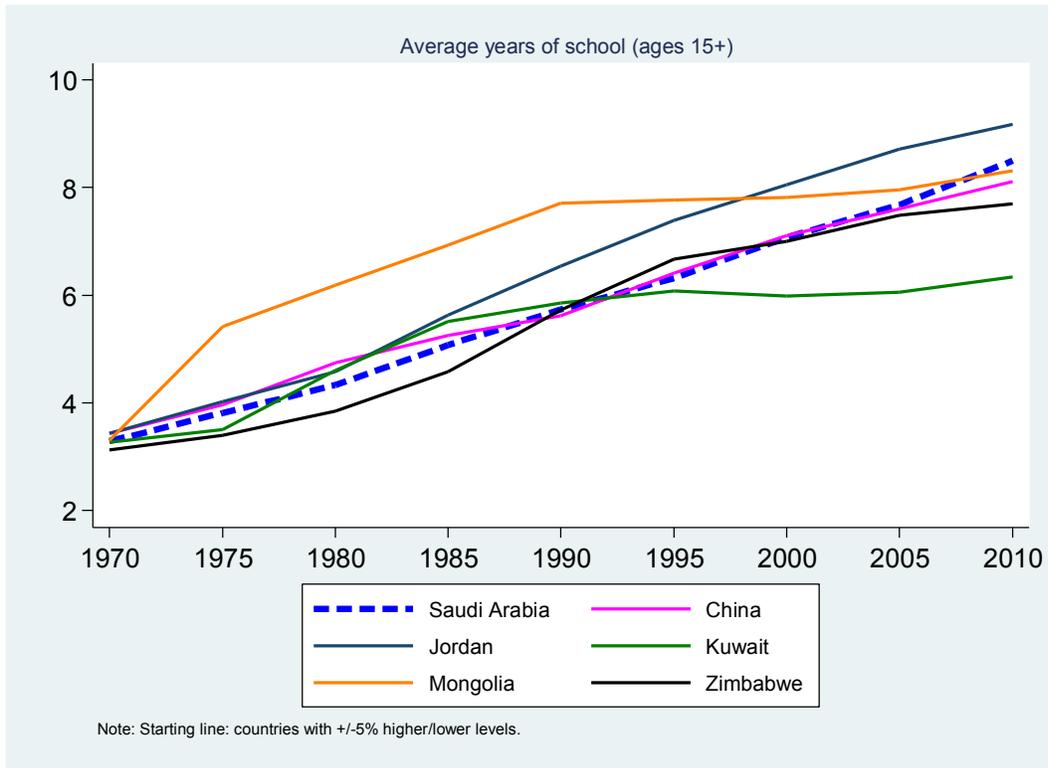
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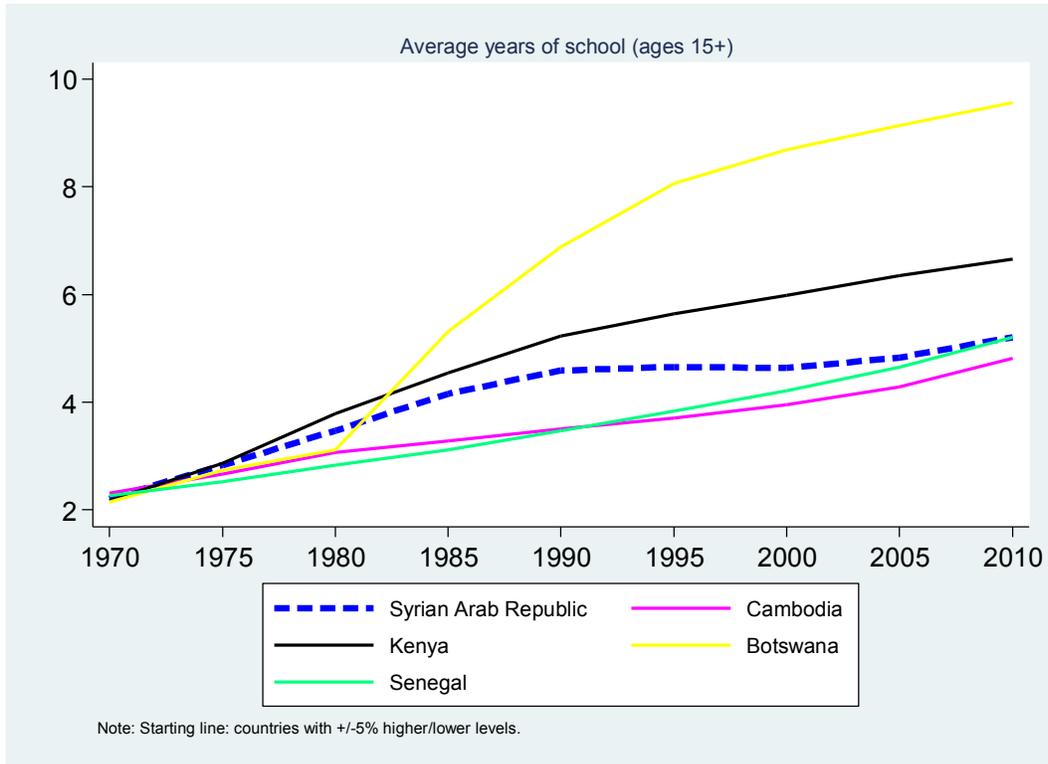
Qatar



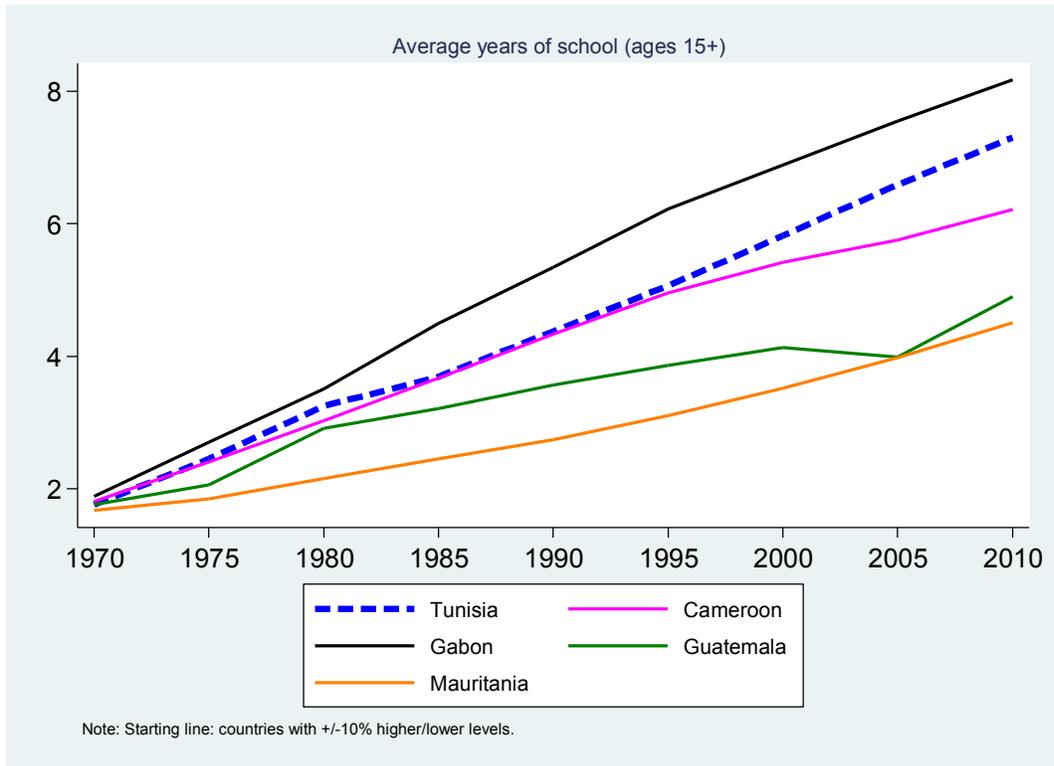
Saudi Arabia



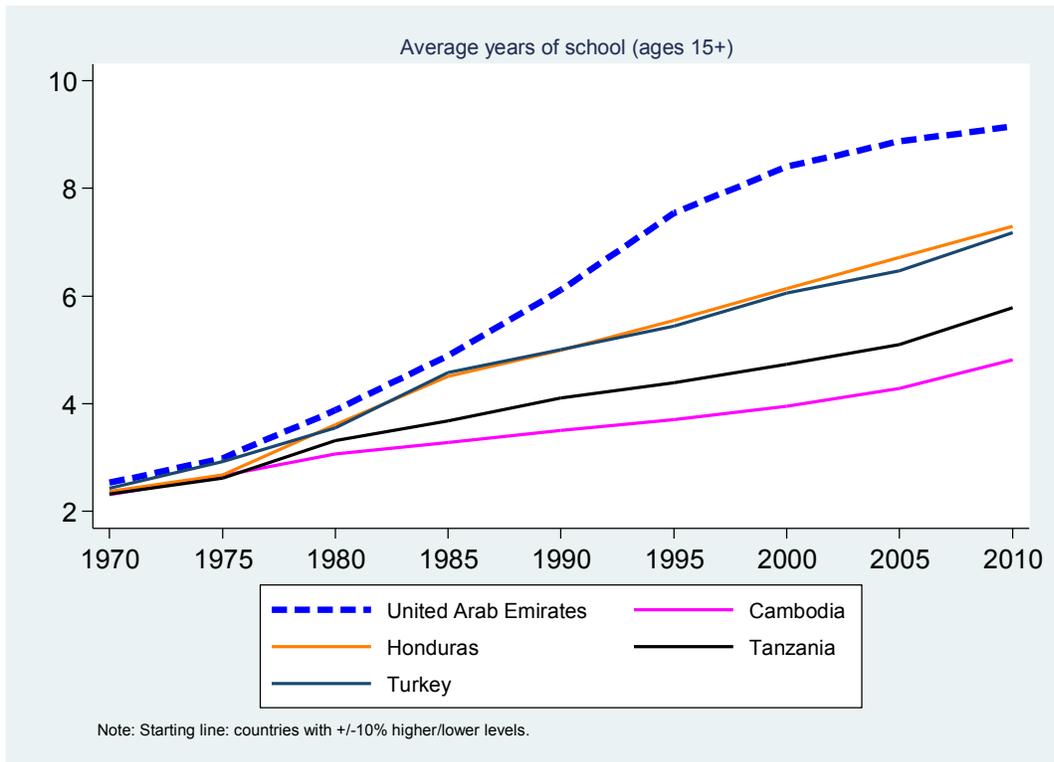
Syrian Arab Republic



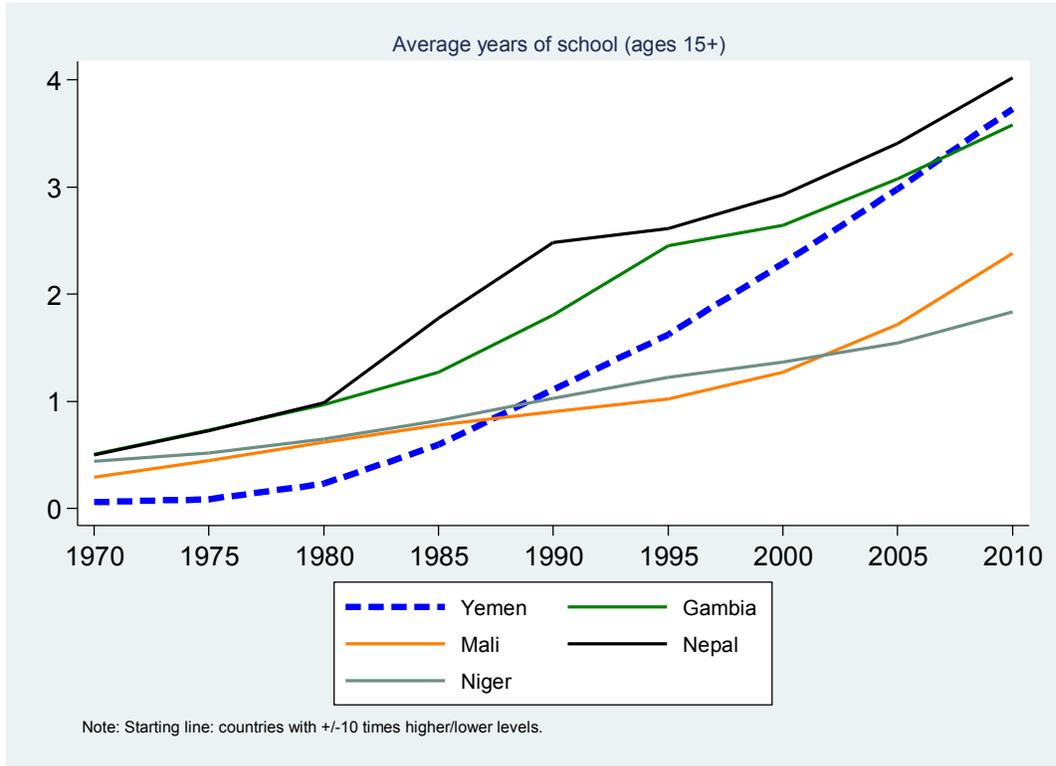
Tunisia



United Arab Emirates



Yemen



Annex 2: Regional country composition

East Asia and Pacific (EAP):

American Samoa, Brunei Darussalam, Cambodia, China, Fiji, French Polynesia, Guam, Hong Kong SAR, China, Indonesia, Kiribati, the Democratic People's Republic of Korea, the Lao People's Democratic Republic, Macao SAR, China, Malaysia, the Federated States of Micronesia, Mongolia, Myanmar, New Caledonia, Northern Mariana Islands, Palau, Papua New Guinea, Philippines, Singapore, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Vietnam.

Europe and Central Asia (ECA):

Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Channel Islands, Croatia, Cyprus, Faeroe Islands, Georgia, Greenland, Hungary, Isle of Man, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Liechtenstein, Lithuania, Macedonia, FYR, Moldova, Monaco, Montenegro, Romania, Russian Federation, San Marino, Serbia, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan.

Latin America and the Caribbean (LAC):

Antigua and Barbuda, Argentina, Aruba, The Bahamas, Barbados, Belize, Bolivia, Brazil, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Curacao, Dominica, the Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Sint Maarten (Dutch part), St. Kitts and Nevis, St. Lucia, St. Martin (French part), St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos Islands, Uruguay, República Bolivariana de Venezuela, Virgin Islands (U.S.).

Middle East and North Africa (MENA):

Algeria, Bahrain, the Arab Republic of Egypt, the Islamic Republic of Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, the Syrian Arab Republic, Tunisia, United Arab Emirates, West Bank and Gaza, the Republic of Yemen.

South Asia (SA):

Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka.

Sub-Saharan Africa (SSA):

Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, the Democratic Republic of Congo, the Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

Annex 3: Variable definitions and Sources

Variable	Variable definition	Source
Average years of schooling	Years of formal schooling received per adult over age 15	Barro-Lee (2013)
Real per capita GDP growth	Real GDP per capita growth, annual percentage change	WDI
Education spending	Public spending on education per capita per year (2005 PPP dollars)	SPEED Database, IFPRI
Children in employment	Children in employment, total (% of children ages 7-14)	WDI
Undernourishment	Prevalence of undernourishment (% of population)	WDI
Urbanization	Urban population (% of total)	WDI