Human Capital Accumulation in OIC Member Countries

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Contents

INTRODUCTION

Human capital refers to the knowledge and capabilities embodied in people that can be utilized to advance the production techniques and contribute to the social and economic development. The term "human capital" is used because people cannot be separated from their knowledge or skills in the way they can be separated from their financial and tangible assets. Along with physical capital stock, human capital stock is one of the factors of production in determining the economic prosperity and progression, with the stock of human capital playing an important role in determining the ability to absorb new knowledge and technologies, and thus increasing labour productivity. Productivity growth in turn is a key factor in promoting long-term economic growth. The role of education in increasing the productivity and efficiency of labour force by increasing the cognitive stock of economically productive human capability is well acknowledged.

Theoretical models of human capital and growth are built around the hypothesis that knowledge and skills embodied in humans directly raise productivity and increase an economy's ability to develop and to adopt new technologies. Empirical literature also provides strong evidence on the impacts of higher educational inputs on productivity and growth. A survey of the empirical results conducted by Sianesi and Van Reenen (2000) shows that an overall 1 % increase in school enrolment rates leads to an increase in GDP per capita growth of between 1% and 3 %. An additional year of secondary education leads to more than a 1 % increase in economic growth each year. At the microeconomic level, there is clear evidence that human capital and productivity are strongly related. Human capital accumulated through on-the-job-training (OTJT), especially for workers with low qualifications, increases productivity at the firm level. OTJT is also a direct source of

innovation for firms that strengthen their long-term competitiveness (Blundell *et al.*, 1999).

Measuring the stock of human capital is, however, challenging. In the literature, various proxies are used in analysing the human capital developments. School attainment has been the most common but also the easiest way of measuring human capital. Economic growth literature suggests alternative ways to construct such a dataset. In this outlook report, when constructing the dataset on human capital stock, a methodology will be adopted that is commonly used in growth literature, including the seminal work of Hall and Jones (1999). A detailed description of the methodology can be found in the technical appendix. According to this approach, human capital is calculated by using two major indicators, the total number of labour force and average schooling. Therefore, under given average schooling level, the countries with higher labour force will have higher human capital stock. Equivalently, under given size of labour force, countries with higher educational attainment will have higher human capital stock. A disadvantage of this index is that it is not able to capture the investments in human capital after individuals complete their formal schooling, which is in fact hardly measurable. Therefore, though human capital accumulation cannot be restricted to formal education only, due to lack of alternative measurement approaches that can take into account the other skill and capacity building efforts, the above mentioned methodology of growth literature will be adopted.

Noting these measurement issues, the analysis on human capital accumulation in OIC countries reveal that, starting with low levels of human capital stocks, the member countries have significantly increased their stocks of human capital over the last four decades, but this did not translate into higher economic

Access to education itself is not enough!

growth in all countries. This fact leads to questioning of the quality of education provided to their citizens by these countries. Additionally, the report evaluates the relationship between human capital, education and productivity. Moreover, it assesses the linkages between social indicators of development and schooling and productivity. This report finally provides detailed discussions on trends and prospects in human capital developments in the OIC member countries.

TRENDS IN HUMAN CAPITAL ACCUMULATION

Improving the access and the quality of education at all levels has been a continuing national development objective throughout Malaysia's sequence of five-year development plans and this strategy played a central role in fostering economic growth and development of the country, as well as an important factor in the reduction of poverty. Government policy has been to encourage education at all levels, backed up by higher share of budgetary allocations for education. In addition to expanding resources at the primary education level, sharply increasing expenditure for education reflected the importance paid by Malaysian governments to secondary and tertiary education as well. As accessibility to education improving, special efforts have been made to provide an environment that is conducive to learning. All these efforts in promoting education will explain the economic and social achievements of Malaysia during the last decades. In the same fashion, the development of human capital has been an essential component in economic development strategies of many advanced countries.

In studying the developments in human capital in OIC countries, the main approach in characterizing the human capital will be based on the data on labour force and average schooling, as explained in the technical appendix. As being the main constituent in building human capacities, education provides many beneficial externalities and long-term effects on individuals. Mean number of years that a representative worker has spent at school roughly determines the absorptive capacity that a worker can use in utilizing the knowledge developed elsewhere. According to this approach, human capital can increase through either an increase in labour force or in average years of school attendance.
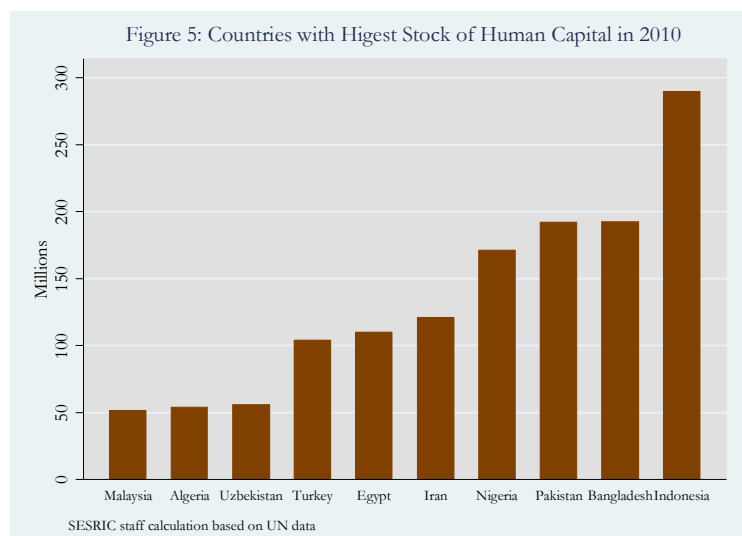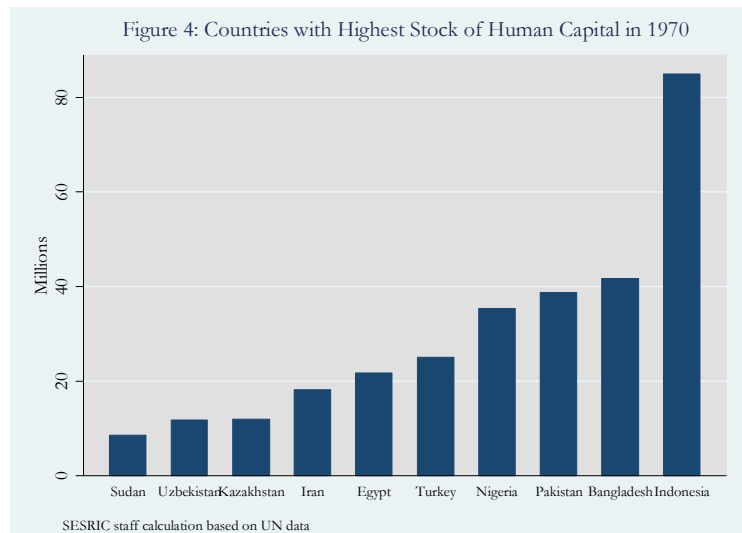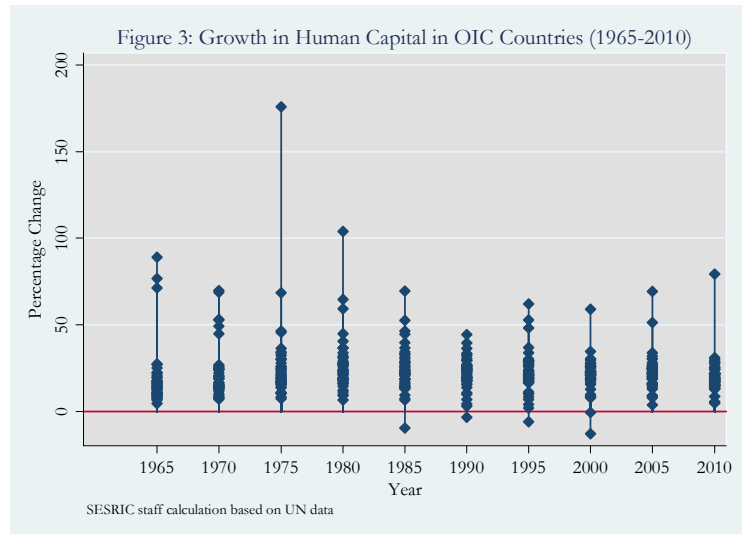

Figure 1: Human Capital Accumulation in OIC Countries

SESRIC staff calculation based on UN data

Figure 2: Human Capital Accumulation in OIC Countries
(Major countries excluded)

SESRIC staff calculation based on UN data
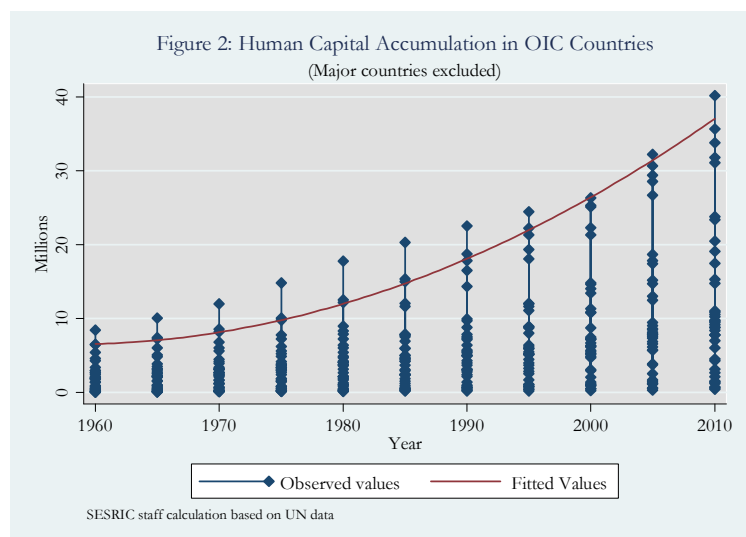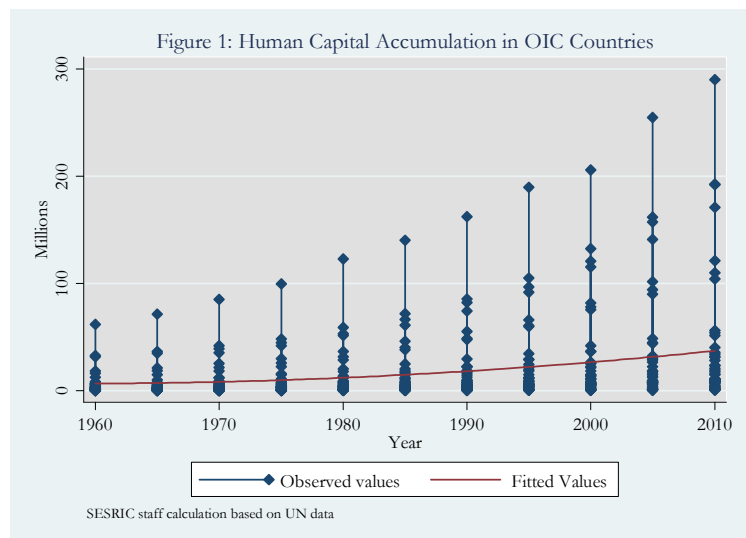
Human capital accumulation has been robust …

Starting with an analysis on overall human capital stock, a steadily increasing trend is being observed over the last 50 years in OIC member countries (Figure 1). Scaling the all countries on the same axis leads to surpassing the trends in smaller countries by larger ones. Nonetheless, headed by Indonesia, the continuous increase in the stock of human capital is unambiguous. Excluding 10 largest countries, Figure 2 provides a clearer picture on the trends in the smaller countries. In 1960, all countries had human capital stock below 10 million, but after 5 decades more than 15 countries in this group exceeded this threshold, with Saudi Arabia taking the lead by crossing the line of 40 million. Fitted line indicates that especially after 1980, the increase in human capital accumulation picked up speed.

 Growth rates in human capital stock over 5-year intervals ranged to a large extend between 5 to 40 per cent (Figure 3). There are some outliers as well. In 1980s, United Arab Emirates experienced respectively an increase over 170% and 100% in its human capital stock after a sharp increase in its labour force around 160% between 1970 and 1975 and 90% between 1975 and 1980. Over the coming 5-year intervals until 2005, it persistently sustained an increase around 50% in its human capital stock. Immigration of foreign workers can explain the sharp increase human capital in UAE.

There are also outliers at the opposite

Figure 3: Growth in Human Capital in OIC Countries (1965-2010)

SESRIC staff calculation based on UN data

Figure 4: Countries with Highest Stock of Human Capital in 1970

SESRIC staff calculation based on UN data

Figure 5: Countries with Higest Stock of Human Capital in 2010

SESRIC staff calculation based on UN data

side. Afghanistan from 1980 to 1985, Mozambique from 1985 to 1990, Albania from 1990 to 2000 and Kazakhstan from 1995 to 2000 experienced reductions in their human capital stock reaching up to 13%. Conflicts and migrations were the main factors in falling stocks of human capital in these countries.

Figure 4 and 5 presents the data for individual countries with highest stock of human capital for 1970 and 2010 in comparison. As in 2010, Indonesia had the highest capital stock in 1970 and more than twice of the human capital stock of Bangladesh, its nearest follower (Figure X4). The followers are quasi grouped in bundles of three countries. First bundle constitutes Bangladesh, Pakistan and Nigeria, the second bundle Turkey, Egypt and Iran and the third bundle Kazakhstan, Uzbekistan and Sudan. Over the 40 years, Indonesia has almost tripled its stock of human capital and retained its position, but Bangladesh, Pakistan and Nigeria have more than quadrupled their stock during the same period and narrowed the gap with Indonesia. (Figure 5). By increasing their human capital stock more than fivefold, Iran and Egypt could exceed Turkey, which could raise its stock only fourfold. By heavily investing on education, Malaysia joined the top ten OIC member countries in terms of stock of human capital, though its total labour force remains

well outside this ranking. The population of Malaysia is around 7 million less than the population in Algeria, but they have almost equal stock of human capital. This explains that the human capital accumulation is largely driven by higher schooling rates in Malaysia.

...and school attendance increased substantially

In OIC member countries, average years of schooling have substantially increased over the last 40 years (Figure 6). The number of countries with schooling more than 6 years was only 4 in 1970. This number increased to 26 in 2010. There are already quite a few countries with average years of schooling exceeding 10 years. In 1970, Albania and Turkmenistan were the only two countries with average years of schooling exceeding 7 years. In 2010, 5 countries (Kazakhstan, Albania, Turkmenistan, Malaysia and Bahrain) provided education to their citizens on average more than 10 years. It is also projected that in 2030 the minimum years of schooling will be 4 years and in 2050 it will be 6 years among the member countries (Figure 7). Majority of the countries are expected to have average schooling rates over 8 years as of 2050.
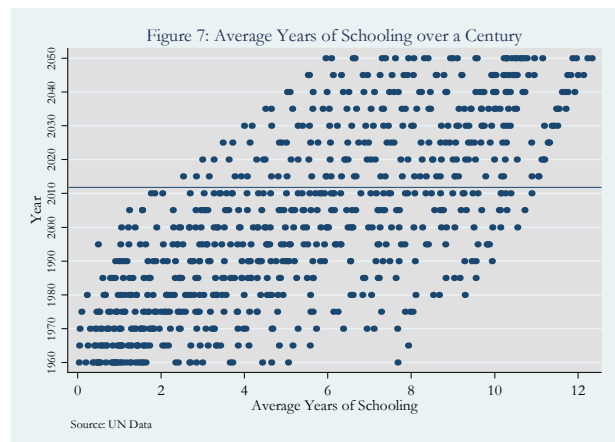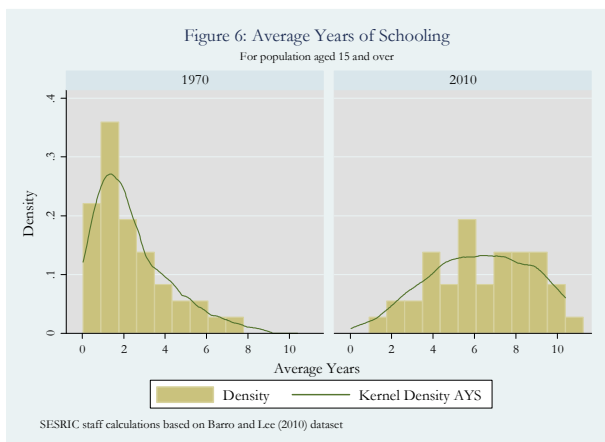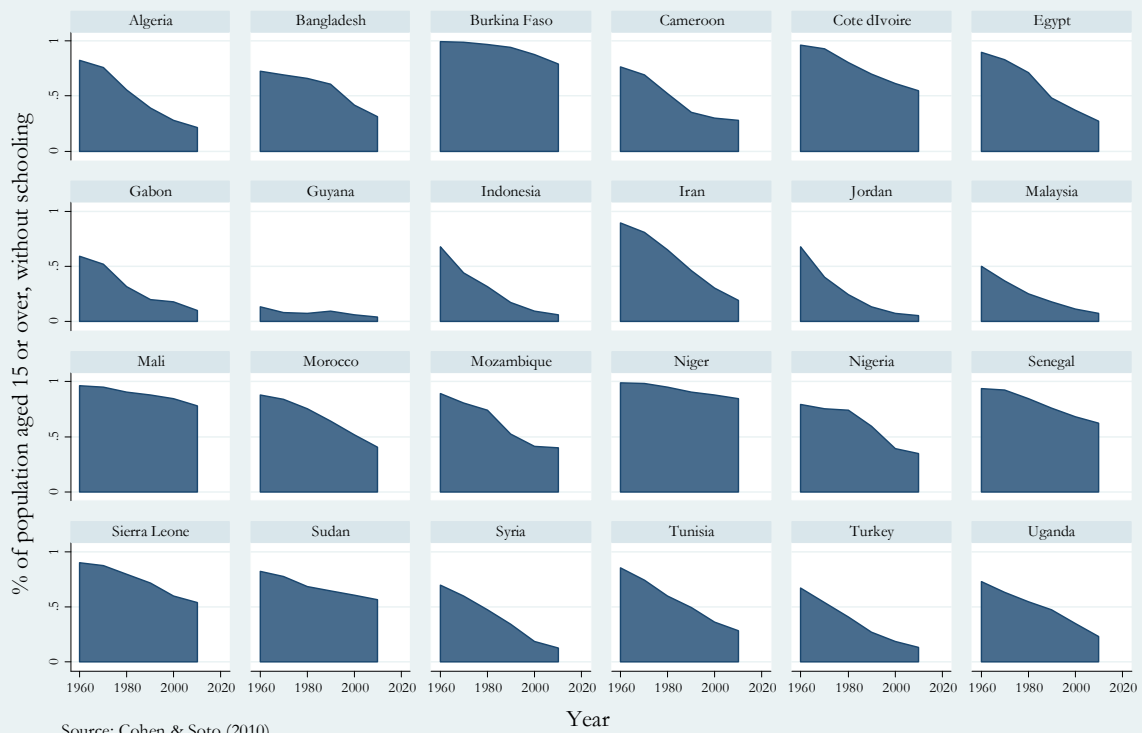

Figure 6: Average Years of Schooling
For population aged 15 and over

SESRIC staff calculations based on Barro and Lee (2010) dataset

Figure 7: Average Years of Schooling over a Century

Source: UN Data

Figure 8: Changes in School Non-Attendance (1960-2010)

Source: Cohen & Soto (2010)

Correspondingly, thanks to a combination of effective policies and sustained national investments in education, the share of population with no school attendance has steadily decreased in many of the member countries (Figure 8). There are however some countries with stubbornly high share of non-schooling. Burkina Faso, Mali and Niger could make only small progress in promoting the education. In Niger, the share of population with no-schooling remains as high as 84% in 2010. Though some progress has been made, the majority of the population in Cote d'Ivoire, Senegal, Sierra Leone and Sudan have still no access to education as of 2010. Indonesia and Jordan are the countries with best performance in improving the accession to education. They reduced the share of people with no school attendance by more than 90%. Guyana, on the other hand, persistently kept the share of non-schooling at very low levels.

…but expenditures on education remained insufficient

It is well recognized that a skilled and well-educated labour force is of critical importance in enhancing the economic performance and sustaining competitiveness. Education as one of the most important component of human capital is frequently measured in ways including expenditure on education and training, years of schooling, number in enrolment and level of education of the labour force. Overall schooling level as well as government expenditure on education and training is generally found to be significantly related to economic growth. What Malaysia achieved in terms of higher human capital accumulation represents the importance of investments on education. However, along with few other countries, this is only an exceptional example among the member countries.

The data on government expenditures on education reveals that OIC member countries are spending far less than the world average. Figure 9 depicts the government expenditures on education per pupil. In nominal terms, among the OIC countries with available data, Kuwait has the highest government expenditure on education per pupil ($6513), followed by United Arab Emirates ($2474), Oman ($1711), Turkey ($1311), and Malaysia ($1219). Iran, Tunisia, Maldives, Morocco, and Indonesia, spending around $300 to $850 per pupil, are also among the top 10 countries. Given the fact that the average world expenditure was 2264$ in 2008, only two member countries could spend more than the world average (SESRIC, 2010).

As the numbers in nominal terms may be misleading, Figure 10 reports the government expenditures on education per pupil as percentage of GDP per capita. World average government expenditures on education per pupil as percentage GDP per capita increased from 20.5% in 1999 to 21.2% in 2008. The increase in this ratio in developing countries as well as OIC countries was quite limited as compared to developed countries. The ratio for developed countries increased from 21.8% to 23.5% in this period while the ratio for developing countries increased from 18.1% to only 18.2% and remained well below that for developed countries. The ratio for OIC countries was not better than that for developing countries. It increased from 16.3% in 1999 to only 16.5% in 2008, remaining below the average for developing countries.

Figure 9: Top 10 OIC Countries by Government Expenditures on Education per Pupil* (US$)
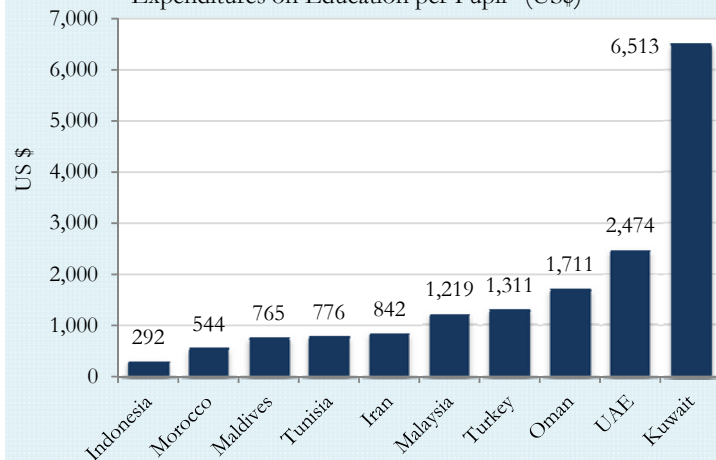
Source: SESRIC (2010)

Figure 10: Government Expenditures on Education per Pupil as Percentage of GDP per Capita*
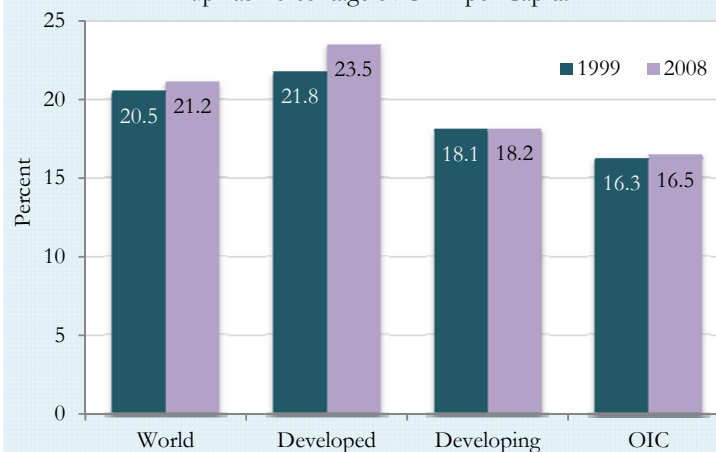
Source: SESRIC (2010)

QUALITY DIMENSION

SCHOOLING AND HUMAN CAPITAL ACCUMULATION

Human capital theory rests on the assumption that formal education is highly instrumental to improve the production capacity of a society. Better education improves the production process in several ways. Educated, or skilled, workers are able to perform complex tasks and thereby contribute to producing more technologically sophisticated products. Especially in developing countries, skilled workers increase the absorptive capacity of the

secondary and tertiary education increases, the ability to adopt new skills and absorb new knowledge increases.

In Figures 11 and 12, the schooling ratios with respect to the levels attained are compared for 1970 and 2010, respectively, for countries the time series data available until 2010. Four decades ago, as depicted below in Figure 11, a large share of the labour force had no school

"The OIC represents one fifth of the world's population and more than one fourth of the developing world; Islam's first divine message was "Read." But in some countries of the region more than half the adult population is illiterate and more than 70 per cent of women are illiterate." UNICEF (2005)

country by acquiring and implementing the foreign knowledge and technology, which is of crucial importance in successful economic diversification and development.

In this regard, the quality of education carries significant importance in building productive capacities. This section summarizes the developments in school attendance at various levels and compares the quality of education in some OIC member countries with other major developed and developing countries.

Level of schooling affects the ability to utilize new technology

Skills level of labour force is generally classified according to specific level of education they attained. As the share of labour force with

education at all. In some countries, including Burkina Faso, Cote d'Ivoire, Mali, Niger and Senegal, this share was more than 80% and reaching as high as 99%. Guyana had the most favourable picture in terms of school attendance, followed by Indonesia, Jordan and Malaysia. Jordan had the highest share of secondary and higher education compared to other countries considered.

This picture has substantially changed within the last four decades (Figure 12). The share of population with no schooling has shrunk in many of the countries considered. Malaysia and Jordan possess the leading position in the attendance of secondary education, while Jordan is still at the leading position in terms of higher education attendance among the countries considered.

Figure 11: Schooling ratios in selected OIC Countries in 1970
For the population aged 15 or over

Algeria	Bangladesh	Burkina Faso	Cameroon	Cote dIvoire	Egypt
Gabon	Guyana	Indonesia	Iran	Jordan	Malaysia
Mali	Morocco	Mozambique	Niger	Nigeria	Senegal
Sierra Leone	Sudan	Syria	Tunisia	Turkey	Uganda

- Without schooling
- With some primary education (complete + incomple)
- With some secondary education (complete + incomplete)
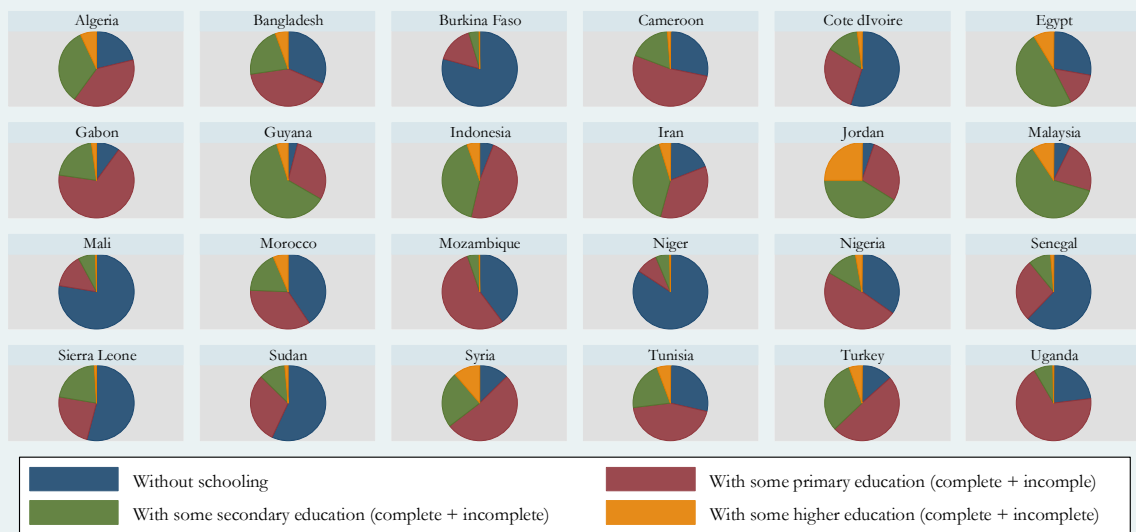- With some higher education (complete + incomplete)
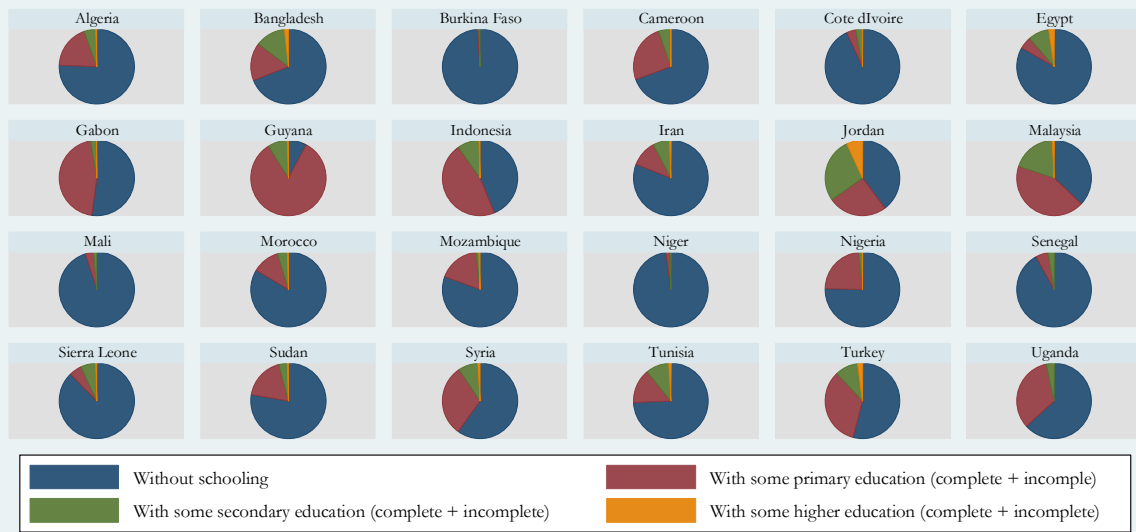
Source: Cohen and Soto (2010)

Despite the impressive progress, the net enrolment rates of the OIC member countries (52.7%) lie well below the world average (64.7%) as of 2008. The OIC average of 52.7% reveals that nearly half of the secondary school age population were not enrolled in the secondary school in 2008. Azerbaijan (98.3%) and Uzbekistan (91.3%) were the only OIC member countries having net enrolment rates higher than the average of developed countries, 90.5%. Finally, in terms of gross enrolment in tertiary schools, with a rate of 17.1 % in 2008, the OIC average was below that of developing countries, 23.9% and nearly half of the world, 30.8 % (SESRIC, 2010).

Figure 12: Schooling ratios in selected OIC Countries in 2010
For the population aged 15 or over

Algeria	Bangladesh	Burkina Faso	Cameroon	Cote dIvoire	Egypt
Gabon	Guyana	Indonesia	Iran	Jordan	Malaysia
Mali	Morocco	Mozambique	Niger	Nigeria	Senegal
Sierra Leone	Sudan	Syria	Tunisia	Turkey	Uganda

- Without schooling
- With some primary education (complete + incomple)
- With some secondary education (complete + incomplete)
- With some higher education (complete + incomplete)

Source: Cohen and Soto (2010)

Early schooling has more benefits

Human capital starts developing long before children go to school, as they constantly acquire skills and develop new ideas about themselves and outside world. Human capital formation can be regarded as a dynamic process that is on-going throughout a lifetime. A basic principle is that learning in one life stage precipitates learning in the next. Therefore, investment in the early stages of childhood increases the productivity of the next stages (Cunha *et al.*, 2006) (see Box 1). In other words, access to quality early childhood care and education significantly proves learning outcomes in later years. What is more, the rate of return to a dollar of investment made while a person is young is higher than the rate of return to the same dollar invested at a later age.

In OIC countries, early childhood care and education appears to be widely neglected (Table 1). Only 13 member countries have pre-primary education rate above the world average of 43.5%. On the other hand, Brunei, Guyana, Maldives, Suriname and United Arab Emirates attained a schooling ratio at pre-primary level higher than the average of developed countries, 79.3%.

There are more children in primary school today than ever before, but there are various factors including poverty, gender or conflicts that complicate efforts to reach to children who do not go to school at all and there is much left to do to ensure the quality of the education they receive as well. In order to enhance the opportunities provided to new generations, their access to early education must be improved. This is also essential to improve the quality of education in the following stages of education. As noted by Cunha *et al.* (2005), interventions at very early ages have higher returns for the most disadvantaged. Due to higher share of disadvantaged groups in OIC countries,

Table 1: GER in pre-primary education (%), Total (2008)	
Algeria	23.4
Azerbaijan	26.5
Bahrain	53.8
Benin	13.2
Brunei Darussalam	82.8
Burkina Faso	2.9
Cameroon	24.8
Comoros	26.6
Cote d'Ivoire	3
Djibouti	3.2
Egypt	16.1
Gambia	22.0
Guinea	11.4
Guyana	84.7
Indonesia	43
Iran	52.2
Jordan	36.4
Kazakhstan	51.5
Kuwait	76.4
Kyrgyzstan	16.7
Lebanon	76.7
Libya	8.9
Malaysia	60.6
Maldives	101.3
Mali	3.9
Morocco	56.9
Niger	3.2
Nigeria	16.0
Oman	33.7
Palestine	31.7
Qatar	51.3
Saudi Arabia	10.9
Senegal	10.6
Sierra Leone	4.9
Sudan	28.1
Suriname	81.3
Syria	9.7
Tajikistan	9
Togo	7.5
Turkey	17.7
Uganda	18.8
United Arab Emirates	87.4
Uzbekistan	27.2
World	43.5
Developed countries	79.3
Developing countries	38.7
Arab States	18.7
Sub-Saharan Africa	16.7
Source: UNESCO Institute for Statistics database (UIS, 2010).	

Box 1: Rates of Return for Investment in Human Capital
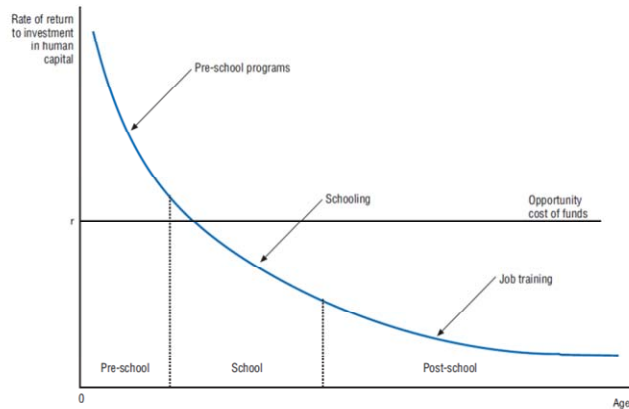
Source: Cunha et al. (2005), *Interpreting the Evidence on Life Cycle Skill Formation.*

Nobel laureate James Heckman, with his co-authors, suggests that the early childhood period provides a unique opportunity for investment in human capital as investing in learning in early childhood brings higher returns than at any other time in life. Why? Learning at early ages makes it easier to go on learning throughout life, which increases human capital and, thus, earning.
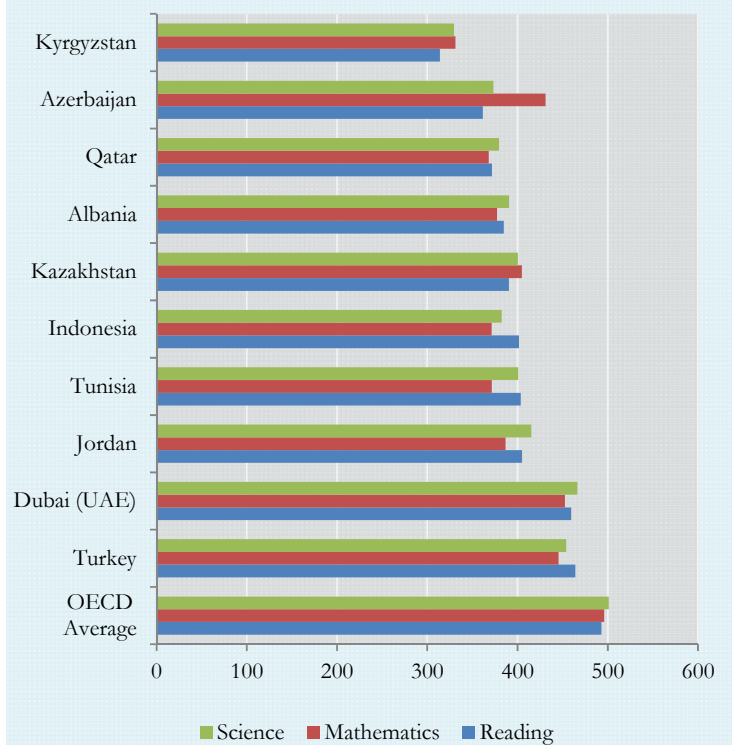
especially in rural areas, this fact emphasizes the significant role of investment in education at early ages for the member countries' economic prospects.

Quality of education is still poor

The analyses at the previous sub-sections indicate that although many countries have made impressive progress over the past four decades, disparities remain between countries. Nevertheless, gains made in access to education cannot be sustained without a parallel improvement in quality. Measuring and comparing the quality of education across the world is not an easy task. A programme pursued by OECD, known as the Programme for International Student Assessment (PISA), is one of the major studies conducted to measure the quality of education. Though the number of OIC countries included in the programme is limited, it provides an opportunity to

compare the quality of education in human capital accumulation in OIC countries with other developed and developing countries. PISA is an internationally standardised

Figure 13: PISA Scores for OIC Countries in 2009

assessment that was jointly developed by participating economies and administered to 15-year-olds in schools (see Box 2 for more information).

Figure 13 shows the mean performance of students on mathematics, reading and science for all 10 OIC countries taking part in the PISA study of OECD The average score among OECD countries is approximately 500 points and the standard deviation is 100 points. About two-thirds of students across OECD countries score between 400 and 600 points. The OIC member countries, except Turkey and Dubai, have average performance hardly exceeding or well below the 400 points. This is true in all three classifications of education. Turkey provides the highest quality education but it is still below the OECD average. Turkey and Dubai (UAE) have better performance compared to major developing countries, including Russia, Brazil, Mexico and Thailand (Table 2).
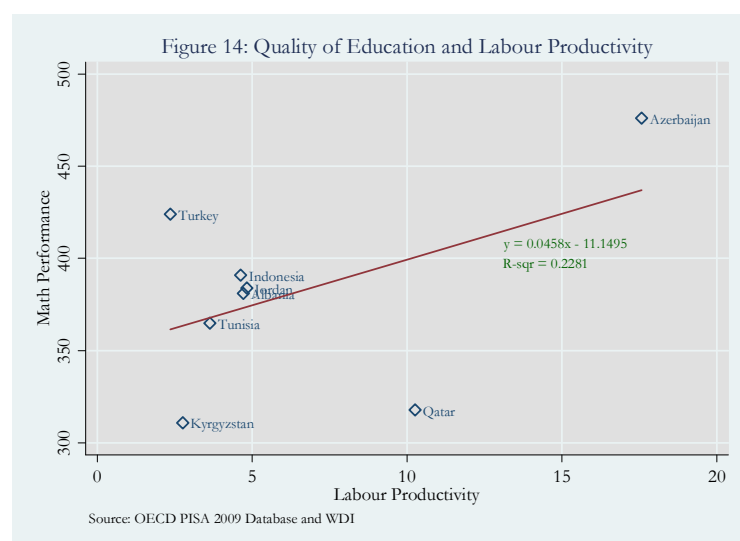
It is, however, worrying that among the 65 countries or economies surveyed in the study, 7 of the 10 worst performers on the overall reading scale are the OIC member countries. Turkey as the best performing OIC member country occupies only 41st position. Several studies illustrate the seriousness of the learning challenge. More than 30 per cent of Malian youths aged 15–19 years who completed six years of schooling

Table 2: Comparing Performances in Education for Selected Countries

	Reading	Mathematics	Science
OECD Average	**493**	**496**	**501**
Korea	539	546	538
Finland	536	541	554
Singapore	526	562	542
Canada	524	527	529
Japan	520	529	539
United States	500	487	502
Germany	497	513	520
France	496	497	498
United Kingdom	494	492	514
Spain	481	483	488
Turkey	464	445	454
Dubai (UAE)	459	453	466
Russia	459	468	478
Mexico	425	419	416
Thailand	421	419	425
Brazil	412	386	405
Jordan	405	387	415
Tunisia	404	371	401
Indonesia	402	371	383
Argentina	398	388	401
Kazakhstan	390	405	400
Albania	385	377	391
Qatar	372	368	379
Peru	370	365	369
Azerbaijan	362	431	373
Kyrgyzstan	314	331	330
	Statistically significantly above the OECD average		
	Not statistically significantly different from the OECD average		
	Statistically significantly below the OECD average		

Source: OECD PISA 2009 database.

Figure 14: Quality of Education and Labour Productivity

$y = 0.0458x - 11.1495$
R-sqr = 0.2281

Source: OECD PISA 2009 Database and WDI

could not read a simple sentence. In Pakistan, tests of grade 3 children found that only half could answer very basic multiplication questions (World Bank, 2011).

As noted earlier, it is recognized that there is a positive relationship between the quality of education and productivity. Figure 14 compares performance in mathematics in 2006 with average labour productivity between 2006 and 2009 for participating OIC member countries. While the impact is largely driven by Azerbaijan, there is a positive relationship between the quality of education and labour productivity in OIC countries. Although this analysis is not perfect due to a number of reasons such as small sample size and significant outliers, it helps to make inference on the importance of the quality of education. It is crucial that for

higher productivity and better economic performance, the quality of education must be improved.

...while activities in Research and Development unsatisfactory

The successful improvements in accession to education in many member countries could not be accompanied with similar improvements in the quality of education, which plays significantly greater role in increasing the absorptive capacity. When measuring the quality of education in terms of its outcomes, the quantity of patent applications may be considered as a proxy for the degree of innovative capability in a country. As a product of research and development activities, patents

Box 2: Assessing the Quality of Education: PISA

PISA is an acronym taken from the "Programme for International Student Assessment". It was officially launched in 1997, with the first survey taking place in 2000, the second in 2003, the third in 2006 and the fourth in 2009. For PISA 2009, 65 countries/economies implemented the assessment in 2009.

Who takes the PISA tests?

Schools in each country are randomly selected by the international contractor for participation in PISA. At these schools, the test is given to students who are between age 15 years 3 months and age 16 years 2 months at the time of the test, rather than to students in a specific year of school. This average age of 15 was chosen because at this age young people in most OECD countries are nearing the end of compulsory education. The selection of schools and students is kept as inclusive as possible, so that the sample of students comes from a broad range of backgrounds and abilities.

What does PISA test?

Every PISA survey tests reading, mathematical and scientific literacy in terms of general competencies, that is, how well students can apply the knowledge and skills they have learned at school to real-life challenges. PISA does not test how well a student has mastered a school's specific curriculum.

strengthen the link between science and technology.

According to statistics from the World Intellectual Property Organization (WIPO), the total number of patent applications around the world in 2008 is estimated to have been 1.85 million, and less than 1% of them were filed in OIC member countries –for which data are available. USA, Japan, China, and Republic of Korea accounted for about 70% of the total patent applications in the world. Table 3 presents statistics on patent applications in OIC member countries for which data are available.

Patent activity is highest in Iran, Malaysia, and Indonesia. In 2006, total patent applications (by residents and non-residents) amounted to 6,527 in Iran and 4,606 in Indonesia. In 2008, total patent applications amounted to 5,303 in Malaysia. In most of the OIC countries, applications by non-residents are higher than those filed by residents; in fact, in half of the 26 countries with available data, they account for more than 75% of the total applications. In quantity, they are highest in Malaysia (4,485) and Indonesia (4,324), accounting for, respectively, 85% and 94% of the total applications. Applications by residents dominate only in eight of the member countries, including Iran (5,970) and Turkey (2,221).

In this perspective, it is evident that investments in human capital are not sufficient to translate the capacities into more innovative structure to generate higher patent applications, casting doubt on the quality of education in OIC countries. Gains in access should turn attentions to the challenge of improving the quality of education and accelerating learning. OIC member countries should focus on improving the infrastructure and thus the potential outcomes related to the provision of education in order to engender a faster catch-up process.

Table 3: Patent Applications		
Country	Total	Year
Iran	6,527	2006
Malaysia	5,303	2008
Indonesia	4,606	2006
Turkey	2,397	2008
Egypt	2,105	2007
Pakistan	1,545	2008
Morocco	1,011	2008
Algeria	849	2007
Saudi Arabia	770	2007
Jordan	566	2007
Uzbekistan	448	2008
Tunisia	338	2005
Lebanon	316	2006
Bangladesh	299	2007
Syria	257	2006
Azerbaijan	227	2008
Kazakhstan	173	2008
Kyrgyz Rep.	138	2008
Brunei	75	2008
Mozambique	40	2007
Yemen	35	2007
Tajikistan	26	2006
Sudan	16	2007
Uganda	7	2007
Bahrain	3	2004
Burkina Faso	1	2005
Source: WIPO		

IMPACT DIMENSION

HUMAN CAPITAL, ABSORPTIVE CAPACITY, AND PRODUCTIVITY GROWTH

The accumulation of human capital through education and vocational training promotes economic growth by improving labour productivity and by facilitating the knowledge and technology adoption. The analysis in this section is not sufficiently technical to assess the importance of human capital as a source of growth and cross-country differences in productivity. Instead, it provides information on average productivity growth and tries to link the productivity growths with human capital developments.

There are various definitions of productivity. Labour productivity is based on the most important factor of production and it is relatively easy to measure. Since it is only a partial productivity measure, a more appropriate option is to use total factor productivity (TFP) measure. Improvements in TFP have been recognized as an important source of economic growth and convergence, but due to data constraints it is difficult to construct TFP data on all OIC countries. Therefore, the preferred productivity measure will be labour productivity and, in line with the literature, it will be defined as GDP per worker; where GDP for each country refers to its Gross Domestic Product, in national currency, at constant prices. Labour input is defined as total labour force.

> *Productivity isn't everything, but in the long run it is almost everything*
>
> *Paul Krugman*

Trends in Productivity Growth

Figure 15 depicts the overlapping 5-year averages of productivity growth in the OIC countries since 1985. More explicitly, the data for 2000 represents the average productivity growth between 1996 and 2000 and the data for 2001 represents the average productivity growth between 1997 and 2001 and so on. In some years the growth rates are more dispersed but in others they more concentrated. In 1990 and 2000, for example, the difference between the best and worst performer is only about 10%, but in 1996 and 2005 the difference reaches up to 30%. The latest data is the best figure that OIC countries ever attained; all member

Figure 15: Labour Productivity Growth (1985-2010)
(5-years moving average)

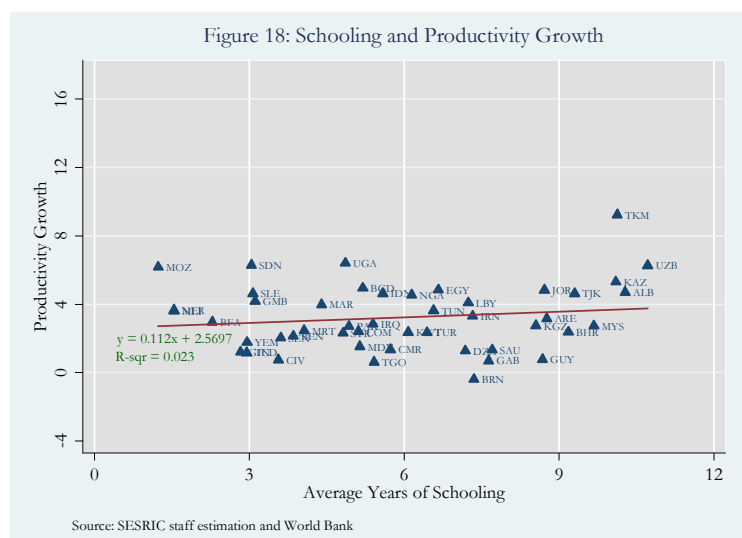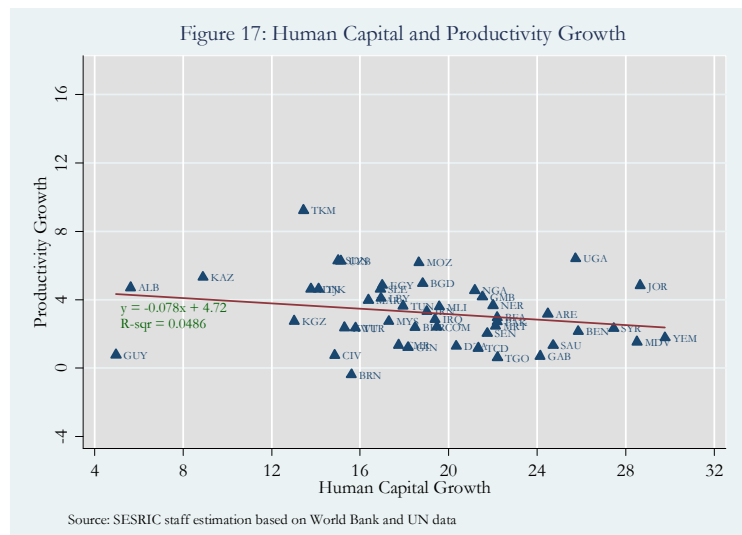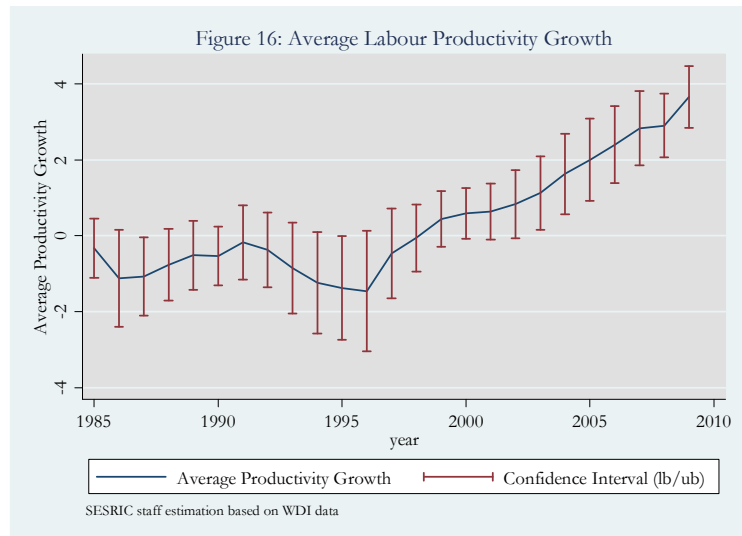SESRIC staff calculation based on WDI data
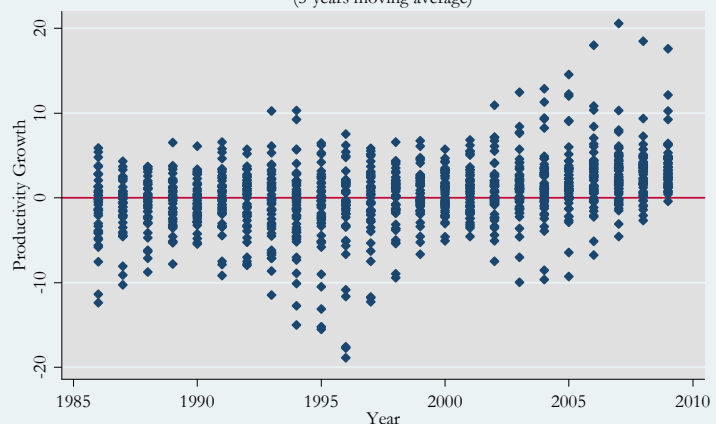
countries except Brunei could increase their productivity, but concentrating largely at levels around 1% to 4%.

The simple average labour productivity based on 5-year overlapping data is plotted in Figure 16. Since it is only simple average, the confidence intervals are provided for more accuracy. On average, OIC countries could attain positive productivity growth only after 1998. Until 1998, the average productivity oscillated around -1%. Starting after 1996, a steady increase in productivity growth is achieved and it reached over 3% as of 2009.

Human Capital and Productivity Growth

Human capital is generally regarded as well-educated labour force and a critical factor in achieving better economic performance. Tertiary schooling is even more relevant in fostering technological innovation. Whether human capital played any significant role in fostering higher productivity growth in OIC countries is rather questionable. Figure 17 depicts the relationship between the average productivity and human capital growth between 2005 and 2010 across the member countries and excludes outliers. It is fair to argue that higher human capital does not necessarily translate into higher labour productivity. This outcome again leads to question the quality of education in OIC member countries (see Box 3).

Figure 16: Average Labour Productivity Growth

SESRIC staff estimation based on WDI data

Figure 17: Human Capital and Productivity Growth

$y = -0.078x + 4.72$
$R\text{-sqr} = 0.0486$

Source: SESRIC staff estimation based on World Bank and UN data

Figure 18: Schooling and Productivity Growth

$y = 0.112x + 2.5697$
$R\text{-sqr} = 0.023$

Source: SESRIC staff estimation and World Bank

Level of Higher Education and Productivity Growth

On the other hand, Figure 18 shows the relationship between average years of schooling in 2005 and average productivity growth until 2009. It is to observe a slightly positive relationship between average years of schooling and productivity growth. One year increase in average schooling is associated with 0.1% increase in productivity and this is a relatively poor improvement. It is clear that labour productivity backwardness and school enrolment rate in higher education is closely correlated.

Past Educational Attainment vs. Current Growth: Catching up

Whether current growth rates are related to the past educational attainment is examined in Figure 19. The figure compares the change in schooling between 1995 and 2000 with the change in GDP between 2000 and 2005. As it is evident, there is positive correlation between these two indicators. Past educational attainment improves the capacity to utilize new knowledge and enhance the potential for better economic performance. 1 year increase in average years of schooling in the past 5 years is related with more than 1% increase in current GDP growth.
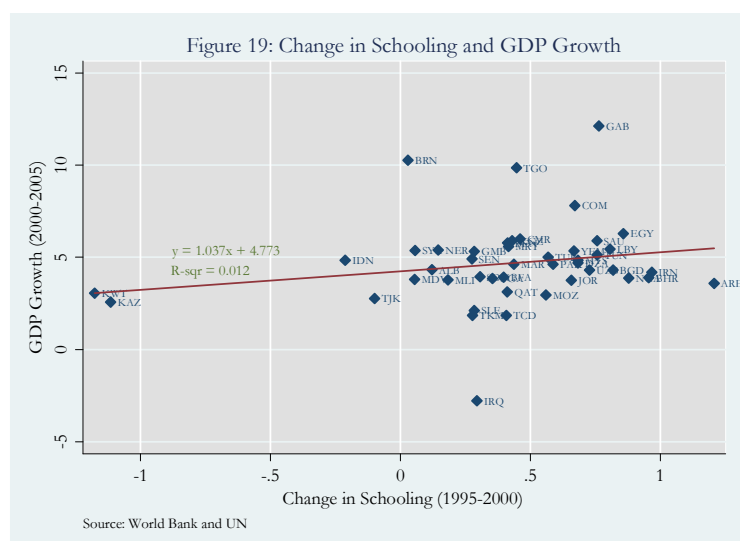
This section clearly highlights the importance of education on productivity and GDP growth. Human capital accumulation driven by good quality education is key to catching up advanced countries. Human capital accumulation driven by higher population growth, on the other hand, is not necessarily

Box 3: Paradox of Education and Economic Growth in Nigeria

An empirical study on Nigeria reports that education has not produced the expected positive growth impact on economic growth (Ayara, 2002). Hence, the author proposes three possibilities that could account for such results, which are:

i. Educational capital has gone into privately remunerative but socially unproductive activities; or

ii. There has been slow growth in the demand for educated labour; or

iii. The education system has failed, such that schooling provides few (or no) skills.

conducive to higher growth rates. Countries aiming at better life standards with prosperity and welfare should not overlook the need for more and better education for their people.

Figure 19: Change in Schooling and GDP Growth

$y = 1.037x + 4.773$
$R\text{-sqr} = 0.012$

Source: World Bank and UN

SOCIAL DIMENSION

HUMAN ASSETS AND SOCIAL DEVELOPMENT

Better educated people are more likely to have better standards of living and better prospects of employability and earnings. They will experience various non-monetary benefits including better health, fertility and less potential to engage in criminal acts. In addition to external impact at individual level, other externalities at public level are most likely to emerge. This section investigates the linkages between some indicators of human and social development with changes in schooling and productivity.

The Human Assets Index (HAI) is one of the three dimensions of development used by the UN in identifying the least developed countries, which provides information on the level of development of human capital. Accordingly, it focuses on achievements in health and education as an indication of the capacity that countries have to take advantage of opportunities for development. The HAI is a combination of four indicators related to the level of health and nutrition and the level of education. The HAI has two indicators of health and nutrition and two for education:

a) The percentage of population that is undernourished;
b) The rate of mortality for children aged five years and under;
c) The gross secondary school enrolment ratio;
d) The adult literacy rate.

Due to in-depth discussion of

schooling in the previous sections, other remaining three indicators will be scrutinized in this section. In addition to these indicators, average life expectancy and fertility ratio will be analysed in dealing with the social dimension of human capital development.

Malnutrition and Cognitive Abilities

While better education improves the health conditions, nutritional intake and better health conditions affect the educational outcomes as well. Malnutrition leads to a poor health status with increasing probability of diseases. Lack of crucial nutritional intake especially at early ages irreversibly affects brain development and learning capabilities.

Figure 20 shows that lower prevalence of undernourishment is associated with higher average rate of schooling. As malnutrition is one

Figure 20: Schooling and Malnutrition

$y = -2.161x + 26.721$
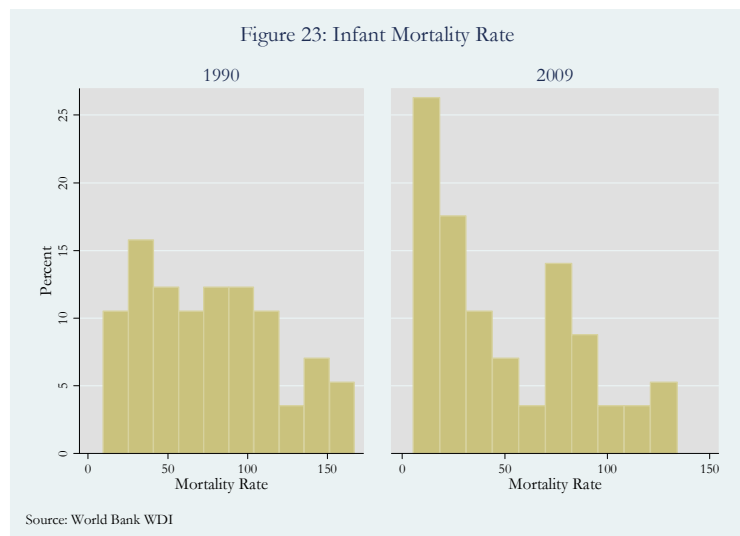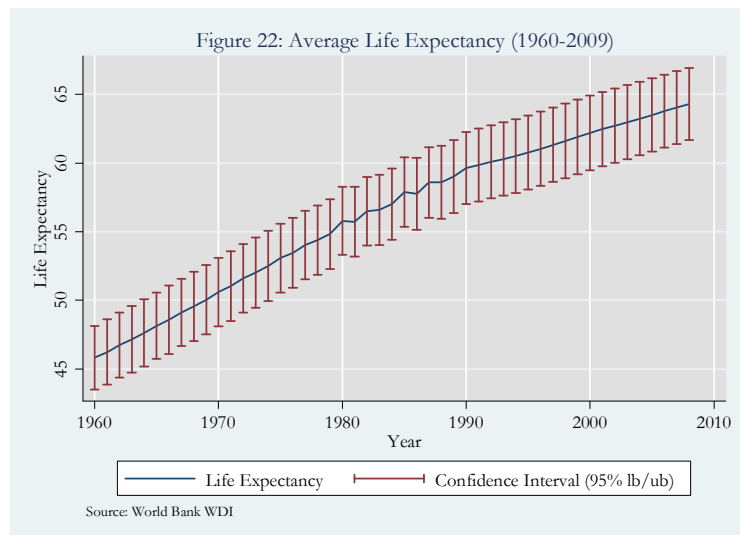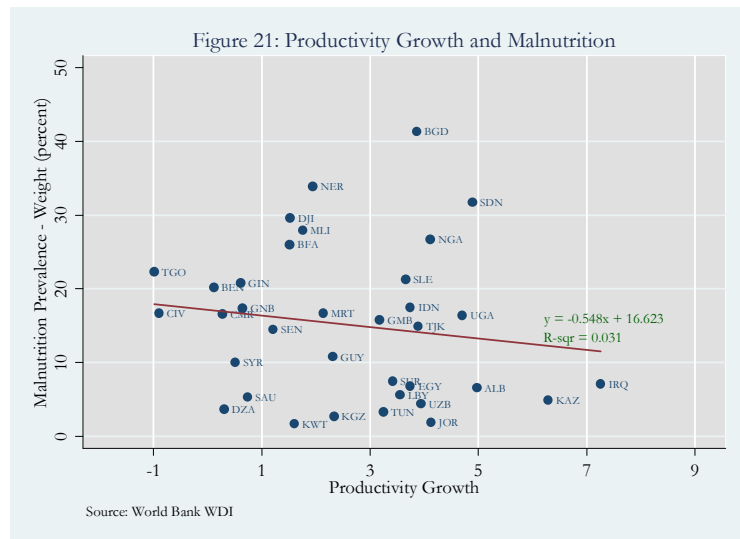R-sqr = 0.248

Source: World Bank WDI
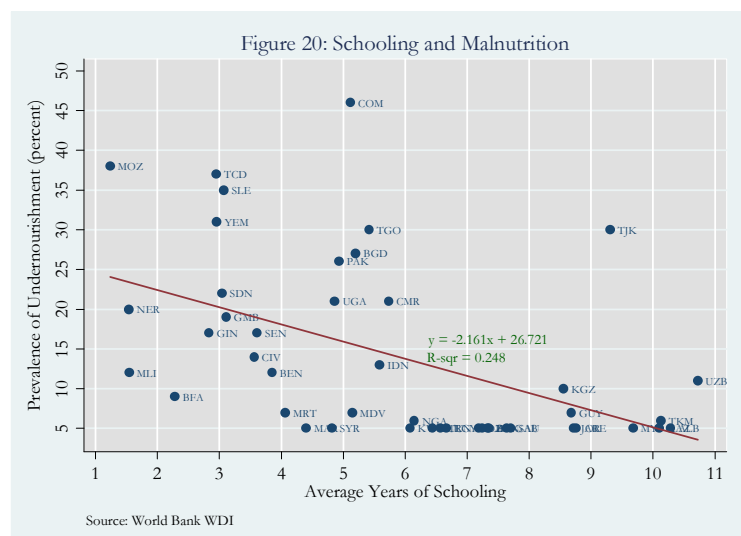
of the indicators of poverty, the figure specifies that school attendance is lower where poverty prevails. Therefore it is fair to argue that it is malnutrition that negatively affects school attainment, despite the two-year gap between the two indicators due to data availability constraints.

Similarly, Figure 21 shows that there is an inverse relationship between the prevalence of malnutrition (05-10) and the productivity growth (04-08). Although the corresponding data do not match exactly due to availability constraints, it is still informative that malnutrition has restraining impacts on productive capacities of people. Therefore it is imperative for OIC countries to invest on alleviating poverty as well when building their human capital for the sake of higher productivity growth.

Mortality, Fertility and Life Expectancy

The development benefits of education extend well beyond productivity and growth to include better health, reduced fertility and an enhanced ability to adopt new technologies. Increasing life expectancy leads people to lengthen schooling time, thus inducing a better education and better conditions for economic development (Ben-Porath mechanism).

In the OIC member countries, average life expectancy at birth has been steadily increasing during the last 50 years (Figure 22). The simple average reached to 50 years during the

Figure 21: Productivity Growth and Malnutrition

$y = -0.548x + 16.623$
R-sqr = 0.031

Source: World Bank WDI

Figure 22: Average Life Expectancy (1960-2009)

Source: World Bank WDI

Figure 23: Infant Mortality Rate

Source: World Bank WDI

late 1960s, and as of 1992, it exceeded the 60 years threshold. According to the latest data, the average life expectancy in OIC countries is close to 65 years, representing a significant improvement.
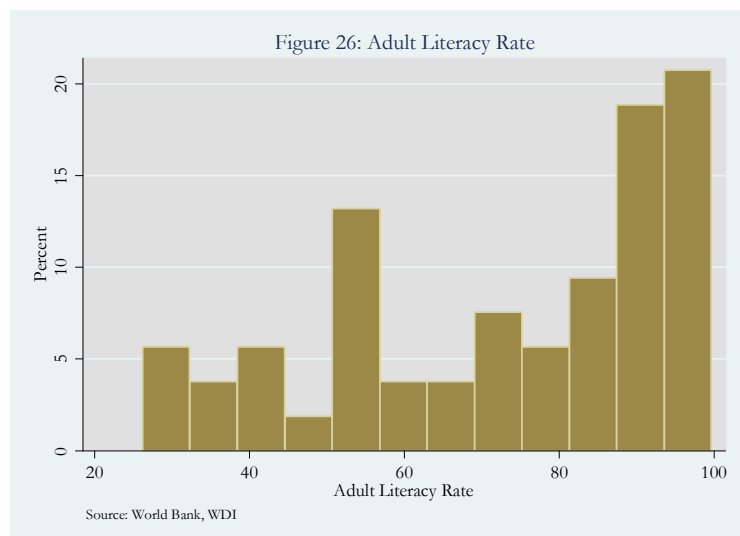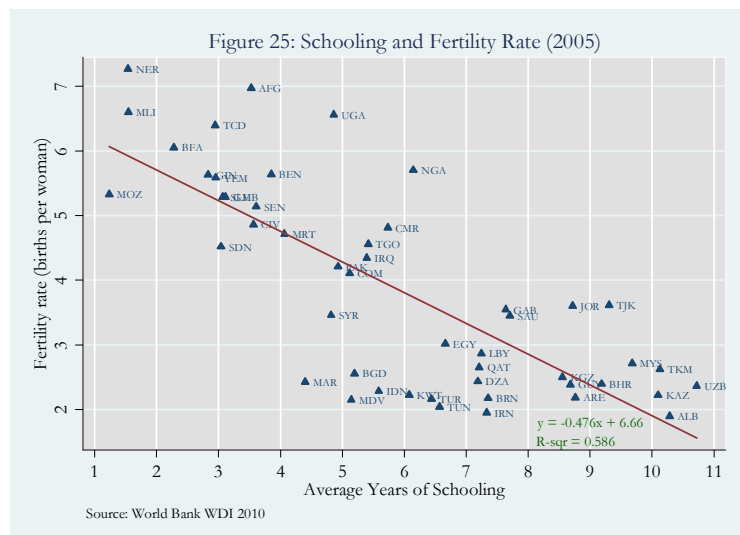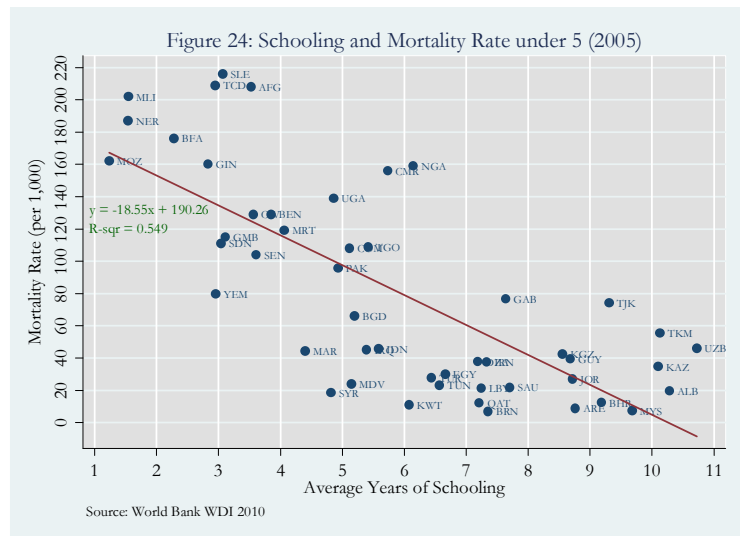
Concerning the mortality rate for children under 5 years old, there is a parallel improvement with average life expectancy (Figure 23). The number of infant mortality per 1000 live births has decreased significantly over the last two decades and in majority of the countries, mortality is below 50 per 1000 live births. The relationship between schooling and mortality rate is also extremely clear (Figure 24). One year increase in average schooling is associated with almost 20% reduction in mortality rate. The OIC member countries, therefore, benefit from higher standards of living with falling mortality rates and improving educational attendance.

The fertility rate is also negatively related with average years of schooling (Figure 25). As the years of schooling increases, the number of births per woman decreases substantially. An increase of 2-years in the average years of schooling is associated with fall of almost 1 birth per woman.
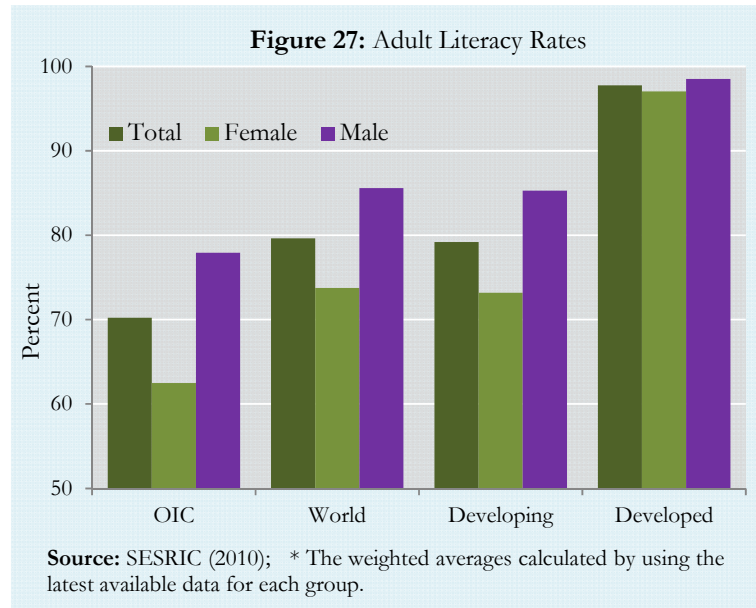
As all these indicators show clearly, the development benefits of higher education appear to be widely extended to other aspects of life through the member countries.

Adult Literacy Rate

Adult literacy rate is one of the

Figure 24: Schooling and Mortality Rate under 5 (2005)

$y = -18.55x + 190.26$
R-sqr = 0.549

Source: World Bank WDI 2010

Figure 25: Schooling and Fertility Rate (2005)

$y = -0.476x + 6.66$
R-sqr = 0.586

Source: World Bank WDI 2010

Figure 26: Adult Literacy Rate

Source: World Bank, WDI

indicators of development that are included in the measurement of human assets index (HAI) as well as human development index (HDI). It is regarded, therefore, as an important indicator of social development. The literacy rates in the OIC countries are not dazzling. In quite a few countries, literacy is still below 50 per cent (Figure 26). With an average adult literacy rate of 70.2%, OIC lagged well behind the world average of 79.6% and also the developing countries' average of 79.2% (Figure 27). There is a larger disparity across genders in OIC countries compared to other regions. Out of 100 women only 62.5 of them can read and write while 77.9 of male population are literate. While the average adult literacy rate of males in OIC countries is much better, it is still below the average of developing countries, 85.3%, and the world, 85.6%. The discrepancy in literacy rates among the female population between the OIC average and the world average reaches up to 11 percentage points. These comparisons highlight once again the lack of investments made in education in fostering economic and social development in the OIC member countries.

Figure 27: Adult Literacy Rates

Source: SESRIC (2010);   * The weighted averages calculated by using the latest available data for each group.
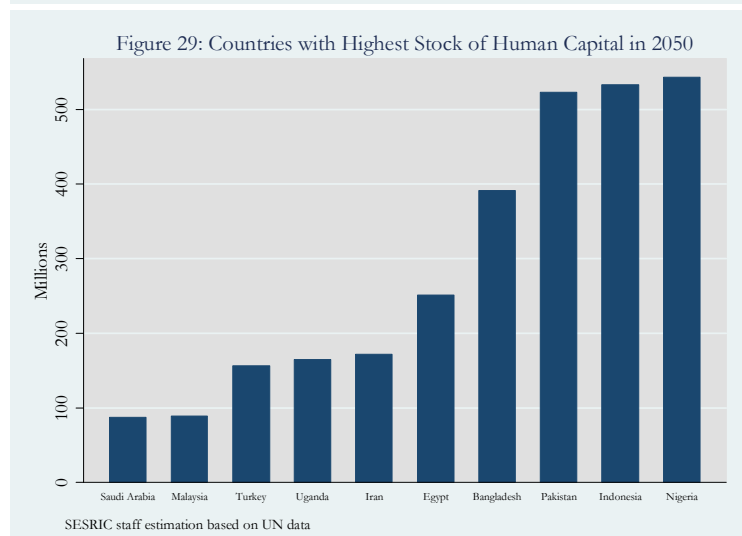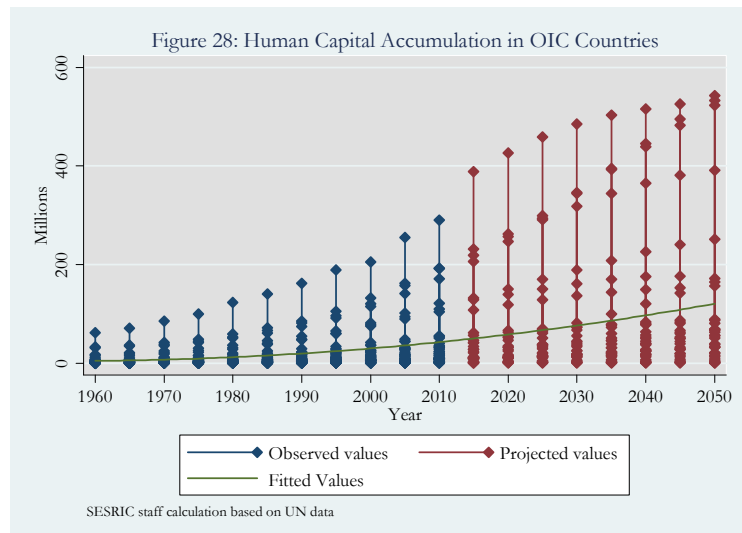
PROJECTIONS ON HUMAN CAPITAL ACCUMULATION

The developments in human capital accumulation until 2010 signify a robust increase in the stock of human capital over the years. Even though the productivity impacts of this growth remained moot, the impacts on the quality of life were fairly substantial. By using the projections made by UN and World Bank on population and schooling up until 2050, respective human capital stock is calculated for the member countries. Before proceeding, it must be noted that the projections could be made for only 34 countries out of 57 member countries.

In general, the tendency towards higher human capital stock continues until 2050 (Figure 28). While the trend decelerates, stock of human capital continues to increase in many countries. Three countries are projected to occupy the top positions with comparable size of human capital. As of 2050, the leading position of Indonesia is projected to be overcome by Nigeria (Figure 29). As average years of schooling reaching above 10-years level, it will remain little room for Indonesia to maintain high growth rate in human capital accumulation. Pakistan is also expected to catch up the leading countries by attaining a stock of human capital over 500 million.

As evident in Figure 28, first set of followers composed of Nigeria, Pakistan and Bangladesh will dissolve after 2030 as Bangladesh loses pace in accumulating human capital.

Bangladesh will be the fourth largest country in terms of human capital stock. It will not only lose its position as second largest country, but also remain far behind Pakistan. Egypt will also make great progress and generate a significant gap between its companions Iran and Turkey. Uganda and Saudi Arabia replace Algeria and Uzbekistan in the list of top 10 and with constantly increasing rates, Uganda will then

Figure 28: Human Capital Accumulation in OIC Countries

SESRIC staff calculation based on UN data

Figure 29: Countries with Highest Stock of Human Capital in 2050

SESRIC staff estimation based on UN data

enjoy the 7th position among the OIC member countries (For Algeria, projected data on schooling is not available). With declining rate of population growth, Turkey is projected to possess only the 8th position in the ranking.

While the human capital stocks will continue to rise, the trends will significantly decelerate in many member countries. The growth rates in human capital are projected to be positive in all member countries until 2025, with rates ranging between 5% and 25% in most countries (Figure 30). Then predicted growth rates will steadily decline over the period until 2050. Except two outliers, the growth rates in 2040 will range between 1% and 20%. Finally in 2050, quite a few countries will experience reductions in their stock of human capital. The regional investigation reveals that these countries are not concentrated in a specific region but located in four different regions (Figure 31).

Regional Projections

Growth of human capital in East Asia and Pacific region will remain positive but will drop below 10% after 2025 and around 2% in 2050. In the countries in Europe and Central Asia, a similar trend is expected but growth in human capital will almost exhaust after 2040. South Asian countries will largely retain positive growth rates but at decreasing rates. As the only member of Latin American region with projected data available, Guyana will experience a

drop in human capital stock after 2020. Although the average years of schooling will continue to increase until 2050, sinking population will reduce the size of human capital.

The countries in the Middle East and North Africa are expected to retain robust growth rate in human capital until 2030. Then these countries will also experience a fall in the growth rates. Only Iran is expected to suffer around 3% decline in human capital stock due to shrinking labour force and that is in spite of increasing schooling rates. In sub-Saharan

Figure 30: Growth in Human Capital in OIC Countries
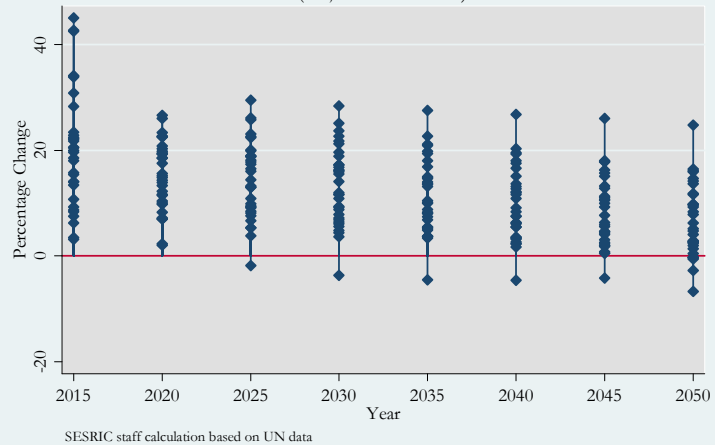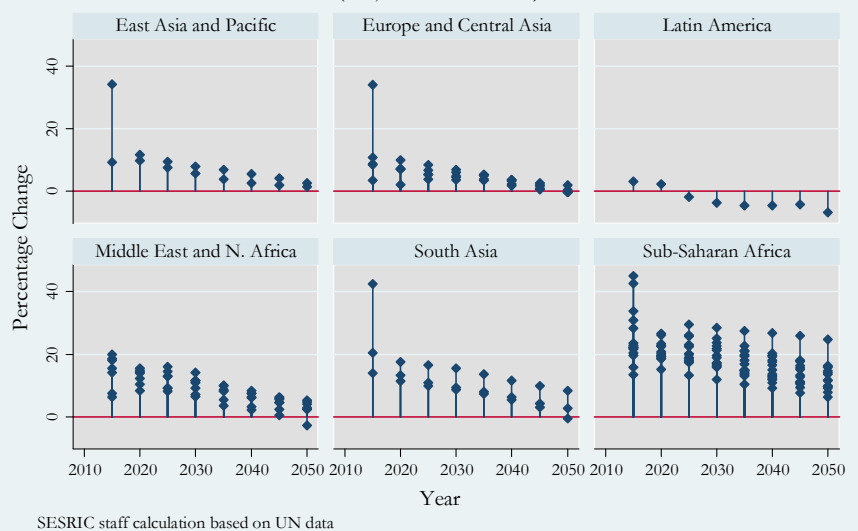(Projections until 2050)

SESRIC staff calculation based on UN data

Figure 31: Growth in Human Capital in OIC Countries
(Projections until 2050)

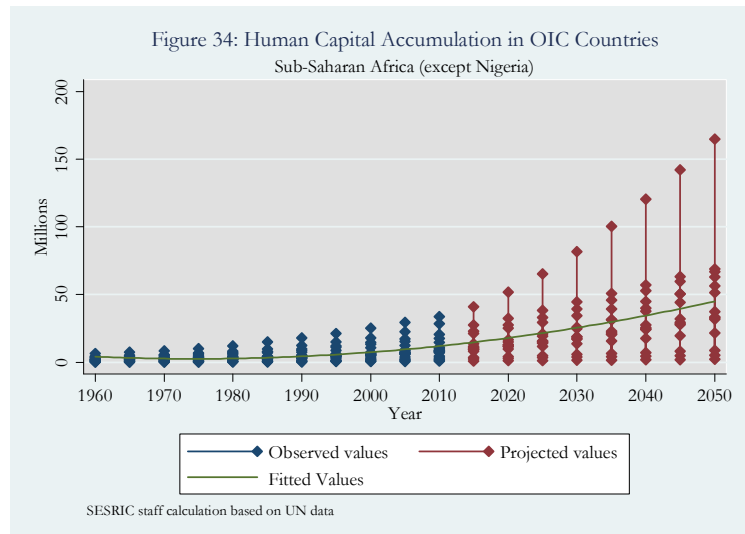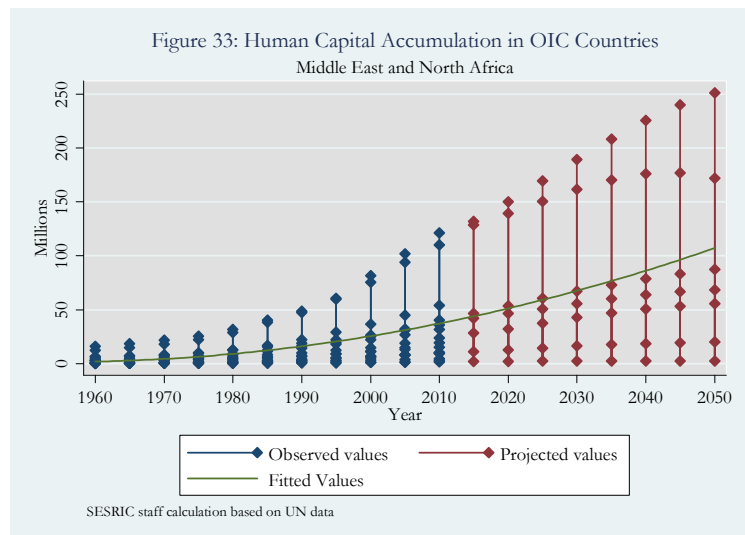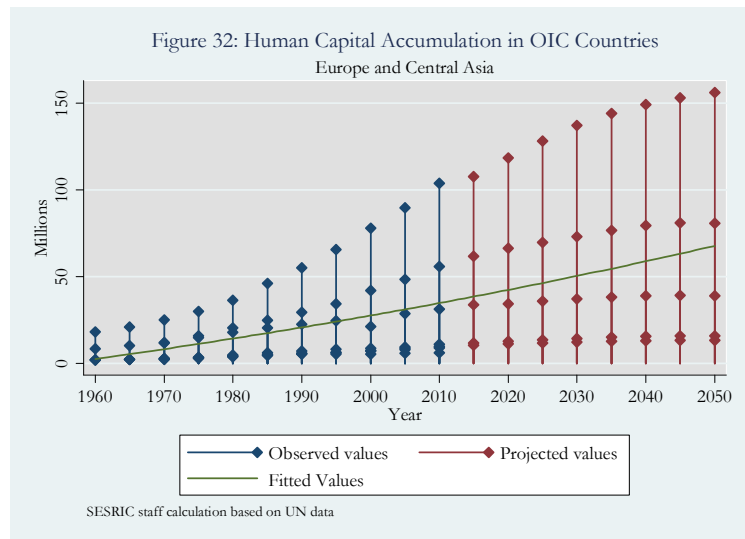SESRIC staff calculation based on UN data

Africa, the average growth rate in human capital accumulation will be above 20% until 2030 and remain above 5% in 2050. This performance will be driven by increasing labour force as well as schooling rates in sub-Saharan countries.

With regards to stocks, we consider three largest regions only. According to the calculations based on population and schooling projections, there will be countries with steeply accumulated or narrowly sustained human capital in each region. Some countries will even experience shrinking stock of human capital. In Europe and Central Asia, Turkey followed by Uzbekistan will be the two largest economies in terms of human capital stock (Figure 32). Except these countries, the stock of human capital is expected to remain constant after 2015.

Among the countries for which the projections are available (7 out of 19) in the Middle East and North Africa, Egypt will continue to accumulate human capital but Iran will experience a reduction after 2040 due to falling size of labour force (Figure 33). Saudi Arabia, Morocco and Syria will be able to accumulate human capital steadily until 2050.

In Sub-Saharan African countries, Nigeria will remain the largest economy with highest human capital stock and will continue to dominate the region. However, Uganda will sharply increase its human capital stock and leave other countries far behind (Figure 34). Though the schooling will significantly contribute to this process, the growth will largely due to fast growing labour force in most of the countries in the region.

Figure 32: Human Capital Accumulation in OIC Countries
Europe and Central Asia

SESRIC staff calculation based on UN data

Figure 33: Human Capital Accumulation in OIC Countries
Middle East and North Africa

SESRIC staff calculation based on UN data

Figure 34: Human Capital Accumulation in OIC Countries
Sub-Saharan Africa (except Nigeria)

SESRIC staff calculation based on UN data

CONCLUDING REMARKS AND POLICY RECOMMENDATIONS

Human capital is one of the main determinants of long-term growth. Skilled and well-educated workforce facilitates the absorption of foreign knowledge and technology from other countries through channels including international trade and foreign direct investments that smooth the spill-over of this stock of knowledge and technology. But, it is the absorptive capacity that determines the level of diffusion. Investment in human capital accumulation or education has, therefore, the potential to increase the capacity to obtain and utilize the knowledge developed elsewhere. Since the majority of the OIC member countries occupy lower ranks in economic development, the investigation on the human capital accumulation is expected to shed light on their potential to achieve long-term sustainable growth. With these motivations, this report provides an evaluation of the development trends in human capital as well as prospects for accumulation.

In general, the analysis on human capital accumulation in the OIC member countries indicates that the member countries have steadily increased their stock of human capital through both increase in population and educational attainment. As average schooling rates in most countries are still low compared to developed countries, there are still room for further increase in all member countries but at a diminishing rate.

Average years of schooling are used as a proxy for the skills and competencies that people possess. Despite the limitations as a proxy, the quality of education is found to be unsatisfactory in most cases. In international comparisons with regards to the quality of education, the OIC member countries commonly occupy the lower ranks. The statistics on patent applications confirm this status. With respect to the impacts of human capital on productivity growth, there appears to be no positive impact. As the years of schooling increases, however, the average productivity increases as well.

Notwithstanding the improvements needed in quality dimension, there is a strong and robust impact on social dimension of development. As the years of schooling increases, fertility rate and child mortality decrease and average life expectancy increases. There is also negative correlation between malnutrition and education.

Finally, projections on human capital accumulation indicate that several countries will experience strong growth in human capital while some others will remain sluggish. Population growth will contribute significantly usually until 2030, and then human capital growth will be largely driven by increasing schooling rates. As the size of population stops growing and even starts shrinking in some countries, the stock of human capital falls despite the increasing duration of school attendance.

In a nutshell, it is exceedingly evident that there is an urgent need to improve the quality of education by improving the instruments and infrastructure. Higher growth rates of human capital driven by growth in population will not be conducive to higher growth and development, but it is the high quality education and highly skilled labour force that matters for prosperity today and tomorrow.

TECHNICAL APPENDIX

The data on human capital is constructed by adjusting the number of workers for their years of schooling (S) by assuming that each additional year increases productivity of workers by a given percentage. Human capital is then calculated as $H = L \cdot e^{\pi(s)}$, with L measuring the total labour force between the ages 15-64, $\pi(s)$ the return to education, and S is the average schooling per worker (a proxy for the stock of education in the economy). The derivative $\pi'(s)$ measures the impact of additional year of schooling on a worker's efficiency.

Various estimates in the literature suggest different rates of return to education, usually between 7 and 13 per cent, due to the fact that the return to education may be nonlinear. With decreasing marginal return to human capital accumulation, the productivity impacts of basic education can be higher than that of advanced education. Psacharopoulos (1994) provides cross-country evidence on Mincerian rates of return consistent with decreasing marginal returns to education. Psacharopoulos reports that the average Mincerian rate of return is 13.4 per cent in Sub-Saharan Africa (with average number of years of schooling around four), 10.1 per cent for the world as a whole (with average number of years of schooling around eight) and 6.8 per cent for OECD countries. Then, the average Mincerian rates of return can be considered to be around 13.4 per cent for the first four years of education, 10.1 per cent on the next four years, and 6.8 per cent for the education above eight, as was also assumed by Hall and Jones (1999). Therefore, the return to education, $\pi(s)$, is assumed to be piecewise linear. This report considers it to be 10 per cent for simplicity.

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