Keeping or catching up? Population dynamics and education in Africa[1]

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Introduction

In the last decade, African economies recorded sustained and impressive economic growth. In 2013, growth rates averaged 4.1%, just below East and South Asia, but almost double the global average. High global commodity prices, increased domestic demand, and improved economic governance and management, among others, accounted for this strong economic performance. Medium term growth prospects remain strong with the average GDP growth rate projected to accelerate to 5.1% in 2015 (UNDESA, 2014).

Despite the remarkable economic performance and progress, Africa posts low levels of human and social development. The continent remains home to the world's highest proportion of poor people , although registering noteworthy performance in improving its social outcomes. Youth unemployment in 2012 is estimated at 23.7% for North Africa and 11.8% for Sub-Saharan Africa (ILO 2013). On average about 72% of the youth population in Africa lives on less than US$2 a day. Africa's impressive growth performance has not led to a sustainable inclusive development because of its limited contribution to job creation and overall improvement to people's living standards (ECA, 2011).

The challenge confronting Africa is, therefore, not only to maintain the rapid economic growth, but to transform it into sustained and inclusive development, based on (1) economic diversification, with special focus on industrialization, that creates jobs, contributes to reduced inequality and poverty rates, and enhances access to basic services. This underlies the renewed calls by countries for a structural transformation that fosters sustained and inclusive sustained economic growth (Lin, 2012; Kuznets, 1966). The structural transformation agenda is based on four interrelated process a declining share of agriculture in GDP and employment; the rapid process of urbanization as people migrate from rural to urban areas; the rise of a modern industrial and service economy; and a demographic transition from high rates of births and deaths to low birth rates and high life expectancy (Timmer, 2008).

The demographic transition feature of structural transformation garners its importance on the link between population growth and development (ICPD 2013). This takes on increased resonance given the new global Agenda 2030 and the Sustainable Development Goals and at the continental level Africa 2063 both proposing transformation of economies as their cornerstone. The second feature is the shift

in employment and output, currently dominated by agriculture and natural resources, towards an economic structure based on industry and modern services, with diversified manufactured goods and commodity-based value addition. The increasing importance of knowledge and technology in value-addition and industrialization is predicated on the status of human capital in nation states. In short, the skills and capacities that reside in people and that are put to productive use are a vital aspect of its productivity gains and long term economic and sustainable success.

The on-going policy debate on Africa's population dynamics and the demographic dividend stems from the potential of a youthful population structure and its positive repercussions on economic growth. Indeed, Africa's working age population currently representing 54 percent of population will peak at 64 percent in 2090. Therefore productivity gains from a large young working age population can generate a "demographic dividend". Some empirical studies have shown that a 1 percentage point change in the working age population increases real per capita GDP growth by 0.5 percentage point (Bloom et al 2011; Drummond et al 2014). The role played by population dynamics and in particular its transitory phase has been cited as one of the features of the economic growth and transformation of the East Asia success stories of the 70s. In fact, the type and pace of the demographic transition in East Asia had a positive effect on accelerated progress in human capital and growth (Mason 2003).

The role of human capital in economic development has been a frequent theme in the theoretical and applied literature (Kedir and Bani, 2014; Krueger and Lindahl, 2001). The belief of policy makers that human capital is a key contributor to economic development has led, virtually everywhere in the developing world, to a policy focus on education. However, human capital would have an impact if it is generated and put to use in labour markets. Consequently, quantity and quality of educational outputs must be matched for a transformative effect. In Africa, in quantity terms the progress towards educational goals has been notable, particularly since 2000. The recent enrolment figures of primary school in Africa, excluding North Africa have increased by 24 percent points from 1999 to 2012 achieving 87 percent of the age cohort group and secondary education enrolment increased from 25 percent to 53 percent from 1999 to 2011 (UIS 2014). In addition, the number of children enrolled in primary school had increased from 62 million in 1990 to 149 million in 2012

In Africa, catching up with increased intake at primary level has caused some supply challenges and resultant decline in the quality of education is a serious challenge. There are a number of drivers that

negatively affect quality among which completion and teacher-student ratios among others. However, the challenge of catching up with increased intakes of students particularly at primary level underpins the constant attempt by African states to match supply factors to growing demand with growing concerns on education resource allocation.

Compared to other regions Africa's demographic profile is atypical. The trends in life expectancy and fertility have been of the right sign and direction with life expectancy on the continent increasing by 10 years over a 30 year period. Total fertility rates have dropped by 2 children per fertile woman to achieve an average of 5.1 children per woman over the same period (ECA 2015). The growth of young age groups has the effect on increased demand for public services but also public finance to meet such demand. This takes on increased resonance in the new development agenda that aims at universality at secondary education level, currently restricted at best to primary schooling.

This paper will analyze how population dynamics currently in force in Africa are restricting quality outcomes of primary education. In particular, the education budget and unit allocation has been severely challenged by the positive but restricting population growth in demand. This paper will use secondary data sources to evaluate population dynamics and in particular fertility rates and its link to quality educational output at the primary level. This paper will use country examples to provide further empirical grounding on the population-education link.

The paper is divided into four complementary sections. Section I reviews the literature on growth and education and population and education. Section II provides the data and methodology. Section III presents the results and its possible contribution to the educational quality debate. Section IV finally points towards some key policy recommendations emanating.

Section I: Growth, human capital and population-a short review

The link between economic growth and human capital has had a long history. There has been divergent views on explanatory variables that try to establish the link between growth and human capital.

In neo-classical growth models, the long-run rate of growth is exogenously determined by the savings rate or the rate of technical progress (Solow 1962, Harrod-Domar 1939). This macro model was reviewed in light of microeconomic foundations that place growth and its effects at household levels.

In the mid-1980s, a group of growth favored a model that replaced the exogenous growth variable (unexplained technical progress) with a model in which the key determinants of growth were explicit in the model (Lucas 1988, Romer 1986). The endogenous growth model which has greater relevance to this paper show that growth in these models is due to indefinite investment in human capital which has spillover effects on the economy at large and reduces the diminishing returns to capital accumulation. The model assumes a constant-saving-rate of endogenous growth. It assumes a constant, exogenous, saving rate. It models technological progress with a single parameter. It uses the assumption that the production function does not exhibit diminishing returns to scale to lead to endogenous growth. Various rationales for this assumption have been given, such as positive spillovers from capital investment to the economy as a whole or improvements in technology leading to further improvements (i.e. learning-by-doing).

This has been developed further for research and development variables (Romer 1990), but for purposes of this paper the main thrust is to place human capital at the center of growth. The endogenous growth model had important theoretical implications and empirical studies on growth and human development (PIssaridies 2000). The base idea is that growth of incomes alone does not capture the development aspect of improved welfare for population. However, macro studies which include a human capital variable in their analysis face the difficult task to properly measure it. Assessing accurately the differences in human capital endowments across countries, regions or years is evidently crucial to examine their influence on macroeconomic phenomena such as economic growth, regional convergence, productivity, unemployment and innovation (Le Chaplain 2015).

Indeed, the measurement of human capital or more correctly the proxies used to estimate its impact to and from growth has been a major task. This is possibly one of the main reasons that empirical literature pertaining to education as a central part of human capital has been unable to identify robust

mechanisms through which education and training contribute to economic development. Although suggestions abound, authors of empirical papers are rarely able to agree on the degree to which human capital contributes to economic development and why there is such diversity in the empirical estimates. This is especially true of the aggregate literature. In empirical studies physical capital invariably has an influence on the growth of aggregate output, with the estimated coefficients corresponding more or less to those derived in the theoretical literature on growth; human capital is sometimes found to be significant, sometimes insignificant and most often with a variety of estimated coefficients that do not always make theoretical sense (Pissaridies 2000).

The quantitative techniques on education can be divided into proxies: proxies which measure human capital accumulation through education variables and proxies that directly measure skills. Whilst the former seem to predominate for example school enrollment rates and education attainment of the active population are the most used. An important and significant set of studies have relied on secondary education generally using enrollment figures (Carlin 2013; Martin-Retortillo 2014). This has particular importance as secondary education is some sort of recognition of skill acquisition for labour markets (Unesco 2014) and currently proposed in the global agenda 2030(UN 2013).

Distinct from enrollment rates, education attainment of the active population is the average years of education of the population is the second main proxy used to measure human capital (Parman 2011; Kung 2012) . This also takes into account, harking back to the endogenous growth model, the innovation aspect. For example, individuals above 15 years of age who have completed tertiary education are used as a more accurate human capital endowment for innovation (Sanchis 2014).

Education as an outcome and therefore literacy rates have also been used to attest the impact of human capital. The replacement of the flow and stock of educational attainment by the more result based outcome of a schooling cycle- literacy seems to combine two features of the link between education and economic growth of importance to this paper.

Firstly, it reflects a skill set of the educational system. As was pointed out above human capital needs to be generated and put into use in labour markets. The structure of the labour market is therefore critical for the quantity and quality of human capital that is generated and for the uses to which it is put

(Pissardies 2000). Thus education has an effect on economic growth through gains in skills put to use in labour markets.

Secondly and closely linked to the above is the quality of education. Literacy as an end point of educational outputs attests to the quality of the production cycle. Until very recently quality has not been monitored due to some technical difficulties in its measurement. Quality concerns have emerged particularly in the African context partly driven by the quantity targets of the previous MDG framework. The pertinence and relevance of educational skills imparted becomes an important aspect of quality. In short, literacy and numeracy skills are outcomes rather than outputs of educational systems.

This short review of human capital and growth and in particular that empirical studies seem to be inconclusive seems to point towards intervening variables. First of all education as a human right in its own right, as reflected in the broader scope of human development. Secondly, national productive capacities develop through the interrelated processes of capital accumulation and technological progress. Therefore, it is not only education but a symbiotic relationship between human capital and economic growth through the generation and utilization of knowledge and technology. Among the most critical dimensions of development are the convergent impacts of globalization, the increasing importance of knowledge as a main driver of growth, and the information and communication revolution. Knowledge accumulation and its application have become major factors in sustainable economic development and are increasingly at the core of a country's competitive advantage in the global economy (World Bank 2005).

The supply of an educated workforce is partly an outcome of public and/or private providers of training but the population growth and age structure is an important aspect. The renewed interest in the macroeconomic consequences of population dynamics germinates from two sets of studies. There is a series of studies that show how demographic factors have a strong, statistically significant effect on aggregate saving rates (Bloom et al, 2003; Williamson et al, 2001). There are also empirical studies that posit a positive and significant relationship between demographic change and economic growth (Bloom et al 2003).

The link between population dynamics and growth has had a chequered history particularly in development economics. In the 60s and 70s, population growth in developing countries was stemming socio-economic development (McNamara 1973). The Malthusian inspired idea was that food supply could not stay ahead of population growth in the long-run (Perkins et al 2006). The revisionist theory sometimes called the optimistic theory sustained the idea that population growth is a neutral feature of development.

This debate took a more policy oriented turn in the 1990s and the new Agenda 2030. The link between population and growth can be summed up as follows. It is not population growth that is the important feature of development but its constituent parts. Age-structure, life expectancy, birth rates all impact development differently and the sustainability of the population dynamics becomes key (UN 2013). For example, in developed countries with low fertility rates and high life expectancy a key economic challenge for ageing populations is to provide for old-age consumption for older persons who typically have substantially reduced labour income. Some societies are trying to meet this challenge by relying on transfer systems –either public programmes or familial support systems (Mason 2003). Other societies are responding by increasing their saving rates and accumulating greater physical wealth or capital. In short, the complexity of the link between population dynamics and development is applied differently to levels of development. What does emerge however is that age structures and decomposed population dynamics- transitions, dependency ratios have more explanatory force than population growth itself. An important aspect of all the above is the centrality of a people-centered development.

A more pointed population development occurring in Africa is the demographic dividend. There has been some importance given to the demographic dividend as part of a vibrant Africa narrative (ECA 2014). The youthful population of the continent would have a positive effect on growth and development. In other words, the rising share of Africa's working age population is increasing its productive potential at a time when most of the advanced economies face an ageing population. Africa's share of the global working age population is thus projected to increase from 12.6 percent in 2010 to over 41 percent by 2100. The magnitude of these demographic developments will be transformational for Africa and will also have major implications for the global economy (Drummond et al 2014). Part of the inter-related factors on structural transformation actually identifies the rise in life expectancy and the drop in fertility. This can be taken to represent a demographic transition- the transition from a

largely rural agrarian society with high fertility and mortality rates to a predominantly urban industrial society with low fertility and mortality rate (ECA 2011).

Demographic transitions can be divided into two phases. The first is when the working age group is a large proportion of the total population and production is larger than consumption of resources. Children and the elderly produce much less than they consume, whereas adults of working age, on average, produce much more than they consume. Countries with heavy concentrations of populations in the working ages have an inherent advantage to produce high levels of per capita income (Mason). The length and pace of this first transition is dependent on the changes over time of fertility and life expectancy. This dividend period is quite long, lasting five decades or more, but eventually lower fertility reduces the growth rate of the labor force, while continuing improvements in old-age mortality speed growth of the elderly population. Now, other things being equal, per capita income grows more slowly and the first dividend turns negative.

The second demographic transition is when a population concentrated at older working ages and facing an extended period of retirement has a powerful incentive to accumulate assets—unless it is confident that its needs will be provided for by families or governments. Whether these additional assets are invested domestically or abroad, national income rises. In short, the first dividend yields a transitory bonus, and the second transforms that bonus into greater assets and sustainable development. These outcomes are not automatic but depend on the implementation of effective policies.

The African continent presents some peculiar features of the first demographic transition with a few countries in the second transition. Compared to other regions, Africa starts at a much lower base, the transition is longer, and the peak around 2090 is at a somewhat lower level than other regions. A similar transition started in other regions (Asia, Latin America, and Oceania) in the 1970s. Owing to the a multiplicity of factors that lie outside the scope of this paper in Africa the demographic transition did not start until the mid-1980s. Additionally, the pace of Africa's transition is somewhat slower—about three generations compared to one generation for the other regions. On current trends, Africa is expected to have a higher share of working age population than North America and Europe in the next two decades, and the highest among all continents by 2060 (Drummond et al 2014).

Current empirical studies seem to confirm this phenomenon. Indeed, results for Africa are equally interesting in view of the relatively early stage of the transition. The gains from the dividend are dependent on the level of human capital, and the fact that Africa's average years of schooling of 5.4 years in 2010 is still below that of Europe and North America in 1960. For Africa, countries at lower levels of education have had a decline in growth following the increase in their working age population. However, countries that have invested in education, have been able to reverse this effect and benefit from a positive dividend (Drummond et al 2014).

This brings us right to the focus of this paper. An important digression in this regard is the link between the dividend and human capital in East Asia. The East Asian success story of economic development based on investing in its human capital has influenced the African narrative on the link between education and development. The effect of education has been amplified through the dividend. Between 1960 and 1990, the gap between labour force growth and population growth was so large that the region's labour force increased by 25% more than the population, accelerating per capita income growth by about 0.8% per
year. This occurred as labour force growth decreased much more slowly than population growth because of favourable changes in age structure and because of increased female labour force participation (Mason 2003).

The greater role of women was predicated on later marriage and/or child bearing responsibilities but also human capital concerns (see Bauer 2001; Okunishi 2001). The seamless interactions between changes in the population and investment in education led to a positive spillover on development. Within a period of two to three decades, the total fertility rate of East Asia dropped from six births per woman to two births per woman or less with coercion policies just part of the overall population policies. In addition, as a consequence of the region's rapid social and economic development fertility dropped. During East Asia's unusually rapid demographic transition, countries were experiencing population changes in terms of age structure, working age tied to the economic role of women that positively effected investing in the health and education (Mason 2003) .

The positive developmental impact in East Asia and the focus on human capital has been long lasting with East Asian countries figuring at the top of international exam centers attesting to the quality of education produced.

Section II: Data and methodology

The research presented in this paper is mainly based on secondary data from UNESCO, UN Population Division and World Development Indicators. Our analysis focused on the relationship between population dynamics and education quality and its drivers. We looked at the trends in Africa's population dynamics focusing on population growth and the age structure. We also presented the trends in fertility and mortality; these being the main determinants of population growth and influencing the age structure. We went further to analyze trends in education quality by looking at learning achievements and teacher-student ratios.

This paper's contribution to the quality of education policy debate in Africa is based on analyzing the changes in primary school age group population over a two year groupings 2005-2010 and 2010-2015. These aggregate were chosen for two specific reasons. Firstly, since the year 2000 the African countries have focused on primary education in alignment with the Millennium Development Goals. In 2005, at the global mid-term review low-income countries were requested to place the MDGs within their national development plans. This indeed, has accelerated progress in many African countries particularly on education (ECA 2014). There are limits to this data in that the assumption is official age groups are used. One of the discerning characteristics of African primary school enrolment but also completion is that late age entry is very common and indeed is one of the drivers of low completion (ECA 2013). However data of official age group and its change over time still indicates direction and demographic movements sufficiently.

On the expenditure side this paper has utilized the change in unit expenditure for primary education over the same period. The unit expenditure obtained from UIS and WDI was computed as an average over the years of reference. This allowed any time lapse factor in changes in unit cost decided by

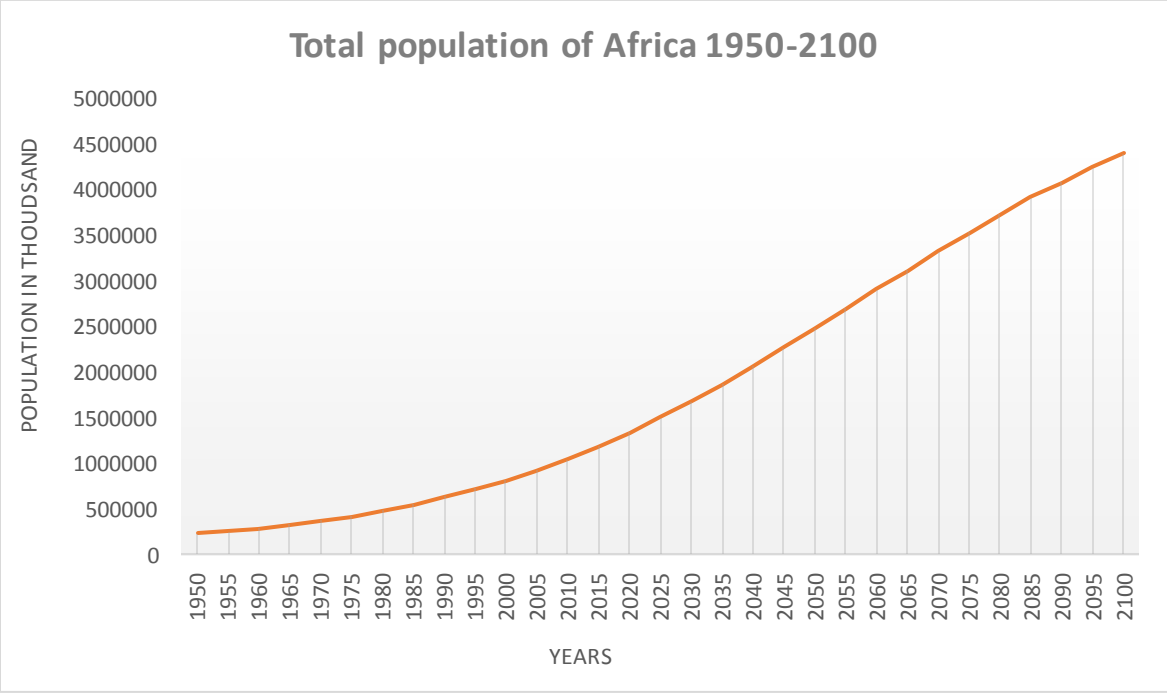
national authorities. This also provided the data for all African countries that could be used for country specific policies that are currently outside the scope of this paper.

Section III: Data and results

Demographic Trends

Africa's population has steadily increased since the 1950's (see Figure 1). The population has grown from 632 million in 1990 to 1.2 billion in 20153. The continent is currently home to 16 percent of the world's population of 7.3 billion people; making it the second most populated region globally -after Asia. Africa's population is projected to increase to 2.4 billion in 2050. The UN World Population Prospects, the 2015 Revision indicate that Africa is the fastest-growing continent, growing at 2.55 percent annually for the period 2010 to 2015.

Figure 1: African population trends



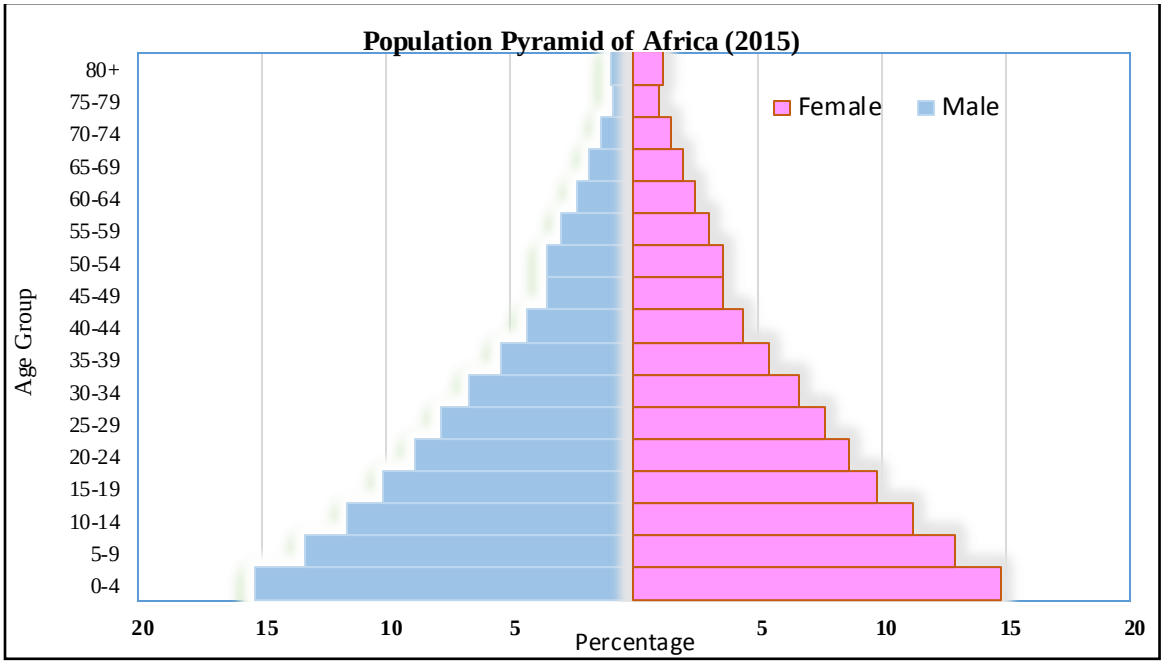
Source: Based on UN DESA, 2015

[3] Statistics presented in this section are from the UN World Population Prospects, The 2015 Revision, unless otherwise attributed

The region is projected to add 1.3 billion people of the 2.4 billion that will be added globally between 2015 and 2050. This trend will continue after 2050 resulting into the region contributing 25 percent in 2050 and 39 percent in 2100 of the global population from the current 16 percent. Out of the 9 countries that are contributing the most to the increase in global population, 5 are in Africa namely Nigeria, Democratic Republic of Congo, Ethiopia, United Republic of Tanzania and Uganda.

In terms of age structure, Africa is said to be the youngest continent. The top ten countries with the youngest populations in the world in 2015 are all in Africa and they include Niger, Uganda, Chad, Angola, Mali, Somalia, Gambia, Zambia, Democratic Republic of Congo and Burkina Faso. The 2030 and 2050 projections show that this trend will continue. Forty-one percent of the region's population is under 15 years old and a further 19 percent is between 15 and 24 years old. The young age structure nature of Africa's population is evidenced in the population pyramid of 2015 below that has a broad base (ECA, 2015). This age structure pose as both a challenge in terms of ensuring provision of education, health care and other services and an opportunity if proper investments are made to lead to a window of opportunity for a demographic dividend.

Figure 2: Population pyramid Africa (2015)



Source: ECA based on UN DESA, 2015

Total fertility rate has declined in all regions of the world including Africa. Fertility is the highest in Africa between the periods 2010-2015, estimated at 4.7 children per woman; a decline from 4.9 in 2005-2010. The top ten countries with the highest fertility in 2010-2015 were in Africa except one, Timo Lest. Niger has the highest total fertility rate at 7.63 children per woman. The other 8 countries are Somalia, Mali, Chad, Angola, Democratic Republic of Congo, Burundi, Uganda and Gambia listed in descending order. Although fertility will decline in these countries in the period 2025-2030 and 2045-2050, the same trend is projected and will see the top ten countries with the highest fertility being in Africa. The pace of fertility decline vary within the continent though. While, there is still high fertility that is declining at a very slow pace in some countries, Mauritius, Reunion, Libya, and Cabo Verde are projected to attain below replacement level fertility by 2025-2030.

The high fertility situation is exacerbated by adolescents' fertility (15-19 years of age) that are particularly high and therefore contribute to the overall high fertility and population growth (UN 2013). Indeed, adolescent fertility is declining at a slower pace than total fertility. Africa's adolescent fertility is estimated at 98.5 births per 1000 women in 2010-2015. This is against the global average of 46.2 in the same period. Africa's adolescent fertility is the highest in the world followed by Latin America and the Caribbean. Early childbearing has a series of consequences on opportunities and choices of the mother and likelihood for intergenerational transfers of poverty. Young mothers might end schooling for childbearing and threaten economic earnings besides transmitting to their children deficient education and a vicious cycle of poverty (Almeida and Aquino 2009). The lifelong opportunity cost of adolescent pregnancy can be as high as 30 percent of GDP.

In the period 2000-2005 and 2010-2015, the world has seen increases in life expectancy at birth from 67 years to 70 years (and 65 years to 69 years and 68 years to 73 years for men and women). An even better

trend is seen in Africa where there has been a significant gain in life expectancy at birth of 6 years from 53.3 years in 2000-2005 to 59.6 years in 2010-2015. Needless to say, this trend was not without variations within the continent with some countries such as Ethiopia and Mali seeing more gains in life expectancy at birth compared to others in recent years. In 2015 it is estimated that all the top ten countries with the lowest life expectancy at birth are in Africa, Swaziland and Lesotho having the lowest at 49.2 and 49.5 years respectively. The HIV/AIDS pandemic has taken a toll on the two countries in the

1990's and 2000's. Swaziland has the highest HIV prevalence in the world and Lesotho has the third highest prevalence.

Africa has made significant progress in reducing under five mortality. The UN estimates that between 2000-2005 and 2010-2015, 42 out of 57 countries reduced under five mortality by 20 percent or more. The absolute numbers of children aged below 15 is increasing and estimated at 486 million in 2015. Conversely, their proportion is declining as a result of declining fertility. "The declining trend is expected to continue into the future: although the absolute number of children aged 0-14 will continue to increase, reaching 585 million in 2025 and 885 million in 2050, when they will make up only 39%t and 28% of the overall African population, respectively" (ECA, 2015). The continent will see an increased proportion of young people in the coming years before it starts to decline by 2065. Although Africa's fertility is declining which in the long run will result into declining population, the effects are estimated over the long term because the large numbers of children will turn into adults of reproductive age who will in turn have their own children (Herrmann, 2015). The UN anticipate that the African population will still be young for some time before it starts to age and supplying the young people with the right skills is a necessity for positive spill overs to development.

Education and its quality in Africa

In Africa the political momentum harnessed in achieving the Millennium Development Goals (MDGs) targets and indicators have made significant contributions to the social and economic development of countries. Indeed, the goals have had unprecedented success in galvanizing international support, not only from governments and inter-governmental bodies, but also from civil society, the private sector, charities, foundations, the media and academia about focusing on a common set of goals that seek to enhance human capabilities (Vandemoortele, 2009; Moss, 2010; UN, 2011). In addition, the MDGs focused the international community on measurable outcomes, creating a shift in practice to tracking progress on intended targets rather than merely calculating inputs (Moss, 2010).

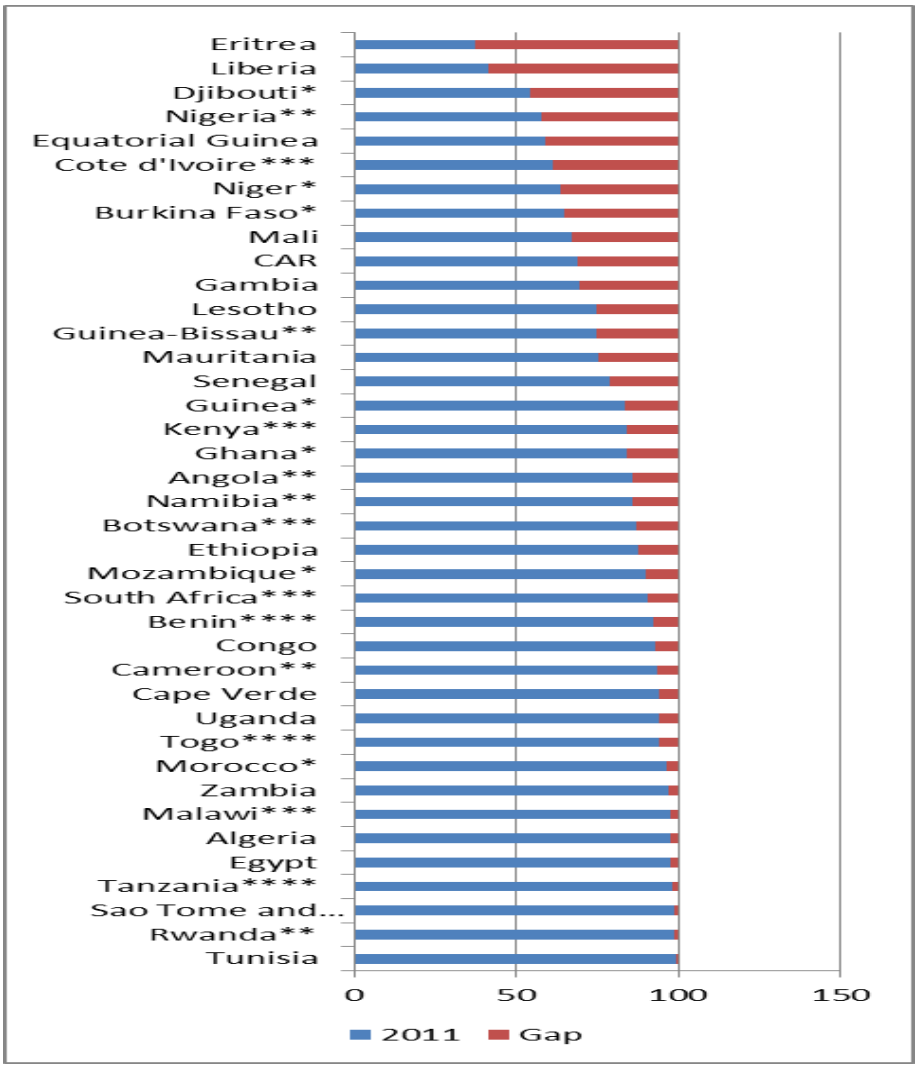
The focus on the education goal 2 originally intended as global aspirations became actual targets for countries. Therefore the limited scope on quality and inequality on education was not given adequate policy focus. The MDGs and its education goals, set the initial global data point of 1990 for monitoring progress until 2015 and the educational emphasis on Universal primary Education became the policy

focus for low-income countries. Consequently, enrolment and completion of primary school cycles became the target. The noteworthy increase in students enrolled in primary school in Africa, excluding North Africa, was a clear reflection of this policy attention.

The galvanizing effect of the MDGs and the policy focus on primary school cycles did have an effect of side-lining more comprehensive educational programmes. Thus frameworks such as the Education For all of 2000 in Dakar and the African Union First and Second Decade of Education were not implemented with the same vigour. The primary cycle emphasis and the outcomes expected of numeracy and literacy is predicated on a necessary first step in educational attainment.

In Africa, particularly south of the Sahara, the progress towards Universal primary enrolment was noteworthy. In increasing on average the net enrolment rate to primary education by 24 per cent over two decades (1990–2011), and an accelerated rate 18 per cent between 2000 and 2012. Twenty-five of the 39 African countries (i.e. 64 percent) with data have achieved net enrolment ratios of 80 per cent or above and are on track to achieve the MDG targets. This This significant performance did not assist all African countries in achieving Universal enrolment (See Figure 3)

Figure 3: Gap to universal enrolment in African countries 2011



Source: ECA 2014

This increase was brought about through public investment to increase participation while implementing retention-oriented actions (school feeding programmes, cash transfers, etc.) for girls and disadvantaged children and other supply side factors such as school infrastructure.

The increase in enrolment was done during a large increase in student intake over the more recent period. Compared to 2000, there were 35 per cent more school children to accommodate in 2012. The number of children enrolled increased from 62 million in 1990 to 149 million in 2012 (ECA 2015).

Completion rates and quality

Completion rates have remained at approximately 67 percent of those enrolled at primary schooling. Completion rates have often been used as a proxy for quality provided (See UNESCO 2013). The low completion rates and therefore the acquisition of the basic skills of numeracy and literacy for the axiom of skills generated being put to use in labour markets. Furthermore, completion rates remain skewed towards Completion rates also portray similar inequities as access across income , gender and location. Thus low and inequitable completion reinforces exclusion of the poorest rural households with a negative bias towards gender. Consequently, their inadequate representation in learning achievements and transitions to secondary level skills (See Table 1).

Table 1: Access and completion rates according to social characteristics of individuals, probabilistic estimation, 35 countries, 2006-2011

	Total[4]	Gender		Location		Quintile of wealth		Gender x Location			
		Girls	Boys	Rural	Urban	Q123	Q45	RG	RB	UG	UB
Access	81.6%	80.0%	83.1%	77.5%	91.2%	76.2%	90.4%	75.4%	79.4%	90.0%	92.4%
Completion	54.8%	52.5%	57.1%	44.6%	71.5%	41.7%	70.9%	41.4%	47.3%	69.0%	74.2%
		Gender x Location x Wealth							Disparities		
	RGQ123	RGQ45	RBQ123	RBQ45	UGQ123	UGQ45	UBQ123	UBQ45	B/G	U/R	Q45/Q123
Access	73.1%	83.8%	77.3%	87.9%	80.5%	92.1%	83.9%	94.4%	1.04	1.18	1.19
Completion	36.2%	57.2%	42.4%	63.0%	48.8%	73.4%	52.1%	78.9%	1.09	1.60	1.70

Source: Ndem 2011 in ECA 2013
Estimates based on EDS surveys
RG= Rural Girls, RB= Rural Boys, UG = Urban Girls, UB = Urban Boys, Q123=Quintiles 1, 2 and 3, Q45 = Quintiles 4 and 5, etc.

The quantity produced permeated by inequities is insufficient to form a critical mass of workers with productivity potential. Many workers in developing countries are confined to the informal economy because of limited educational opportunities and rudimentary work skills setting off a vicious circle of a workforce of "low skill, low productivity, low wage, low investment" (Pina 2012

[4] Estimates based on household surveys differ from those derived from administrative data. A primary reason is that the estimates derived from household surveys are probabilistic and generational, while school administrative data comprise combinations of generation. Furthermore, whereas elements for calculating indicators for household surveys stem from the same source, indicators from administrative data aggregate data from independent sources.

An often used quality gauge is the teacher: student with the understanding that 20-25 students per classroom should be the benchmark (UNESCO 2014). The observations emerging do indicate inadequate quality (See Table 2). In 2011 (latest data) the pupil/teacher ratio was above 40:1 in 26 countries and 23 of those countries were in Africa, excluding North Africa (see Table 5). In addition, there has been some regression in this ratio in some African countries due a significant increase in enrolled children particularly at primary level. For example in Malawi it increased by 20 percent since 1999 and reached 76:1 in 2011. This has in some African countries been offset by the enrolment of teachers that have not been through formal training. Indeed, the teacher/pupil ratio increases by 10 students if trained teachers had to be taken into consideration.

Table 2: Pupil/teacher ratios in developing regions

	Pupil/teacher ratio primary
Low Income	24
Africa, excluding North Africa	43
East Asia	24
South Asia and Pacific	36

Source: Computations on UIS data

This supply side challenges are partly caused by the increase in the proportion of children attending school. While the increase in the number of children attending school is a reflection of positive national policies and household demand for education. The supply constraints of African governments in catching up with the increased intake results in lower quality of educational outputs but also outcomes.

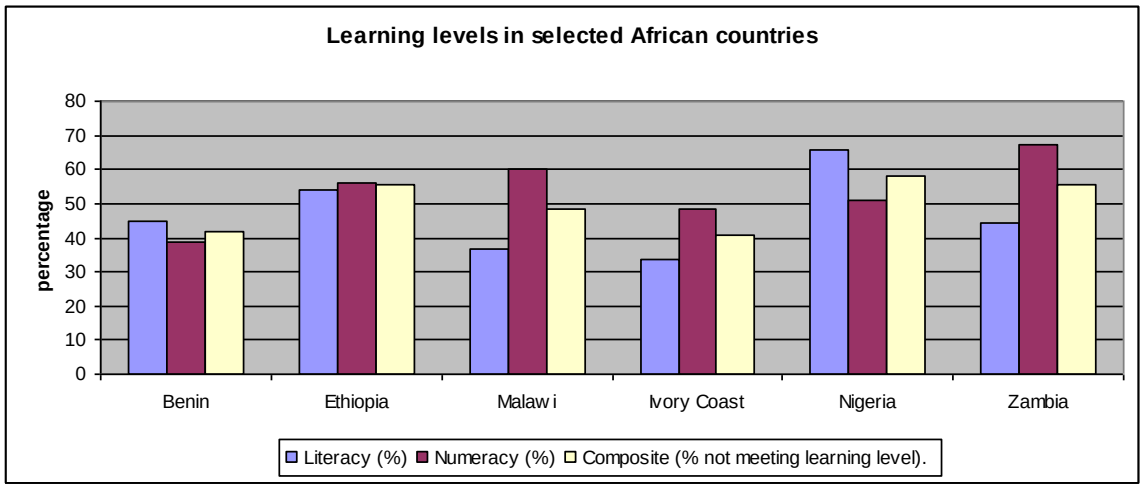
Learning outcomes

The educational low quality outputs are exacerbated by the learning outcomes. The outcomes even for those completing primary school cycles in terms of effective literacy and numeracy is low. In a survey[5] done using national and regional assessments the results reveal a low standard of

[5] Learning Barometer conducted a survey covering 28 African countries and 78 percent of primary school age children. Ethiopia and Nigeria are national assessments SAQMEC III (regional assessment) was used for Malawi and Zambia while PASEC (regional assessment) was used for Benin and Ivory Coast

learning achievement (See Figure 4). The scores are particularly low and demonstrate insufficient quality of educational output, but more importantly the skill barrier in joining the labour market or transiting to secondary education (Watkins 2013).

Figure 4: Learning achievements in selected African countries



Source: www.brookings.edu 2013

Turning full circle: demographic dividend and its decomposition

There is no doubt about the importance of investing in human capital to build a skilled and well prepared labor force for development. Education might not be the answer to all of Africa's problems but its transformative role can never be overemphasized. Having an educated and skilled population is an absolute prerequisite for sustainable development. The success stories of countries such as Japan, South Korea, China, Finland and Mauritius among others attest to the huge role that education and investments in human capital had on these economies (Lutz, 2015).

The 2000 World Education Forum formed a very important milestone as countries agreed on a Framework that had goals for education for all. The Millennium Development Goals also put education as one of the priorities of the development agenda through goal number 2 of universal primary education. Previously, the International Conference on Population and Development (ICPD) in 1994 had acknowledged the importance of paying greater attention to education for its role in population and development (UNESCO, 1999). This momentum continue to date both globally and at the Africa region level. The Sustainable Development Goal number 4 of the newly adopted 2030 Agenda for Sustainable Development is states "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (UN, 2015).

At the regional level, the African Union (AU) recognize education as a means to "develop human resources, impart appropriate skills, knowledge and attitudes. Education forms the basis for developing innovation, science and technology in order to harness our resources, industrialise, and participate in the global knowledge economy and for Africa to take its rightful place in the global community" hence the first (1997-2006) and the second (2006-2015) decades of education (AU, 2006-2015 Second Decade of Education Plan of Action). Additionally, a good number of AU's commitments and instruments put education as one of the top priorities of the continent's development agenda. For example the African Youth Charter and its Decade Plan of Action emphasize quality education as a human right and call its member states to among other things provide free and compulsory primary education (AU, 2006 AU Youth Charter).

Evidence has shown that countries with high levels of development have low fertility and mortality levels and conversely countries with lower levels of development have high fertility and mortality levels (Herrmann, 2015). Education, especially for girls and women has a lot to do with this linkage hence the current emphasis on girls' education. Both trends and empirical evidence have shown the impact of girls and women education on fertility, mortality, child and maternal health. There is almost always the tendency of fertility to decline as levels of education go up. The more girls are retained in school, the less children they will have and the later they will have them. Furthermore, research has consistently shown that the more years women spend in school, the less number of desired children. Women with more years of education tend to have more access to information and family planning services. Evidence from several studies confirm this.

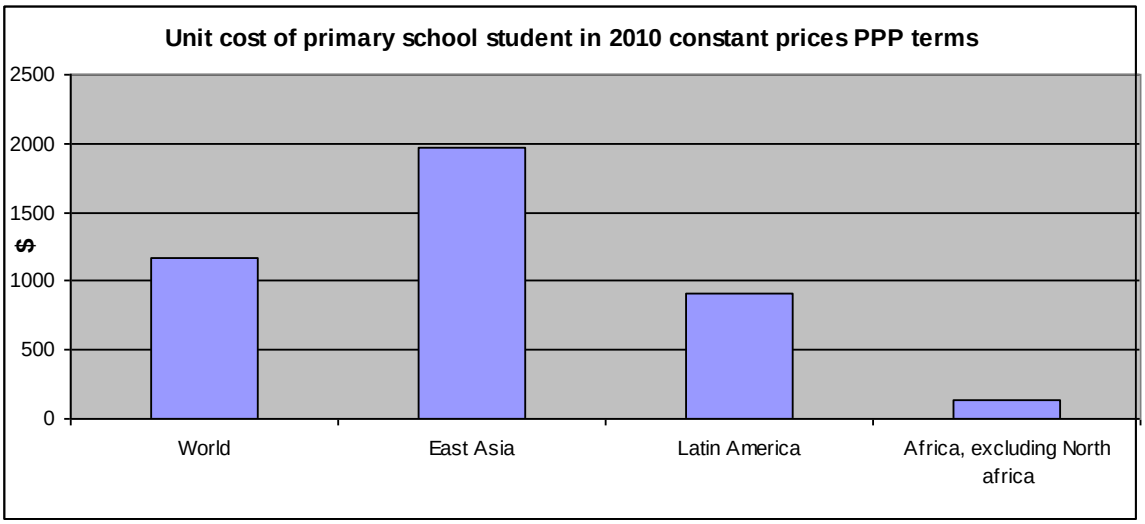
Findings from Mali showed a difference in terms of average number of children per woman of women with secondary education versus that of no education to be 4 (Population Reference Bureau, 2011; UNESCO, 2010). The extent of the impact of education on fertility varies in different countries but the same trend has been seen in all regions of the world including in countries such as Botswana, Uganda, Morocco, Senegal, Thailand, Indonesia, Brazil and Guatemala among others. For example, while fertility rate for women with no education was 7.3, it was 6.3 for women with four to six years of education and was 3.3 for women with ten or more years of education in Zimbabwe. Similarly, in Thailand for women with no education, fertility rate was 3.5 while for women with four to six years education it was 2.5 and 1.5 for women with ten or more years of education (UNESCO, 1999).

Education of the mother has been observed to have a positive effect on the health of infants and children in terms of chances of survival and nutritional status. Additionally, girls' and women's access to education has been linked to improved maternal health. The impact of education on fertility, child and maternal health is associated with the power of education to give people including women opportunities to participate in the labor force and to increase their incomes. UNESCO (2010) estimate that each additional year of schooling increases an individual's earnings by 10 percent. This might provide more access to better nutrition and health care. Education also provides knowledge that might influence people to seek health care where necessary. A study done in Uganda by Keats (2014) revealed that women that had more years of schooling had lower fertility, their first birth was delayed and they invested more in their children in terms of immunizations and nutrition.

While education has all the above positive effects on population, it is impacted by demographic changes. Hermann (2015) rightly observe that the size of a population matters to development. He argues that population growth affects countries opportunities for improving per capita incomes and provision of education, health and infrastructure. The growth of primary school going age group has put pressure on education systems and in turn affected the quality of education.

The slow demographic transition in Africa and the relatively high fertility rates are partly causing the primary schooling system to keep up with intake rather than catching up with quality and ensuring the positive education growth link. A glance at unit cost of primary education provides evidence to this effect (See Figure 5).

Figure 5: Unit cost of primary school student in 2010 PPP terms

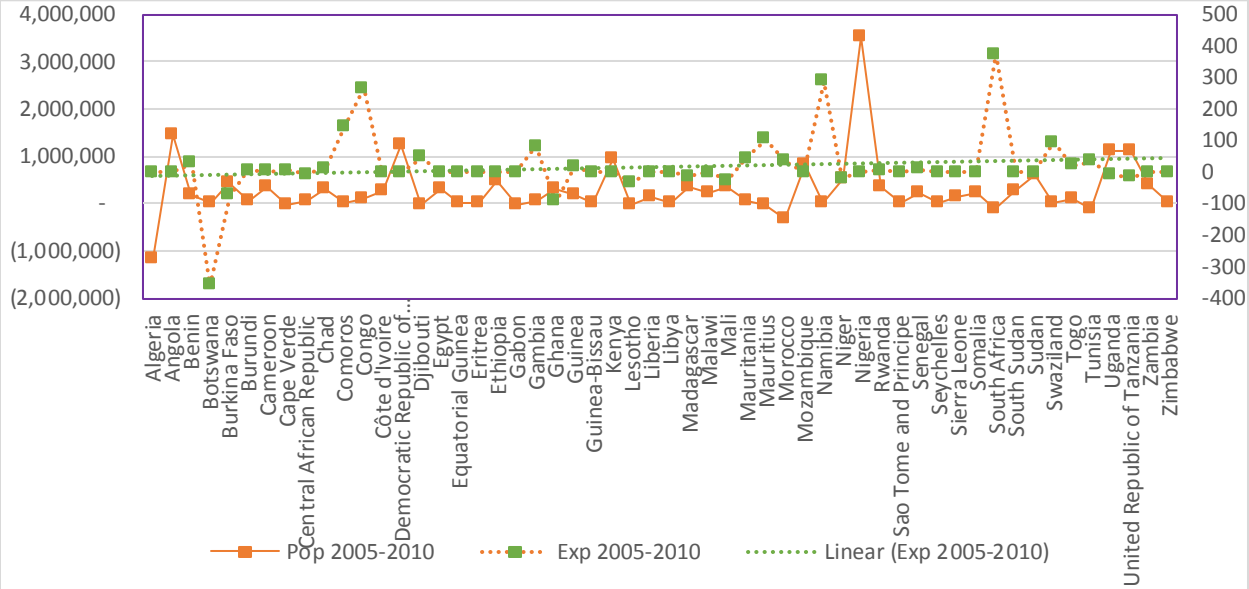


Source; UNESCO 2014

Unit cost of public expenditure for primary schools in Africa is $131, one tenth of world average and significantly lower than the East Asia average of $1974. This takes on more resonance as there is a clear decrease in recent years of aid to education caused by donor financial difficulties. Indeed, aid to basic education fell by 6% between 2010 and 2011, its first decrease since 2002. Secondly, the shift in emphasis on quality education in the new Agenda 2030 and Africa 2063 and their extension to universal secondary schooling makes adequate resources allocation to education an imperative. Thirdly, the shift towards domestic resource mobilization of these development agendas reinforces matching population growth and in particular student intake with resources.

The relationship between population change and change in expenditure per unit at primary school attest to this and provides some interesting points (See Figure 4). The unit cost right hand axis shows a low allocation practically across all countries and this seems to be unrelated to changes in population on the left hand side axis. In 2005-2010 the trend of unit cost is somewhat flat showing very little change over time and possibly keeping up with increased intake without devoting major resources to quality. The correlation between population and expenditure lies at 3 percent and shows how notwithstanding the large increase in student intake population counts little in determining allocation.

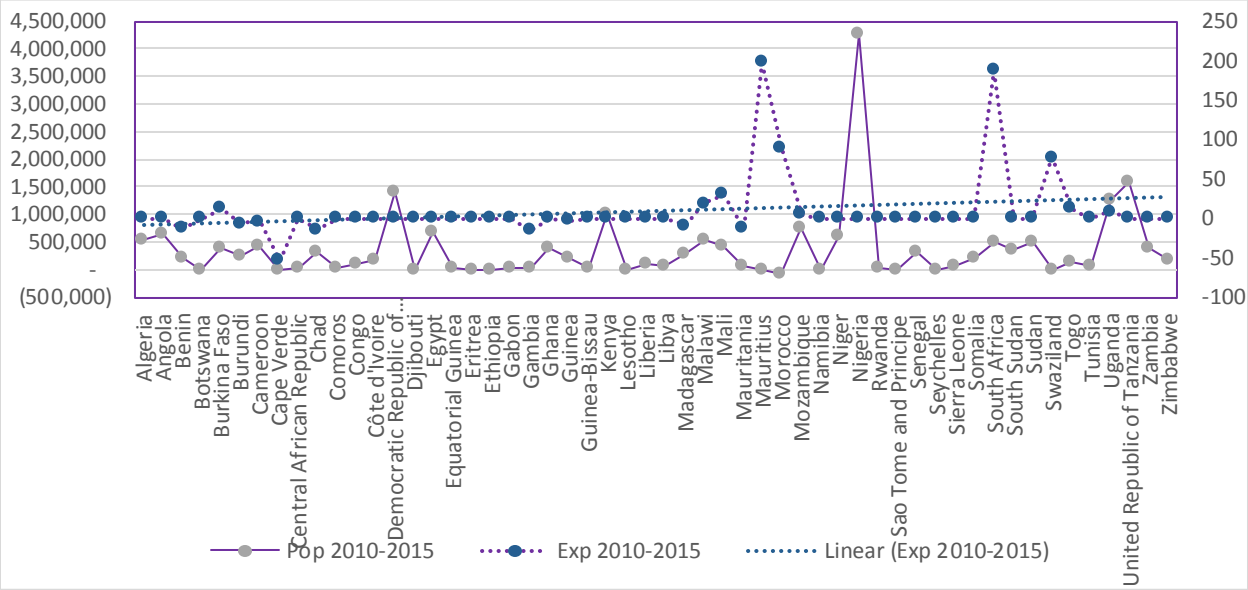
Figure: 4: Change in Primary School Student Population and Government Expenditure per Primary Education 2005-2010



Source: Authors computations on UIS data

Figure 5 provides the same graph over a more recent period and the status has remained rather static. Population change contributes 6 percent of change in unit expenditure. In both cases there are a number of variables which drive unit cost but population and educational quality remains relevant.

Table 3. Change in Primary School Student Population and Government Expenditure per Primary Education 2010-2015



Source: UIS data

The "dividend" in the concept demographic dividend in Africa means that given the proportion of working age groups in population growing over time results in productivity gains and increases in savings rate. This is predicated on the acquisition of appropriate skills by the working age group. The quality of primary education on the continent is not adequate for harnessing this dividend.

Importantly, the slow demographic transition with current high fertility rates and the envisaged end of the transition in 2090 provides another important link to quality education. Student intake will remain high for some time to come. The inadequacy of quality of education partly driven by population increase not met by adequate resources also constrains the demographic dividend on the continent.

Section IV: Policy considerations

The demographic dynamics currently in force on the continent imply an educational policy that is trying to catch up with supply factors. The shift towards keeping up with the imperative of quality education at primary level requires taking population dynamics into account in planning literacy and numeracy skills for all and the alignment of other interrelated policies.

The new global development agenda and its regional vision indicate quality education, extension to universal secondary schooling sand domestic resources. The population dynamics indicate that the alignment of intake quantity to allocation must aim at quality of outcome. This signifies raising the unit cost to international standards becomes an important part of this agenda. The increase in educational spending must also be matched by quality aspects.

A second important policy consideration is reducing fertility through education and other legislative measures. Early child marriage needs to be stemmed and reproductive rights enforced. The drop in fertility through keeping girls in school is a policy option of some interest. Adolescent (15-19years) represent 18 percent of the 15-30 age group births registered. As has been observed the education of girls has an effect on decreases in fertility, but an added effect is the over a medium term decreased intake at primary level and improved quality. Economic and other incentives to keep girls in school should be introduced.

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