



Demographic Dividends in Sudan: Opportunities and Challenges

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ABSTRACT

This paper seeks to investigate the demographic dividends in Sudan by focusing on its opportunities and challenges. The concept of the demographic dividends has joined the domain of development after an examination of the East Asian "economic miracle", which occurred in the years the 1960s to 1990s. The overall objective of this paper is to probe potential socio-economic benefits generated by such chance and to see how Sudan is going to reap from the currently increasing working age population. The paper is depended mainly on a series of sources, including official censuses, international and national reports, and socio-economic surveys conducted in Sudan and abroad. The paper has come out with that, Sudan is lagging behind in getting maximum benefit out of the demographic windows and that even the decision makers are not aware of the demographic dividend. Lack of clear policy towards the youth, high rate of unemployment, massive informal migration, brain drain and lack of investment in human capital (development) are some

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barriers that shaped the situation of the population in Sudan. To benefit out of the opportunities of the demographic dividend, the paper suggested that Sudan should formulate proactive policies to control fertility, ensure high quality of education and vocational training. This paper also aims to enhance the knowledge of demographic dividend and open doors for further studies.

Keywords: Demography; age structure; demographic dividend; population and Sudan.

1. INTRODUCTION

Since the era of Malthus, population issues worldwide have become a major concern for planners, researchers, and politicians as well as policymakers. For the last 50 years, world population has increased dramatically and multiplied more rapidly exceeding the expectations. In 1950, the world had 2.5 billion people, then jumped to 6.5 billion people in 2005 and expected to be more than 9 billion in 2050 [1]. Moreover, in 2100, our planet is expected to be home to 11.2 billion people, that is a more than 50% increase of today's 7.3 billion [2 and 3]. Much attention has been paid to the relation between population and development [4]. Three scenarios used to dominate the relationship: Population growth either (1) restricts [what they call the *pessimistic* theory], (2) promotes [the *optimistic* theory], or (3) is independent of economic growth [the *neutralist* theory] [5]. This implies that increase in population will either speed up or hinder the development. For a researcher like Bongaarts [3], decline in fertility is the key success for the economic growth. As he stated that, many countries would be better off with lower population growth and birth rates.

Most of the previous studies on population concentrated only on the relationship between the size of population and development with minor or less attention being paid to the characteristics of people. In recent years, however, the debate has given much attention to a critical issue, namely the *age structure* [5]. Age structure (classification of people based on age group) is now shaping the debate between population and development [6]. This shift is due among others, to the economic success that has taken place in some Asian countries in the last five decades. Several authors like Bloom and Williamson [7]; Bloom and Canning [8]; Bloome et al [9]; Radelet et al [10]; Mason [11]; Pool and Wong [5] confirmed that age structure has significant effects on the economic performance of the Asian countries. They stated that demographic transition accounts for a sizeable portion (about one-third) of the

economic growth experienced by East Asia's economic tigers during the period 1965 to 1995. The relation between the economic success and the slowdown of fertility has given the concept of Demographic Dividend (DD). As written by Bongaarts [3] the boost to economic growth that follows a decline in fertility is referred to as the 'demographic dividend. This concept has entered the arena of development after an examination of the East Asian "economic miracle", which occurred in the years 1960s to the 1990s [12].

The concept of demographic dividend has become one of the most scrutinized issues in the field of development studies and economic growth [13,14,15,16,17 and 18]. Simply, demographic dividend happens when the working age population group is exceeding the dependent groups namely children and old people. Owing to that, the country will attend several socio-economic gains. Demographic Dividend will accelerate economic growth and generates financial gains [14], increase labor force, a decline in the dependency ratio, helps to maintain a high savings rate and led heavy investment to be the main source of GDP growth [19]. The Demographic Dividends should not be taken for granted and it will not continue forever as it lasts at least for forty years.

It is important to note that African countries including Sudan will maximize the benefit of DD if well managed. Owing to the fact that most of the developed nations and even China are passing through such stage and their population has become an ageing population. According to Baxter et al. [20], in high income countries, the population age 65+ will escalate while the proportion of working age will diminish, leading to slower growth in national incomes. Also they mentioned that China's working age population began to shrink in 2016, and will drop by 14% from 2015-2040. In the same line, Fang and Yang [21] declare that china working age population (aged 15 to 59 years) stopped growing in 2010. In some low-income countries, by contrast, the population shares in the working ages will rise, generating a

demographic dividend and raising per capita income and consumption. Therefore, Africa is in the right time to fill in the gap of missing jobs in both developed countries and china. Not only that, Africa can reap a tremendous demographic dividend and replace the labor-intensive manufacturing of East Asia due to rising wage rates in East Asia [22]. Despite very few success stories, Africa is still lagging behind to catch the opportunities of the demographic dividend. This is due to lag of awareness, the absence of rational policies, increase of illiteracy, poor infrastructure, massive informal migration and corruption. This led some authors to emphasize the fact that some African countries might witness a youth revolution, unless a meaningful and decent employment has been secured to them [23].

Sudan is one of the African countries that has witnessed slightly decline in fertility and child mortality in the last few decades. According to United Nations, Department of Economic and Social Affairs [2], the total fertility in Sudan has declined from 6.92 in 1980 to 3.9 in 2008, and expected to reach 3.57 in 2025. This decline in fertility has led to the reduction of the proportion of the population under 15 years as it reached 38.68%, compared to more than 40%. This figure implies that Sudan is at the threshold of entering the demographic dividend. This paper tries to scan the challenges and opportunities generated by demographic dividend in Sudan. The overall objective is to probe the socio-economic opportunities generated by such chance and to measure to what extent the country can achieve the demographic dividend. It seeks to answer the questions that; what is needed by the country to get the advantage of the demographic dividends and what challenges should be cleared to pave the way for its take off. The paper has depended mainly on multiple sources of information like for instance; official censuses, international reports and socio-economic surveys. To enhance the analysis the papers used experiences of relevant countries like Ethiopia.

1.1 Sudan: Economic and Demographic Context

Sudan is located in Northeastern Africa, between latitudes 8° - 22° north and longitudes 22° - 38° east, with an area of 1,882,000 square kilometers, sharing borders with seven countries, namely Egypt, Libya, Chad, Central Africa Republic, Ethiopia, Eritrea and Republic

of South Sudan. According to the 5th population census 2008, the total population was 30,894,000 and reached 41 million in 2016. The annual growth rate of Sudan is 2.4. Owing to massive migration and regional disparities, almost one-third of the population is living in Khartoum, the capital. Khartoum population was 5.3 million, in the census of 2008 and estimated to be 8 million by the end of 2018 [24].

Agriculture (farming, livestock and fishing) still remaining the major economic sectors in the country as it employs over 80% of Sudanese and making up a third of economic sector [25]. In the last quarter of 1999, Sudan began exporting crude oil, which has become the main source of revenues until the separation of the South in 2011. Due to the separation, Sudan lost 75 percent of oil production, 36 percent of budget revenues, more than 65 percent of foreign exchange revenues and 80 percent of total exports. Accordingly, the percent of GDP growth rate was 2.5 in 2010 decreases to 1.4 in 2012 and reached 4.4 in 2016 [26]. The inflation rate was 13 in 2010 jumped to 35.6 in 2012 and declined to 15.6 in 2017 [27].

Recently, gold has become one of the major revenue generators, bringing in more than 90% of foreign earnings. According to African Development Bank et al. [27], exports became the main source of foreign exchange for the official sector, accounting for 31.2% of exports in 2016 and are projected to remain the same in 2017, the bulk being produced by the informal mining sector. Despite that, almost half of Sudanese lives below the national poverty with 75% of the poor living in rural areas. Besides poverty, Sudan is facing several challenges that hinder its development. These include high debt, protracted conflicts and displacements, large influxes of refugees from the neighbouring countries, depletion of natural resources, recurrent natural disasters, and a dramatic economic downturn. Sudan ranked at the bottom end of the latest UN development index (165) out of 188 countries in 2015 (United Nations Development Programme, 2016) compared to 150 out of 182 countries in 2009 and 147 out of 177 countries in 2008.

2. METHODOLOGY

This paper is based mainly on a desk review of a comprehensive literature written on the population issues. It relied heavily on the various demographic and labour force surveys

that have been conducted in Sudan. It also used reports, periodicals, and current statistical data from several official institutions in Sudan, including Central Bureau of Statistics (CBS), National Population Council, Ministry of Finance and Economic Planning, Ministry of Labour and Administrative Reform, Ministry of Human Resources Development, Ministry of Security and social development. Moreover, the discussion has been enhanced by the data collected from United Nation Population Fund, International Labour Organization, and International Monetary Fund reports were used. To enhance the knowledge on demographic dividend the paper used some examples from both developed and less developed countries.

3. THEORETICAL FRAMEWORK

The debate on the relationship between population and economic growth or development is not new as it dated back to the work of Malthus theory. Recently, the debate has become more prominent in the socio-economic field, and its consequences become very concrete [28]. The debate focuses profoundly on the ramification of population change on economic development [4]. It is always between population size and development. Little attention has been paid to a critical variable: the age structure of the population [4]. Age structural transitions (ASTs), or the demographic transition is now dominating the debate of population fields. It begins in many developing countries in the middle of the 20th century [29]. Since then, the concept of "Demographic Dividend" has become widely used in the growth of researcher's vocabulary [16]. The concept is not derived from population size or the growth rate of the population but from a specific feature of the population age structure [7 and 21]. It goes back to the late 1990s to describe the interplay between changes in population structure and fast economic growth in East Asia [30,7 and 22]. According to Mason [17], the demographic dividend was an important contributor to that region's economic success. This also the same result for China. Fang and Yang [21] indicated that the unprecedented economic growth in China over the past 30 years can be attributed largely to the demographic dividend.

"Demographic Dividend" used to describe a window of opportunity that opens up as fertility rates decline and the working age population

increases relative to the dependent population. It can be defined as an economic surplus triggered by an increase in the employed working-age population relative to the dependent population. The demographic dividend is the accelerated economic growth that may result from a rapid decline in a country's fertility and the subsequent change in the population age structure [29]. This "phenomenon" is economic in nature but generated by the demographic transition [13]. Moreover, the dependency ratio declines dramatically as the generational bulge begins to enter the productive labour force [15]. In this line, Bloom et al. [4] argued that it is not the size and growth but the age-composition of the population that is closely associated with economic development. The following diagram summarizes how demographic dividend can be achieved. Fig. 1 explains that decline of both fertility and mortality is part of demographic transition theory. The massive decline will lead to demographic dividend where the working age population is increasing very sharply compared to children and old people. This stage if well addressed and a wise policy has been implemented, will lead to generating a window of opportunity and increased economic growth. The sustainability of DD depends on political commitment at pre DD, within DD and post DD for more details see Fig. 1.

It has been well documented that there is a positive correlation between the increase of working age population and economic growth if the political will is ensured [31, 32 and 8]. According to Bloom et al [8], the key policy variables that combined with reduced fertility and increases in the working age population, have contributed to economic growth in some areas of the developing world. Roy and Kayesh [33] stated that the demographic change in Bangladesh is opening up new economic opportunities. To gain maximum advantage of demographic dividend working age population need to be trained before they turn old and dependent themselves. If a society successfully achieves these, the bonus becomes a dividend. This idea supported by Sippel et al [34] who believed that the key to success is investing in education and the labour market. In the same line, Bloome et al [4] believed that the most important are labor supply, savings, and human capital. The saving has to be invested in childcare, schooling and caring for the elderly [16].

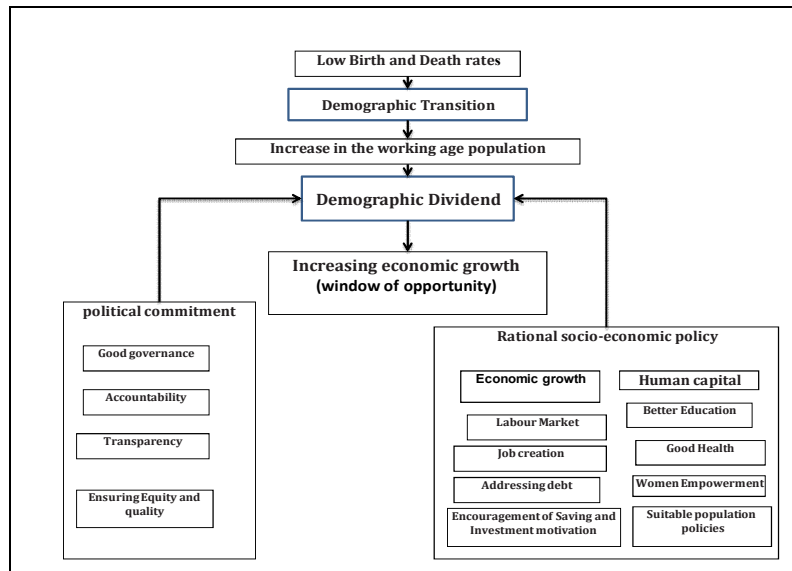


Fig. 1. Achievements of the demographic dividend

Several methods have been adopted to measure the opening time of DD. According to the UN Population Division, the window of opportunity opens when the proportion of children and youth under 15 years (Pop<15) falls below 30% and the proportion of people 65 years and older (Pop65+) is below 15%" [35 and 36]. Guengant [37] mentioned that the demographic window of opportunity is open when the dependency ratio falls below 100, or one dependent per working-age person. He uses the formula of dependency ratio as follows: $(\text{Pop}<20+\text{Pop}65+)/\text{Pop}20-64$. In addition, the use of Total Fertility Rate (TFR) is another measure. Based on TFR measure three stages need to be identified. These are an early dividend, late-dividend and post-dividend [36]. The window of opportunity for the first dividend, opens when the TFR dropped below four births per woman. Based on these measures some authors mentioned that many African countries will not enter the demographic window until 2045 or later". In this regard, Kasprovicz and Rhyne [38] find that the window was open for only four sub-Saharan countries: Cape Verde, Gabon, Mauritius and South Africa. Using both dependency ration which is less than 100 and child per women where is less than four, this paper suggested that Sudan is now passing through the pre-dividend stage. The next section provides details on the nature of the population in Sudan.

According to Mason [17], many countries in developing world are experiencing substantial

changes in their age structure, and have challenged the demographic dividend. UNFPA [39] stated that "mainly but not exclusively in Africa and South Asia, now face a potential demographic dividend. Fertility has started to decline, and they have a proportionately large population of young people on the cusp of working age. The time is right for these governments to make the strategic investments to ensure an empowered population, filled with potential and ready to drive growth across all sectors. The second report "Population and Development in Arab Countries: The Demographic Window is an Opportunity for Development in Arab Counties" issued by ESCWA [40], pointed out that the Arab Region has entered the demographic dividend, but the main challenge is how to take advantage from it. Available literature from Eastern and Southern Africa indicates that many countries have the opportunity to benefit from the demographic dividend through the rational policies. In this context, evidence indicate that different paths were followed by developing countries to take advantage of the demographic dividend. Asian Tigers, for example, are a model of success in this aspect through investing in education and family planning and carrying out necessary economic reforms and initiatives. In addition, these countries recognized that the labour participation by women is absolutely necessary for economic progress and that education is a crucial prerequisite for this goal [34]. In the same line, between 1990-2000, Iran has achieved some

gains due to decline of the total fertility rate (3 children per woman) [22]. Also Ethiopia has achieved significant improvements in its economic performance and made remarkable progress in education, particularly for girls [41]. Starting from the mid-1990s, fertility in Ethiopia has declined from 6.6 children per women in 1990 to 4.1 in 2014 [42]. In contrast, many developing countries failed to benefit from demographic dividend. In North Africa, while the age structure has been developing in positive way, countries have so far not managed to benefit from the demographic bonus due to lack of jobs. This matter is clear in Egypt, which is experiencing dramatic changes in its age structure, of which the Egyptian government opened the door for immigration. In India, although the working age population has increased, it is far behind in realizing the potential of demographic dividend. Here, Bhagat [6] stated that it is obvious that India is far behind in realizing the potential of demographic dividend. As employment expansion hugely lagged behind compared to the increase in the demographic opportunities, the work participation is also one of the lowest, and nearly half of India's workforce is dependent on agriculture, which contributes less than 15 percent of the GDP. South Africa, according to Moultrie [43] has almost completed its demographic transition. Unfortunately, South Africa had been unable to reap the benefits because of the impact of the HIV/AIDS epidemic. In Latin America countries, due to inappropriate planning, the demographic bonus was not used to its full extent, so the countries were somewhat less successful in this respect [34]. This situation is similar to Sub-Saharan Africa, which will need to increase investments, create jobs, and pursue appropriate planning. Generally, one of the main factors behind the failure of developing countries to gain demographic dividend is the socio-economic and political instability, furthermore it is impossible to gain a demographic dividend when there is violence, corruption or mismanagement.

3.1 Population Characteristics in Sudan

3.1.1 Population growth

Officially, five population censuses have been conducted in Sudan [44]. The first census was in 1955, and the total population at that time was 10.3 million, then it reached 14.8 million in the second census in 1973. The third was in

1983 where the total population was 20.6 million, while in the fourth census, it reached 25.9 million in 1993. The fifth was in 2008 the total population reached 39.1 million. The annual growth rate increased from 2.13 in 1973 to 2.57 in 1983, then to 2.88 in 1993 and declined to 2.83 in 2008.

The demographic trends in Sudan reveal that the population grew almost fourfold between 1956 and 2008. The population almost doubled between 1956 and 1983 a period of 27 years, and tripled in a period of 52 years. The figures also demonstrated that the population increased by about 52.5% in the 1973-83 inter-censal periods, by 19% in 1983- 93 and by 21% in 1993-2008. Despite the separation of the south Sudan in 2011, still the population of Sudan is increasing. More recently, the United Nations Population Fund [45] estimated that the total population reached 41.2 million in 2016.

3.2 Sudan Population Age-Sex Structure

According to the census of 2008, the population of Sudan reached 30,894,000, 15,786,677 are males (51.1%) and 15,107,323 are females (49.9%). This means the gender composition of the population in the Sudan are comparatively balanced as a percentage of males exceeds the females by just (1%). Nevertheless, the variation existed between urban and rural areas as female is higher in rural areas (Table 1). Owing to the massive migration to urban areas where males are predominant. According to the 2008 census, the number of internal migrants reached 3,665,007 persons, representing 9.12% of the total population of the Sudan.

Although male births outnumber female, the ratio is changing in the adulthood. Women outnumber men in every cohort of the population age 20 years and over, especially age 25-54, which makes Sudan exceptional in this regard. This is most likely due to the massive in and out migration of Sudanese men.

3.3 The Fertility in Sudan

Total Fertility Rate TFRs (children per women), is one of the major indicators in measuring the demographic transition. Our data have shown that fertility in Sudan is in decline supporting the notion of demographic dividend (Fig. 1). It has declined from seven in the first census to almost 3.9 children in 2008 [44]. More recently, the United Nations, Department of Economic and

Table 1. Trends in Sex ratio in Sudan 1956-2016

Year	Sex ratio (males per 100 females)		
	Total	Urban	Rural
1956	102	116	101
1973	102	113	100
1983	104	112	101
1993	103	91	100
2008	105	NA	NA
2016	102	NA	NA

Sources: Central Intelligence Agency [46]

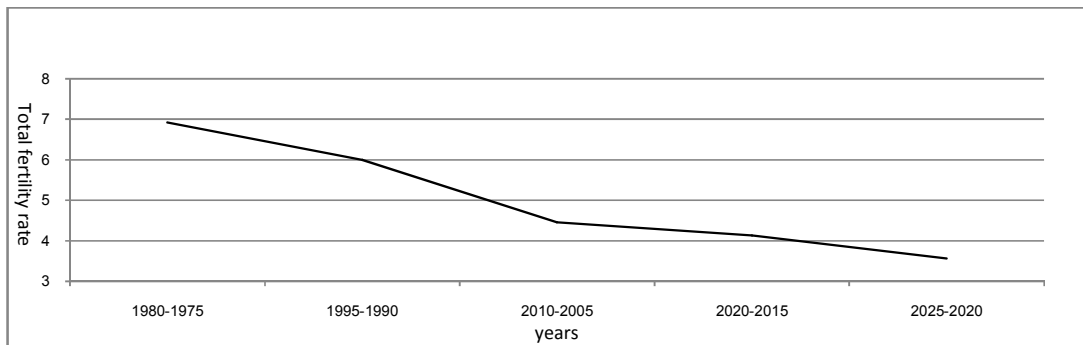


Fig. 2. Trends of total fertility rate in Sudan 1975-2030

Source: United Nations, Department of Economic and Social Affairs [2]

Social Affairs [2] found that the total fertility rate in Sudan has declined from 6.92 in 1980 to 3.9 in 2008, and expected to reach 3.57 in 2025 and 2.9 in 2050 (Fig. 2). Family planning, urbanization, migration, women's education improvement, and the increase of women's participation in labour force are some factors responsible for declining fertility in the country.

The decline in fertility is accompanied by a rapid decline in both birth and death rate. The crude Birth rate has declined from 48 births per thousand population in 1973 to 29.6 in 2008 [44]. Moreover, the crude death rate declined from 26 deaths per thousand population in 1956 to 16.7 in 2008 [44 and 47].

3.4 Age Structure in Sudan

Age structure is the very significant indicator of the demographic dividend. Our data about Sudan has shown that the population below the age of 15 years was 45.2 percent in the 1956 census, while in 1973 was listed as 46.6 percent [48], and it was 42.6 percent in 2008 [44]. Regarding the working age population (15-64), the census of 2008 indicated, that 54.02 percent of the total population was in this group while the percentage of old group has reached

3.3 [49]. It is very important to mention that, age structures percentages were not affected by the separation of South Sudan. According to Sudan Central Bureau of Statistics [44], the population of north Sudan was 30,894,000 in 2008. The age structure represents 42.1 percent for age below 15 years, 54.3 percent for working age 15-64, and 3.6 percent for age 65 and above (Table 2).

3.5 Life Expectancy

Available data have shown that life expectancy in Sudan has improved significantly from an average of 43 years in 1983 to 59.8 years in 2008; however gender and regional disparities exist. Life expectancy is 58.1 for male and 61.4 for female. This figure is almost close to an average of low HDI, which is 59 years. Moreover, life expectancy of an individual in rural communities is two years longer than in urban communities. With regard to the regional disparities, the census of 2008 confirmed that Blue Nile state recorded the lowest average life expectancy in Sudan by 48.8 and 51.3 years for males and females, respectively. The South Kordofan state recorded average life expectancy reaching 54.6 and 58.7 years for males and females respectively. Northern State

recoded average life expectancy at birth, reaching 60.6 and 65.4 years for males and females respectively. North Darfur State recoded average life expectancy at birth, reaching 61.2 and 64.8 years for males and females respectively. Khartoum State recorded average life expectancy at birth, reaching 58.8 and 62.9 years for males and females respectively. These variations reflect the in balance of provision of socio-economic services like health, water and infrastructure. In Sudan the differences between the center and margins is quite clear. Compared to other developing countries, United Nations, Department of Economic and Social Affairs [2] found that life expectancy in Zimbabwe and Tanzania is 60 and 62 years, respectively, with an average of 57 in sub-Sahara the figure varies in some East Asian countries like Malaysia 75; Thailand 74; and South Korea⁸¹ with an average of 74 years.

3.6 Dependency Ratio and Median Age

With regard to the dependency ratios (U15 + 65 Plus/15–64), our data has shown that this figure is decreasing. It was 92.73 in 1960 declined to 82.47 in 2010 [13] and it reached 81.3 % in 2018 (<http://countrymeters.info/en/Sudan>). This is in line with the result of the last census 2008 as it reached 84%. This result implies that in every 100 persons of the age range 15 – 64 years, there are 84% of kids or the elderly in need to look after. This even less than the average of Central and Eastern Africa Region which is 90.04; and Western Africa Region Average which is 90.43. Nevertheless, a little bit higher if compared it with an average of Southern Africa region as it reached 81.56. Some countries in Africa have achieved less dependency ratio like Botswana 60.69 and South Africa 53.70. The gab will be wider if compared Sudan with some Asian countries as in Indonesia it reached 53.47 and only 35.80 is in Singapore. The value of 81.3 % shows that the pressure on the productive population in Sudan is very high. It means that each working person in Sudan must provide goods for himself

and cover expenditure on one child or aged person additionally. Despite that, this figure coupled with ongoing reductions in fertility indicated clearly that the window of opportunity for the first dividend Sudan would obtained. Moreover, massive number of currently young people will enter the labor market in very near future.

The median age in 2008 was 18.5 years, then 19.4 in 2015, and estimated to be 22.3 in 2030 [2]. Figures in Table 3 indicate that the population of Sudan is very young with 53.3% of the population in 2008 being in the age 0-19, and 40% is potentially economically active.

3.7 Demographic Dividends: Challenges and Opportunities

Several indicators need to be highlighted to measure how Sudan is going to benefit from the DD. These include, among others education, health, infrastructure, and service provision. It is difficult to measure all these indicators generated by passing DD. Therefore, the focus will be on the major indicators like education and labor force. The blow discussion demonstrates that Sudan has achieved some progress in such indicators, but still there is a long way to go if a country is willing to catch the economic potential of DD.

3.8 Education in Sudan: Reality and Trends

Despite the effort made to eliminate literacy, still the number of non-educated people is so high. According to the fifth population census 2008, the overall literacy rate of age six and above was 57.2 percent: 63.3 % for male and 51 % for female compared to 52.3 percent in 1993. This figure is even higher for age 15-25 as it reached 67% (71.4 and 62.8 percent for men and women respectively) however, gender and regional disparities are persisting. For example, Khartoum and Northern States recorded high literacy rate as it reached 89 percent compared

Table 2. Age structure in Sudan 2008

Categories	Total	Percent
Children (0-14 years)	13,015,911	42.1%
Adults (15-64 years)	16,771,462	54.3%
Elderly (65+)	1,106,627	3.6%
Total population	30,894,000	100%

Source: Sudan Central Bureau of Statistics [44]

Table 3. Percentage distribution of population by age and gender in Sudan 2008

Age group	Male	Female	Total population
0-4	14.97	14.89	14.93
5-9	15.06	14.56	14.82
10-14	13.40	12.30	12.86
15-19	10.72	10.61	10.67
20-24	8.67	9.42	9.03
25-29	7.31	8.64	7.96
30-34	6.02	6.79	6.40
35-39	5.65	6.19	5.91
40-44	4.51	4.55	4.53
45-49	3.43	3.22	3.33
50-54	2.90	2.69	2.80
55-59	1.47	1.50	1.62
60-64	1.90	1.63	1.77
65-69	1.13	0.88	1.01
70-74	1.14	0.97	1.06
75+	1.45	1.16	1.31
Total percent	100	100	100
Total number	20,073,977	19,080,513	39,154,490

Source: Sudan Central Bureau of Statistics [44].

to 44% for West Darfur State. It is astonishing to find that literacy rate was lower than expected (15.6 percent) among nomadic people in Sudan.

According to the 2008 census, the total number of schools in Sudan was 53636 in 2008, while the total number of students and teachers were 632786 and 227166 respectively. Based on the report of "The Status of the Education Sector in Sudan, 2012", the number of students enrolled across the sub-sectors has grown during the past decade [50]. Since 2001 the growth has reached (10 percent) in preschool,(5 percent) in basic education,(6 percent) in secondary education, and(7 percent) in higher education. Basic education is by far the largest sub-sector of education in terms of student enrollments, and, in absolute terms, grew by almost 1.6 million from 2000-08. It is worth mentioning that the Comprehensive Peace Agreement assigned between Sudan and South Sudan in 2005 played an essential role in increasing the growth rate of basic school enrollment during the period 2000-08 especially in the war-affected states including Blue Nile and South Kordofan States.

Although the rates of growth of students enrolled in education have substantially increased, it was estimated that out of a population of over six million 10-17 years old, one six, or close to one million, never attended

school in 2010. Of these 62 percent are girls, and 48 percent are from rural areas [51] see Table 4.

Regional disparities at all levels of education are found across the states and among gender. The growth enrollment rate among states is ranging from 13 percent to 65 percent to 94 percent for basic school, and 15 percent to 61 percent for secondary school. Moreover, The World Bank [50] stated that the probability to education access in urban areas in Sudan in 2005 was 94% compared to 77% in rural areas. It is important to highlight that access to education was 87% for rich people compared to 85% for poor. Not only social but also disparities appeared in the Student – Teacher ratio. The general ratio was 38:1 in 2008 but it varies among State as it ranges from 14:1 in the Northern State to 76:1 in Western Darfur State with highest ratio in the State of South Kordofan and Western Darfur (Table 5).This might be due to the conflict that has taken place since 2003.

Figures in Table 5 reflect the huge variance in student-teacher ratio among states. With especial regard to basic education, the student-teacher ratio varies from 15:1 in Khartoum State to 198:1 in Red Sea State which reflects the regional and development disparities in Sudan. Generally, the student-teacher ratio in basic school in Sudan is considered low compared to

Table 4. Estimated number of population aged between 10- to 17-years, who have never been to school, by sex, 2008

Indicator	Urban	%	Rural	%	Total
Boys	55,090	14.9	313,520	85.1	368,610
Girls	99,660	16.4	507,740	83.6	607,400
Total	154,750	15.9	821,260	84.1	976,010

Source: The World Bank [50]; International Labour Organization [51]

Table 5. Student/ teacher ratios in Sudan, by State, 2009

State	Preschool	Basic		Secondary	
				Academic	Technical
Northern	18	17	10	11	
River Nile	175	22	13	10	
Red Sea	198	27	18	14	
Kassala	76	31	14	23	
AlGadarif	47	38	16	14	
Khartoum	15	30	16	21	
Algazira	25	30	17	16	
White Nile	75	30	17	18	
Sennar	31	33	13	13	
Blue Nile	71	24	7	8	
North Kordofan	76	42	16	12	
South Kordofan	153	39	22	26	
Northern Darfur	60	47	18	14	
Western Darfur	195	64	23	21	
Southern Darfur	64	44	20	15	
Average	85	34	16	16	

Source: The World Bank [50].

Table 6. Student-teacher ratio in basic school in some African countries 2012

Country	Sudan	Egypt	Morocco	Tunisia	Mauritania	Uganda	Eritrea	Mali	Guinea
Student-teacher ratio (basic school)	34	27.7	25.8	17.2	40.1	47.8	40.9	74	43.6

Source: Nation Master [52]

Table 7. Estimated public expenditure on education during the period 2000–2009

Indicator	2002	2003	2004	2005	2006	2007	2008	2009
Nominal education expending (current SDG millions)	319	656	902	1,010	1,527	1,966	2,509	2,714
Recurrent		317	466	846	941	1,446	1,845	2,288
Development		2	90	56	69	80	121	245
Real education expending(constant 2008 SDG millions)	660	1,037	1,335	1,332	1,892	2,276	2,509	2,404
Recurrent		656	869	1,252	1,241	1,792	2,136	2,288
Development		4	168	83	91	100	140	217
Education spending as % of total public expending	8.1	9.2	7.1	7.3	10.3	11.2	13.2	12.0
Education expending as % of GDP	1.3	1.8	2.0	1.9	2.4	2.7	2.7	2.7

Source: The World Bank [50]

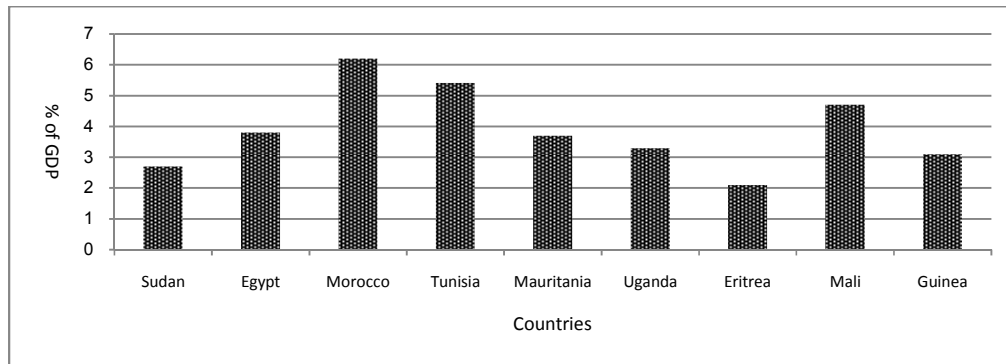


Fig. 3. Total Expenditure on public education, as a percentage of GDP in some African countries 2012

Source: United Nation Development Programme [53]

the countries with lowest ranking in human development index, such as Mauritania, Eritrea, Mali, and Guinea. However, it is high when compared to the African Arab Countries such as Egypt, Morocco, and Tunisia, where the ratio was 27.7, 25.8, and 17.2 respectively (Table 6). With regard to the education funding, although the federal system of government in Sudan has entrusted the education spending to the states, the Sudan Federal Government was still spending on education. Between 2000 and 2009, there was a substantial increase in education spending from SDG 660 million in real term to SDG 2.4 billion. The share of gross domestic product GDP allocated to education doubled to 2.7 percent to this period. Nevertheless, Sudan still spends less on education compared to most African countries (Table 7 and Fig. 3). This has impacted negatively to the quality of education.

Based on "The Status of the Education Sector in Sudan, 2012" report, 42 percent of classrooms in basic education were in need of repairs, and 9 percent required replacement. In Khartoum, the capital, 29 percent of classrooms are in urgent need to be replaced. In addition, many schools are built of local materials and are either unsuitable for learning or inaccessible during the rainy season. Moreover, lack of textbooks and the basic services (drinking water and toilets) are some challenges facing education. Although the basic education seems to be free, households were suffering for paying a large amount for accessing textbooks and other education needs. Aside from these, in rural area student have to go far distance to reach schools. These challenges coupled with the economic situation of families have deteriorated the quality of education and speed

up the student dropout. For example, the rate of intake was (80 percent) of new students to grade 1 of basic schools in 2008 only 54 % have completed the stage. The dropout of secondary education is even higher as indicated that among every 100 students only 74 have completed the stage see Table 8.

Regarding higher education, the Ministry of Welfare and Social Security (MWSS) [54] mentioned that higher education in Sudan has witnessed significant expansion during the period 1990–2011. In 1990 there were a limited number of institutions (five universities, two private colleges and 12 technical colleges). In the year 2011, the number of higher education institutions rose to 30 government universities, six private universities, 44 colleges and high institutes [54].

The above discussion on education has shown clearly that much is needed in order to catch the DD. Sudan is in urgent need to address issues like school infrastructure, regional disparities, education quality and quality of both basic and higher education and female discrimination. Empowering women through education is the key factor in controlling fertility and capturing the demographic dividend. Females' education will be more effective to entice young women to reduce their family size and participate in the economy [23]. In this line, Canning et al. [22] stated that the fertility rate of women with a high school education in Ethiopia has a total fertility rate (TFR) of less than two children per woman compared to the national, which is just fewer than five children per woman. Without addressing the above-mentioned challenges any effort made to catch, the opportunities of windows will be lost.

Table 8. Education attainment in Sudan 2005 – 2015

Literacy rate (2005- 2015)	Adult (% ages 15 and older)		75.9
	Youth (% ages 15–24)	Male	87.8
		Female	91.3
Population with at least some secondary education (% ages 25 and older) (2005- 2015)			16.3
Gross enrollment ratio (2010-2015)	Pre-primary (% of preschool-age children)		34
	Primary (% of primary school-age population)		70
	Secondary (% of secondary school-age population)		43
	Tertiary (% of tertiary school-age population)		17
Primary school dropout rate (% of primary school cohort) (2005-2015)			20.6
Education quality	Primary school teachers trained to teach (%) (2005-2015)		60
	Pupil- teacher ratio, Primary school (number of pupils per teacher) (2010-2015)		-
	Government expenditure on education (% of GDP) (2010-2014)		-

Source: United Nations Development Programme [55]

3.9 Labour Force in Sudan: Challenges and Opportunities

Shifting from agriculture to oil oriented economy in 1999 has created remarkable progress in the economy of Sudan. However, this shift was lasted in 2011 due to the secession of South Sudan. Owing to that, the economy of Sudan has declined and inflation rate has increased very sharply. This has shed negative light to the situation of the labour force in Sudan. Section below provides some details on the impact of economy on the labor force in Sudan.

The analysis is based profoundly on the report on Labour Force Survey (LFS) conducted by the Ministry of Human Resources Development in 2011. This also has been enhanced by the data drew from population censuses. According to the survey, the working age population (15+) was 17.78 million out of these 9.15 million were male and 8.63 million were female. The actual employed persons were 7.31 million and the unemployed person were 1.66 million. This implies that the total labour force in Sudan was 8.97 million in 2011 and the employment rate was 81.49%. It is important to note that the majority of those who are economically active are involved in informal economic activities. The International Labour Organization (ILO) in 2014 estimated that informal workers make up 60% of all employment. Therefore, the immense challenges that faced Sudan are how to engage the large youth cohort in high-productivity, formal sector jobs rather than in informal, low productivity, low-wage jobs in agriculture or household-based enterprises [22].

The employed population ratio (EPR) was 41%, however, gender and spatial divided are existed. The employment to population ratio of men was 61.4 percent versus 19.6 percent for women. Moreover, the rate of younger age 15-24 years is 28.9 percent for young men and 11.4 for young women [51]. It is important to highlights that the employment to population ratio in Sudan (41.1) is considered low compared to the global rate (60.3), or with Sub-Saharan Africa (65%), and North Africa (44.1). Concerning spatial disparities, the data has shown that the national labour force participation rate of men is 66.8 percent in urban areas and 73.3 in rural areas. Regarding female, the figure goes down to 26.1 in the urban area and 30.7 percent in rural areas. Generally speaking, the labour force participation rate in Sudan (15+) is considered low compared with the global rate (64.1%), or with Sub-Saharan Africa (70.3). Nevertheless, it was slightly higher than North Africa, where the labour force participation rate was 49% in 2011 [56].

The rate of unemployment in 2011 was 18.5% compared to 8 percent in 1983 and 11 percent in 1993 [49]. With the reference to the 2008 census, the unemployment rate was estimated at 16.8 percent, 13.9 percent for males and 24.7 percent for females. Not only gender, the unemployment rate disparities also appears between rural and urban areas, with unemployment rates of 17.5 and 12.3 percent, respectively [44]. It is important to highlight that the unemployment rate in Sudan is considered very high compared to the global rate ,which was (5.9 percent), in 2011 or when it compared

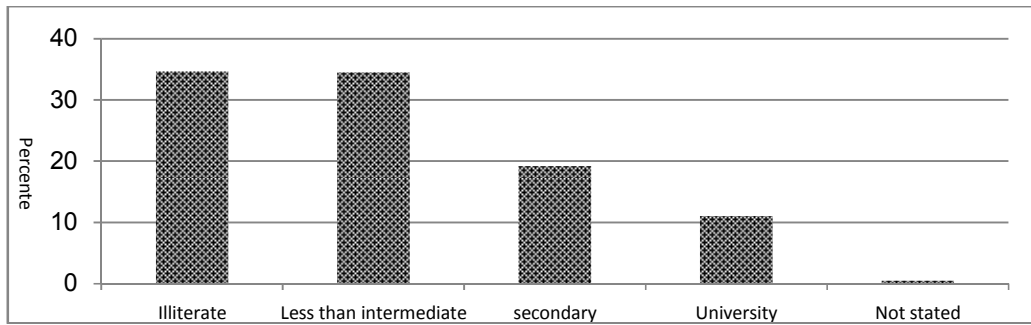


Fig. 4. Labour force (15+) by Educational attainment in Sudan 2011

Source: Sudan Ministry of Human Resources Development and Labour [57]

Table 9. Population employed by economic sector and educational attainment in %

Education	Primary agriculture	Secondary	Tertiary	Total
Illiterate	26.8	3.4	7.6	37.8
Primary/ basic	14.5	7.3	13.6	35.4
Secondary	3.0	3.7	11.8	18.5
University	0.4	0.9	7.0	8.3
Total	44.6	15.3	40.1	100

Source: International Labour Organization [51]

with the rates of North Africa (10%), Middle East (11.1) and Sub-Saharan Africa (7.6) [56].

Concerning the characteristics of labour force by education attainment, it is important to note that about one third of the of labour force are illiterate, 34.7, 34.5 have intermediate education , while less than 20 that have secondary certificate and only less than ten have a university education (Fig. 4).

Table 9 shows the percentage of illiterate workers across economic sectors including agriculture, industry, and services in 2014. It demonstrates that the total illiterate among all sectors was 37.8. Moreover, the rate was high among agriculture compared to services and industry: 26.8, 3.4, and 7.6 respectively. This implies that of every ten people employed in the agriculture six of them were illiterate. Those with only primary education across all sectors were 35.4 percent, of which 41 percent in agriculture sector. This explains why agriculture in Sudan is deteriorating and failed to attract the high rate of unemployment person.

Several plans have been adopted to improve the economy of Sudan for more details see [58]. The common objective of these plans was to sustain economic growth, provide equal services, enhance rural development and

eliminate poverty. Recently, the government of Sudan has introduced the long term vision: the Twenty Five Years National Strategic Plan (2007-2031). This plan focuses mainly on job creation, building capabilities and skills, giving due care to labour in the informal sector, approving equitable standards of labour, developing a labour market information base, and strengthening social dialogue between all those involved in the production process. Accordingly, several projects have been adopted to enhance the economic situation in general and creates jobs for the youth in particular. In the mid of 1990s, the government introduced Productive Families Programme aiming to increase family income. This programme flowed by the Graduate Employment Programme, through which the government aimed to create jobs for graduate students. Moreover, in 2009, the state has increased the pro-poor spending from 6.2% to 10.2% of the GDP in 2009 [58]. Sudan Microfinance development facility has been introduced in 2007. In 2011, the total amount of finance, providing by banking sector and microfinance institutions reached 42.7, 937.9 million SDG respectively [59] .These programmes failed to address the need of the youth such as human development and job creations. The failure in addressing the economic issue, has put Sudan within low human development category, with almost half,

49.8% of the total population is facing multidimensional poverty [55].

4. DISCUSSION

Available data have shown that the age structure in Sudan is changing in favor of working age population. More than fifty percent of the population falls within (15-64 years), while the older is three percent. Moreover, the total fertility rate declined sharply from seven children per women in the early eighties to less than four in 2008, and expected to reach 3.57 in 2025. Furthermore, the dependency ratio has decreased and life expectancy has decreased. All these indicate that Sudan is in the first stage of demographic dividend or will obtain the demographic dividend in the near future. This notion is in line with Dramani and Mbacké [36] who stated that the window is already open for all African countries except Niger. This implies that Sudan can indeed harness the demographic dividend in the next four decades, if rational policy toward the youth people are adopted and implemented. As indicated, economic growth does not happen automatically unless wise policies are adopted [6]. Demographic dividend does offer only economic opportunities, but the present also challenges when governments are unable to fulfill the aspirations of their populations, especially of the youth [12]. The key question need to be answered is whether Sudan at this moment qualified to achieve the maximum benefit of demographic dividend And what should be done to ensure that a demographic dividend could effectively happen?. Data presented in this paper showed that Sudan has achieved some progress regarding human capital like education and health, but still is lacking behind to capture the maximum gains of the demographic dividend. Despite the fact of regional disparities and gender gap, Sudan achieved some progress related of the reduction of under five year mortality, increase school net attendance, and improve access to basic services.

Regarding Population policies, the year 1971 has witnessed the establishment of the National Population committee which later became the National Population Council under the umbrella of the Presidency in 1995. In 2002, the authority has introduced the National Population Policy which aims to improve human capital through increasing healthcare, life expectancy,

strengthening capacity building, and reducing unemployment.

With regard to education, the major pillar behind the success story that has taken place in East Asia, is in need to be addressed and improved. Education becomes the most important tool to achieve the demographic dividend [34]. Lack of educational infrastructure, massive dropout, and gender inequality are some of challenges that faced basic education in Sudan. Not only basic but also high education in great need to be tackled. Since the education "revolution", Sudan has increased both public and private institutions and this always comes at the expense of the quality of education. The education status in Sudan coupled with low salaries of teachers, , poor funding of research has pushed many outside the sector to search for better chances. Moreover, the country is in need of bridging the gap in gender divided and spatial disparities. According to African Development Bank et al [27], 48% of female are illiterate compared to 12% for men. This led Sudan to be classified among the poorest ten performers on the Gender Inequality Index (Sudan is classified as the 135th out of 155 countries) . As for social segregation, Sudan comes among the countries with very high levels of discrimination against women in social institutions, with a total score of 0.555 [27]. This paper does not fully agreed with Bongaarts [3] in his idea that Family-planning programmes are more effective in catching DD. Owing to religion and traditions, some families in Sudan are so sensitive in using family planning (birth control) methods. The best way in controlling fertility is should be through education mainly for female. Empowering women through education means a voluntary decline in fertility and increase the awareness of saving. This implies that the system of education in Sudan need to be addressed and reducing gender inequality is a must. Improving education is not a magic solution in catching the DD unless followed by improving health situation. In this regard the paper warns policymakers not to repeat the experience of the South Africa.

Regarding health some progress concerning infant mortality, child mortality, maternal mortality and reducing malaria infections, has been made. Currently, the national average of malaria infections fell from 33 percent in 1990 to about 5 percent in 2010. Despite this progress still more efforts are needed to make further gains in these areas. For example Sudan

should work hard to reach zero infections of malaria, reduce or control the HIV epidemic. It has been estimated that 0.2 percent of adults aged 15–49 are carry HIV. The country also has the second highest number of new HIV infections in the Middle East and North Africa region. Several factors have been accused behind the separation of HIV. These include poverty, vast and open borders, massive population mobility and conflicts. Sudan has to work hard to increase the budget of education as well as for health. African Development Bank status report, 2017 found that actual health expenditure remained at 1% of GDP over 2012-14 requiring considerable scaling up for the SDGs to be met. In this regard the paper warns policymakers not to repeat the experience of the South Africa. According to Moultrie [43], South Africa has almost completed its demographic transition. Unfortunately, South Africa had been unable to reap the benefits because of the impact of the HIV/AIDS epidemic.

Addressing the economic issue is essential in capturing the DD. Sudan is facing economic crises particularly after the separation of South Sudan in 2011. Market shooting up, rise of inflation, difficult to control prices and failed to create jobs are some of the major challenges that facing Sudan today. The economic situation has impacted negatively on GDP per capita, which is estimated at \$2920 in 2017 [26]. Consequently, saving has decreased and investment rates have declined. Moreover, the rate of unemployment reached 18.5 % in 2011 shifted to 19% in 2016 [60]. How Sudan will benefit from DD where (42.8 percent) of its people above six years and 34.7 of the total labor forces are illiterate 2011. Moreover, the available data indicate that unemployment is relatively high for those with medium and advanced levels of education; while the illiteracy was high among employed people in the agricultural sector(six out of ten people were illiterate). It is important to note that gender inequality is also exists in the labour force. The rate of labour force participation is 14.1% for female and 38.4% for males.

According to the African Development Bank [27], the deterioration of the economy has impacted negatively on population of Sudan. Almost half of the population is under the poverty line and the country remains one of the highly indebted countries. The distribution of poverty is not almost equal when it comes to

rural (57,6 %) and urban (26.5 %) areas. This reflects the historical bias of national development policies towards urban areas. The relation between education and poverty is quite clear. The main provider who has no education is 60 percent of all poor households, while only 9 percent of the poor have a main provider with a higher education level .Not only poverty, Sudan in high need to be dealt with the issue of debt. In 2015, the country remained in possession of a substantial external debt amounting to about \$45.1 billion. Therefore, without reaching zero debt any effort made to catch the DD will be lost. Addressing conflicts is another essential factor for capturing the DD. Since 1980s, Sudan has witnessed a state of political instability due to civil war in the south, Darfur, South Kordofan, and Blue Nile states. This conflict has impacted negatively on all aspect of life and deteriorated the economic situation of the country. In these fragile states where some areas are not under the government's control may make any interventions difficult and economic development nearly impossible [22].

Achieving DD and increase the performance of the economic situation is not far reaching dream, the previous experiences mentioned before showed that with the political commitment changing to benefit from DD is not impossible. To harness the demographic dividend ,Sudan is in needs first and foremost to enhance the human capital through better education, good health and ensuring gender and spatial equality. The success of this depends on political will, political stability, and good governance (transparency and accountability).For what have been said, Sudan will witness a rapid increase in population working group sooner. Will that growth, produce a demographic dividend or a demographic disaster? The answer is up to the policy makers of today.

5. CONCLUSION

The working age population is increasing in Sudan compared to the older people and children. This situation confirms that Sudan is passing through the stage of the demographic dividend. It generates some positive socio-economic gains if well managed otherwise it will generate huge challenges. The DD is neither automatic nor taken for granted; a country should formulate policies to earn it. Sudan has

made some progress regarding human capital, but it is not enough to capture the DD. Some challenges regarding human capital are in urgent need to be addressed. Enhancing the quality of both basic and higher education is essential, to begin with. It has been well documented that Sudan has witnessed the lack of investment in human capital, faced unprecedented debt, the rapid increase in poverty, gender gaps in accessing jobs, regional disparities, protracted conflicts, corruption and massive migration of both laymen and qualified people. Without addressing these issues any effort made to gain the DD will be at least wasted. This paper sent a signal to the decision makers to formulate policies to benefit from demographic dividend before it closed. The success depends on the political will as well as implementing wise policies regarding the economy and social matters. At this defining moment policymakers in Sudan have two options: either to create a suitable socio-economic environment for the youth or the country will face a new type of Arab Spring.

RECOMMENDATIONS

The researchers recommend the following:

1. Enhancing opportunities for human capital development (training - education - health) Capacity building for young people.
2. Open more vocational education and training that adapts to the market.
3. Attention should be made to the social welfare of the population
4. Promote women's economic participation and reduce gender gap
5. Formulate policies and laws to protect private sector workers (safe jobs)
6. Higher education institutions should respond to the market need at local and national level.
7. Generate additional jobs in various economic fields and reduce the rate of reducing unemployment
8. Include the population studies in the syllabuses of basic schools
9. Develop economy towards the knowledge economy and e-government
10. Prepare for the post-population opportunity
11. Ensure the fertility is in decline to benefit from demographic dividends
12. Reducing poverty rate is very essential

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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