

The trajectories of population impact and the promises of harnessing the benefits of demographic dividend in Ethiopia: A perspective

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ABOUT THE INSIGHT

The main goal of this insight is to generate evidence-based information on the current demographic transition, its present challenges and promises, and highlighting on the measures to be put in place to creating an enabling and stimulating environment towards harnessing the benefits of a demographic dividend. The insight builds on evidence emerging from the review of available national and regional level data and some policy documents. A major part of the paper focuses on synthesizing the overall demographic scenario (including the trends in population size and growth rates, age structure and composition, fertility as major driving force), population as critical indicator of impacts in Ethiopia, promising changes and demographic transitions, and harnessing the benefits of demographic dividend in the years to come.

I. The Ethiopian demographic scenario: facts and figures

Size and growth rate: The review of demographic trends in Ethiopia discloses that the population has been increasing rapidly since the 1950's. As can be seen from Table 1, the size of the population was estimated to be around 11.7 million in 1900 increased to 23.6 million in 1960 and further to 47.3 million in 1987. This indicates that the 1900 population took 60 years to double in 1960 while the 1960 population took only 27 years to double. The annual rate of population growth of the population, which was a mere 0.2 percent at the turn of the century, reached 2% in the period between 1950 and 1955. The rate of population growth of Ethiopia has been on a declining trend over the last three decades (about 3% per annum in the 1980s and early 1990s, and between 3% and 2.8% from the late 1990s up until 2011). From 2011 onwards the population growth rate of the country has been consistently declining (FRED, 2020). By 2019, the population growth rate stood at around 2.58% which is still considered to be high given the country's population size and demographic profile. Mortality rate for adults and children also declined substantially in the last two decades. Today, Ethiopia is the second-most populous country in Africa with an estimated population of over 115 million (CSA,2020). Given this population composition, Ethiopia's population is estimated to reach 140 million by 2030 and 190 million by 2050 (UN, 2017). At the current rate, the population may double in about 30 years.

Table 1: Estimates of Ethiopian population size and growth rates: 1900-2022

Year	Population (in Million)	Growth rate in percent
1900	11.7	
1905	11.9	0.2
1910	12.1	0.4
1915	12.4	0.5
1920	12.9	0.8
1925	13.6	1.0
1930	14.4	1.1
1935	15.3	1.2
1940	16.2	1.3
1945	17.5	1.5
1950	19.1	1.8
1955	21.2	2.0
1960	23.6	2.1
1965	26.2	2.2
1970	29.5	2.3
1975	33.1	2.3
1980	37.7	2.6
1985	43.3	2.8
1990	50.8	3.0
1995	65.0	2.9
2000	71.0	2.7
2022	120.0	2.58

Age structure and composition of the Ethiopian population: The present age structure of Ethiopia is a direct product of past and ongoing demographic processes such birth, death and migration. A total population of any given country may be divided into young (age 0– 14 years), working (age 15–59 years) and elderly population (age 60 years and above). The country is characterized by young population with over 70% of the population under 30 years old, while nearly one half of the population is under 15. The median age of the population is less than 20 years. With regards to other compositional characteristics, more than half of women do not read and write. The proportion of the urban population increased from 13.8% in 1994 to 16.1% in 2007 and is expected to rise to 30.6% in 2037, keeping the urbanized population size 70%.

II. Population as critical indicator of impacts in Ethiopian

Multiplying factors: One of the most popular ways of measuring the impacts of a given population is expressed in terms of a simple model: $I = P \times A \times T$. Beyond basic needs, each individual's impact on the environment is a multiplied function of (1) The sheer number (population size) and age structure described above) (2) his or her level of consumption of resources (closely related to one's standard of living) and (3) the level of technology used to support that level of standard. It is a mere fact that a population of more than 115 million has huge consumption demand (food, water, energy, housing...etc). The ever-increasing standard of living among a section of Ethiopian population is demanding more consumption of water, food, energy and other durable goods.

Density: Population growth helps to increase the density of human settlements beyond the ability of local ecosystems to renew themselves or to absorb wastes, both in rural and in urban areas. As population density increases, more pressure is put on the land to grow food, produce fuel wood, urban services, and meet other needs. Similarly, population growth is helping to create giant, fast-expanding cities throughout the country. Today, the urban population of Ethiopia is around 20% [CSA, 2015), with an urbanization growth rate of 4.9% per year (World Bank, 2013). Based on the recent world development report (2020), the percentage of people-land ratio for urban areas of Ethiopia is 0.02 hectares on average (which is equivalent to 200 square meters) and 1.1 hectares (which is equivalent to 11,000 square meters) for rural areas. Such concentrations of people can overwhelm municipal services such as water supply, sanitation, housing, energy, and transportation. In theory, dense settlements should enable local governments to provide energy, water, waste disposal, and other services efficiently. In practice, however, such efficiencies are rarely possible because cities grow too fast for services to keep up. For example, the water supply system in Hawassa, Southern Ethiopia, was originally built for 60 thousand people. It now serves about 300, 000 residents, resulting in serious shortage of water.

When a city is at maximum or excess capacity, people tend to compete over the limited and scarce resources. Urbanization leads to urban sprawling, informal settlements proliferation, infrastructure shortages, land value increase, and growing tensions between migrants and host communities competing for scarce basic urban services. For instance, in 2015, the total housing units illegally built in peri-urban Hawassa city was 20,000 whereas the formally certified houses over sixty years in the city were only 23,000 housing units. Similarly, City Administration of Addis Ababa's major challenge is said to be confronting to about 40,000 informal settlers who built unauthorized houses around peri-urbans (SADC,2017).

It is argued that despite the developmental challenges associated with migration, it also contributes to socio-economic development. For example, rural to urban migration, in the case of Ethiopia eases pressure on the land and offers opportunity for land consolidation. Urbanization reinforce migration serving as a pull factor. A growing industry around urban areas in Ethiopia attract surplus labor from the countryside. This creates a situation in which urban areas require a continuous supply of rural migrants (job opportunity as a pull factor), increased remittance to rural households thereby reduce rural poverty. The rapid growth of cities also means an increase in the demand for agricultural goods and other products from rural areas (EEA, 2020).

Population growth and density typically affect the availability and quality of water resources in an area, as people attempt to assure their water supply by digging wells, constructing reservoirs and dams, and diverting the flow of rivers. In Addis Ababa, the availability, adequacy and the quality of water are in danger, and the water demand of the city is unmet mainly due to internal migration, high population growth rate and rapid development (Alemu and Dioha, 2020). The modelling scenarios for sustainable water supply and demand in the city indicated that unmet water demand increases by around 48%, from 208 to 307 million cubic meter in 2015 and 2030 respectively (Alemu and Dioha, 2020). Scarce and unclean water supplies are critical public health problems in much of the country. It was estimated that 60 to 80 % of

communicable diseases are still caused by the poor hygiene, access to safe water and sanitation services in the country (UNICEF, 2017). In addition, poor environmental condition contributes to an estimated 50 % of the consequences of undernutrition (UNICEF,2017). Diarrhea, which is mainly caused by poor hygiene and sanitation, is the leading cause of under-5 mortality in Ethiopia, accounting for 23 % of all under-5 deaths representing more than 70,000 children a year (UNICEF,2017).

Pace of change (growth rate): With its population doubling in two to three decades, Ethiopia can barely keep up with the relentlessly increasing demand for food, jobs, water, energy and housing. Ethiopia's economy is dependent on agriculture, which accounts for 40 percent of the GDP, 80 percent of exports, and an estimated 75 percent of the country's workforce, with poor market linkages and limited use of agricultural inputs such as improved seeds, fertilizers and pesticides remains limited (USAID, 2020). This sector is dependent mainly on traditional and subsistence farming methods. Despite the irrigation potential of the country which is around 3.5 million hectares, nearly 5 percent has been utilized up to now (Mengistu and Driba, 2021). With the current population growth and composition, the average farm land holdings per household will decline in rural areas. For example, a study conducted based on land registry data from Tigray region of Ethiopia from 1998 and 2016 showed that average farm size has declined from 1.15 to 0.90 ha over the time period; the farm size per household Gini increased from 0.38 in 1998 to 0.50 in 2016; the farm size per capita Gini increased from 0.42 in 1998 to 0.57 in 2016 (Holden and Tilahun, 2020). Thus, a doubling of the population would necessitate the equivalent of a tripling or more of our current food supply to ensure that the undernourished were no longer at risk and to bring population growth stabilization. The fast pace of changes in population size has visible adverse effects on affordable housing in urban areas of Ethiopia, Given the present population pressure, there will be a demand for 471 000 urban houses per year until 2025 and for 486 000 houses per year from 2025 to 2035 (CAHF, 2022). However, the housing finance system in Ethiopia is underdeveloped, and less likely to fulfil such huge demands.

In Ethiopia, the demand for freshwater has been rising in response to industrial development, increased reliance on irrigated agriculture, massive urbanization and rising living standards. According to the international water security level measurement (Felkenmark, 2000), Ethiopia is categorized under water stress zone i.e 1000-1,700 cubic meters per person per year. This is mainly due to incompatibility between the growing demand for water due to population increase and the rate of water supply. While population growth rates have slowed somewhat, the absolute number of people added to the population each year-the relevant figure considering the availability of and need for freshwater-remains near historic highs. For example, because nearly 3 million people have been added to the country since the beginning of the century, per capita availability of water is much lower now than previous years.

The impacts of growing population on education system is huge. Low birth rates which lead to a slow growth of the school age population can ease the pressure on the educational system. A less rapidly growing enrollment rate produce savings, and can be used to improve the quality of education. On the contrary, a growing population will require additional investment on the provision of primary and secondary education. As the number of schools going children constantly increasing, the quality of education and training at all levels remains poor resulting in rising educated unemployment (Beyene and Tekleselassie, 2018). Though progress is observed in terms of expanding access to education, the education system is not efficient enough to produce competent and innovative students/graduates. Results on National Learning Assessments (NLAs) for grades 4, 8, and 10 in the last 15 years indicate decreasing trend in performance from time to time. Overall performances on the assessments are generally below 50%, which is the expected score level set by the ministry. For instance, in the NLA conducted in 2014, only 23% of grade 10 and 35% of grade 12 students were able to achieve 50% and above (MOE, 2015). Grade repetition, dropout, and low completion rates have also remained as pertinent problems in the Ethiopian education system. For instance, the dropout rate for primary grades (1 to 8) in 2019 17.5 which is higher than the rates in the previous two years – 2017 (11.7%) and 2018 (11.1%). Out of 10,000 new graduates selected based on GPA for

recruitment to newly established universities, only 7.2% were able to score above the passing point in their major field of study (Molla, 2018).

When a population grows at a high rate, it has many adverse effects on health, especially with regard to the provision of health services. For instance, it affects the doctor population ratio and the bed population ratio. The short intervals between births put a strain on the health of mothers and children. It is difficult to provide efficient ante natal care and follow up services to a large number of expectant mothers who live in rural areas where there are no infrastructural facilities like health centers and transport. It is due to this reason that a majority of the deliveries in Ethiopia take place at home and are attended to by untrained personnel. Apart from this, immunization of infants and children is a big problem and often results in a very high level of infant mortality. Malnutrition of mothers and infants is also the result of a rapidly growing population. A rapidly growing population also puts a strain on the provision of sanitation facilities and clean drinking water. As a result, there is widespread prevalence of water borne diseases such as gastroenteritis and cholera and epidemics such as malaria in the developing countries (see chapter thirteen above).

Ethiopia is one of the countries with very low health workforce (Medical Doctors, Health Officers, Nurses and Midwives) density which is 0.96/1000 population. This is much far below the African density of health workers (2.2/1000 population and five times less than the minimum threshold of 4.45 per 1000 population set by the World Health Organization to meet the SDG health targets. Another way of stating it is, taking the current population of over 115 million, Ethiopia is supposed to have over 220,000 health work forces to level with the African health workforce density, and 445,000 to meet the minimum threshold to ensure UHC, while the available number is less than 100,000 (Haileamlak, 2018). This means, with the ever-increasing population, the country needs to produce over 30,000 health workers (Medical Doctors, Health Officers, Nurses and Midwives) every year for the coming 10 years to achieve universal health coverage by 2030 (Haileamlak, 2018).

Fast population growth increase also impacts speed of service provision (i.e waiting time), especially in urban areas. While waiting time for all services (such as water, electricity, bank, transport, telecommunication...etc) are worth mentioning, the most important one is the waiting time for health sector. The waiting time in the hospitals particularly in the outpatient department is lengthy. Studies at Jimma University specialized hospital indicated patients are forced to wait an average of 4.5 waiting hours to get service (Assefa 2011). The whole waiting time patients spent in the hospitals before getting service was a minimum of 41 and a maximum of 185 min (Biya et al, 2022). According to a study conducted in Bahir Dar government hospital, the measured mean waiting time in this study was 219.98(95%CI: 210.02, 229.95) minutes (3.6 hours) with (SD +100.75 minutes (1.6 hours).

Threshold Effects: Threshold refers to the possible influence or impact that an additional organism brings about on the environment. Threshold effects occur when gradual population growth evokes an abrupt, discontinuous response. Threshold effects can be either biological or economic. Biological thresholds stem from the increasing stress that additional human numbers place on natural ecosystems. Natural systems such as forests and lakes can absorb certain amount of pollutants without being harmed. As the amount of pollution gradually increases, however, it eventually reaches a threshold. Beyond that level, the ability of natural systems to produce food and to absorb wastes diminishes drastically. Thus, the effects of population growth can cross a threshold and incur serious consequences. Unfortunately, it is difficult to identify the threshold until it has been passed (Richard, 2000). Economic threshold effects can cause dramatic jumps in costs. As growing numbers of people require more food, energy, water, and minerals, these resources become scarce or less accessible. It becomes increasingly difficult and expensive to provide them to additional people, and techniques for obtaining more of such resources are likely to be environmentally destructive.

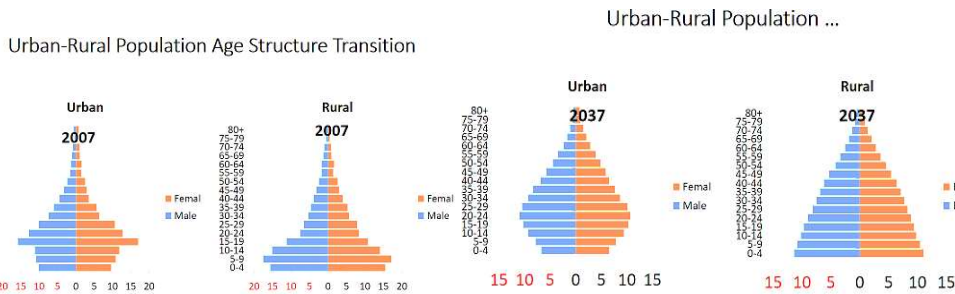
Carrying Capacity: The term "carrying capacity" refers to the number of people a facility/service/land/resource can support. Logically, population growth must stop at some point or the available resources would become overcrowded and eventually would be depleted. However, what is this maximum human population that can be supported by a given resource/facility? The answer to this question depends on what assumptions are made about technology, consumption levels, and other factors that are not easily forecast. Calculating the maximum number of people who could be supported by a given resource/facility seems less important than determining how resources can be used wisely and managed sustainably to improve living standards without eventually destroying the environment. As it stands now, most services in urban areas of Ethiopia surpass their optimal carrying capacity due to increased population. The transport services, the health and school facilities, and other amenities.

IV. Harnessing the benefits of demographic dividend

The demographic dividend is the accelerated economic growth that may result from a decline in a country's birth and death rates and the subsequent change in the age structure of the population. With fewer births each year, a country's young population increases. With fewer people to support, a country has a window of opportunity for rapid economic growth if the right social and economic policies are developed and investments made (Andrew & Tomoko, 2008)). Only few African countries significantly benefitted from such transition. A study indicated that five SSA countries (South Africa, Botswana, Cape Verde, Seychelles and Mauritius) has nearly completed the demographic transition, in a time frame similar to Asia and Latin America (Paulo et al, 2014). Due to the fast decline in their mortality and fertility rates, the share of their working age population increased by nearly 20 percentage points, and these countries have completed over 80 percent of the transition. These countries have also experienced some of the highest growth in SSA during that time period, and graduated to middle income status (Paulo et al, 2014). On the contrary, five SSA countries started their demographic transition after year 2000, and are late to harness the benefits of demographic dividend.

If Ethiopia wishes to benefit from demographic dividend, three things should be fulfilled: 1) Ethiopia should make significant reduction in fertility as fewer birth every year brings down the dependent population in relation to the working-age population. This process is commonly referred as "demographic transition." This can be achieved through investments in voluntary family planning, child health, quality education, girls' education—especially at the secondary level(to delay marriage and first pregnancy) and gender equality 2) There should be drastic economic transition such as changes from an agriculture led economy, to an industry-led economy. This should be supported by flexibility and competitiveness in the labor market to absorb the rapidly increasing number of young people entering the job market; and openness to trade to allow growth of productive and rewarding jobs. Other important preconditions include modern infrastructure and technology to improve economic efficiency, good governance, stable macroeconomics 3) Improve the policy environment (such as labor market flexibility, financial market efficiency and investments in Information Communication Technology (ICT) is vital to achieving the demographic dividend.

The figure below shows the anticipated changes in Ethiopian age structure to meet the conditions for harnessing the benefits of demographic dividend. The change in the age structure narrows down the base (0-14) and the emerging bulge of the working age population (15- 64) as we move from 2007 to 2037. The working age population increases from 52.8% in 2007 to 61.8% in 2037 in urban areas and from 51.5% in 2007 to 55.1% in 2037 in rural areas. The number of working age adults becomes larger relative to the dependent population.



It is important to mention that the Ethiopian government, in its 10 year plan, is committed to put sustained demographic transition as a precondition to benefit from demographic dividend. This is in line with the year 2017’s decision of the Heads of State of African countries to “Harnessing the Demographic Dividend through Investments in Youth” for the successful implementation of its Agenda 2063 as well as the 2030 Agenda.

V. Opportunities and hopes of changes

Women education: During the last two decades, Ethiopia has made significant progresses in ensuring access to basic education supported by the Education Sector Development Program. Ethiopia has achieved near-perfect gender parity in net education enrolment at the primary level (Zerihun et al,2015). Literacy of women between the ages of 15-49 doubled between the 2000 and the 2016 Ethiopian Demographic and Health Surveys (CSA & ICF, 2016). Such changes did not occur equally across regions. Addis Ababa, Dire Dawa, and Harari have the highest literacy levels, while Afar and Somali have the lowest literacy levels nationwide, followed by SNNPR and Amhara. In some regions, the proportion of women ages 15-49 with no education has reduced significantly over the last 15 years. For example, in the year 2000, 77.8 percent of women in Tigray had no education and by 2016 this proportion was reduced to 57 percent (CSA & ICF, 2016).Also, large regional disparities continue to exist in the opportunities available to school-age girls. The four regions with higher proportion of female literacy rates (Addis Ababa, Dire Dawa and Gambella and Harari) had TFR below the national average. (Figure 5).

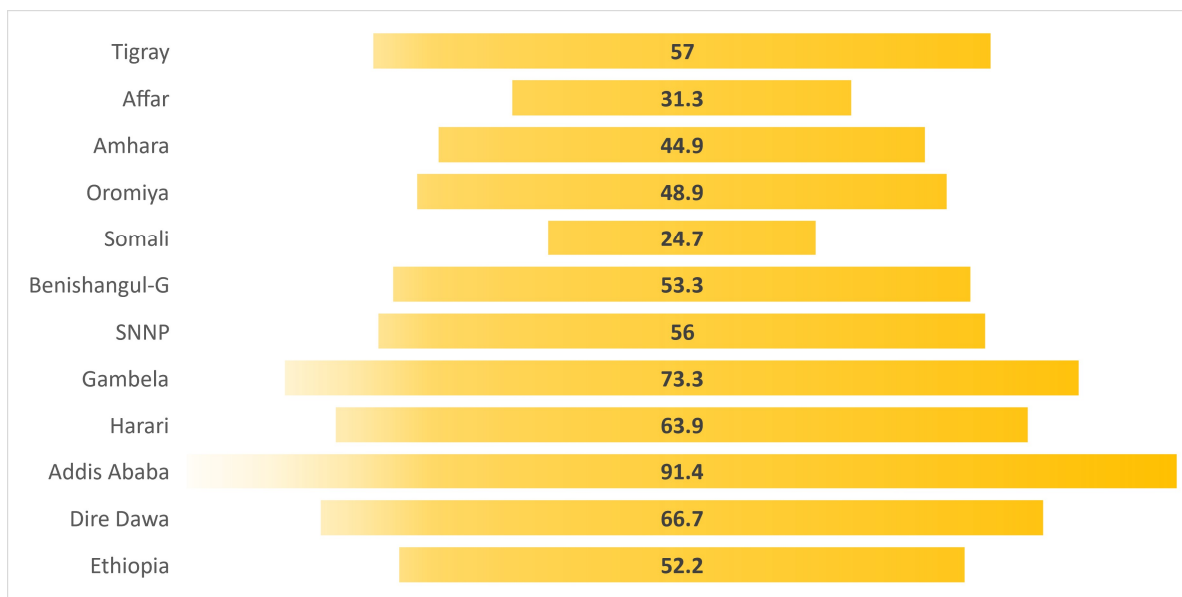
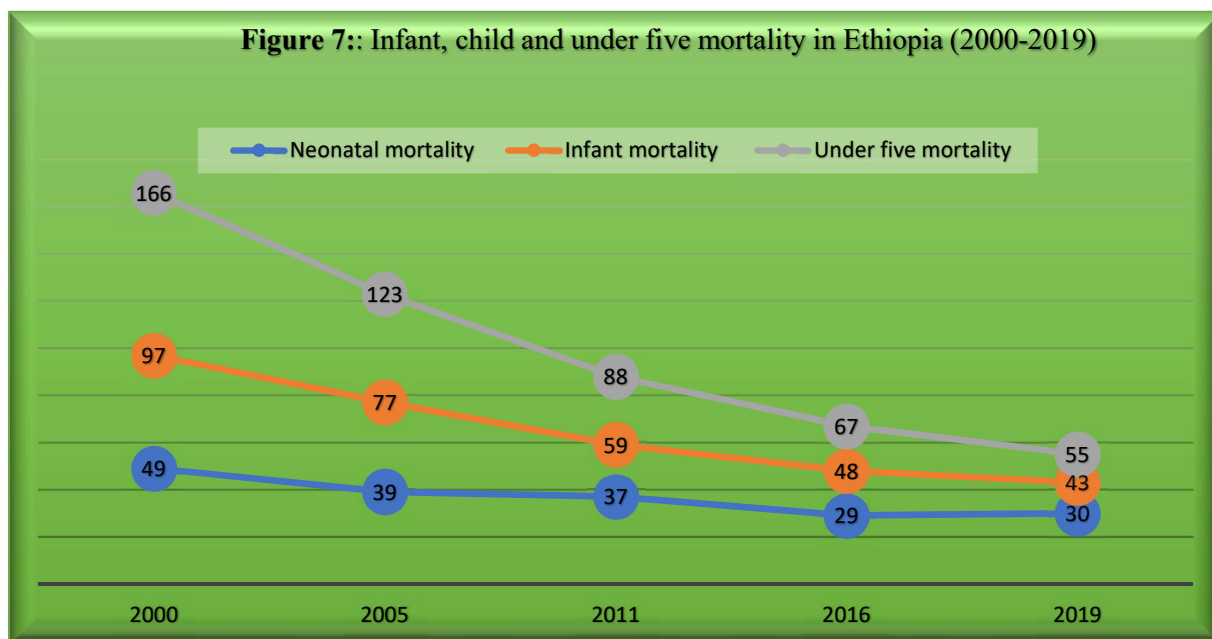


Fig:5 Female literacy rate

Net Enrolment Ratio (NER) for primary (grades 1 to 8) reached to 94.7% in 2019 from what it was 57.4% fifteen years ago (MOE, 2019). NER for secondary education. Seven years ago, NER for secondary education (grades 9-10) was 17.3% (16.9 for males; 17.6 for females) only to grow to 24.1% (24.1 for males; 24.2 for females) in 2019 (MOE, 2019). The Human Development Index for Ethiopia improved from 0.28 in 2000 to 0.47 in 2018. This is substantial progress, but there is substantial room for improvement in its human development index placing (UNDP, 2019).

Local government authorities should play a pivotal role in making women stay more years at school thereby increase the age at first marriage to reduce fertility in the high fertility regions. Special attention should also be given to increase the enrollment of women/girls in secondary education to reduce fertility significantly and sustainably in rural communities. The very low literacy rate in some regions (Afar, Somali SNNPR and Amhara) should be a prime focus. The respective regions should launch and strengthen voluntary literacy programs. Enabling women and girls to have the autonomy to make informed choices regarding their sexual lives, age at marriage and timing of pregnancy. The provision of skill-building training for women enables women to generate income and build assets, enhance their decision-making power over household resources. With the integration of FP/RH messages, such skill substantially improves their communication and power balance with their partners/husbands.

Declined mortality and other health indicators: The Ethiopian health sector development was instrumental in bringing about a significant reduction in infant and child mortality. Reduction of mortality has two impacts: First, it reduces the insurance effects of having a larger number of children as more and more children survive until adolescence and adulthood. The EDHS provided ample evidence of the fast-declining mortality. Between 2000 and 2019, infant mortality decreased by almost 56% percent and under-five mortality decreased by 48%. In 2019, the infant mortality rate at the national level was estimated to be 43 deaths per 1,000 live births, and the under-five mortality rate was 55 per 1,000 children³. This implies that one in 23 Ethiopian children died before the first birthday and one in 21 Ethiopian children died before the fifth birthday (Figure 10). There are also significant regional disparities in early mortalities (Figure 11). A recent study indicates that undernutrition contributes to 28% of all under-five deaths in Ethiopia (African Union Commission et al, 2014).



Second, the combined effect of improving under-five and adult mortality rates has brought about considerable improvements in the life expectancy at birth. Ethiopia has gained more than 12 years of life expectancy for both sexes combined in a period of 15 years and much of this progress is attributable to the sharp decrease of under 5 mortality (UN, 2013). Such positive outcomes in health have been linked directly to bold and aggressive health policies and programs. One of these programs has been the Health Extension Program (HEP) which has been in place since year 2003.

Table 2: Changes in the key outputs of the health sector

Indicator	Baseline/ 2000	Current/ 2019/ 2020	% Change
Life expectancy	47.1	66.3	28.9%
Infant Mortality Rate (IMR) per 1000 birth	95	34	64.2%
Under-five mortality(U5M) per 1000 children	165	55	67%
Maternal Mortality Ratio per 100, 000 births	959	401	58.2%
Child immunization	14	50	72%
Stunting among under five children	54	37	31.5%
Antenatal care service (in %)	10	43	76.7%
Home deliveries (%)	94.5	50	47.3%
Post-natal care services (%)	2.4	34	92.9%

Source: (CSA and ICF 2000 and 2019)

Meeting future targets of reduction in early mortality and improvement of life expectancy (Table 3) would be possible by considering the main causes of early death (such as the huge undernutrition, poor sanitation and hygiene) and narrow down the gap in access to antenatal and delivery care services in the high fertility regions. Given most pastoral communities in the peripheral regions do not have adequate access to health, FP and reproductive health services, the respective regional governments should strive to strengthen and deploy the health extension workers, build the capacities of traditional birth attendants and community volunteers.

Table 3: Key demographic targets (2035)

Indicator	Base year	Global Average	Target for Ethiopia year 2035
Maternal Mortality Ratio per 100,000	420	210	57
Under 5-year mortality per 1,000	64	51	20
Neonatal mortality rate per 1,000	29	22	10
Life Expectancy at Birth	64	70	74
Total fertility	4.3	2.47	3.0

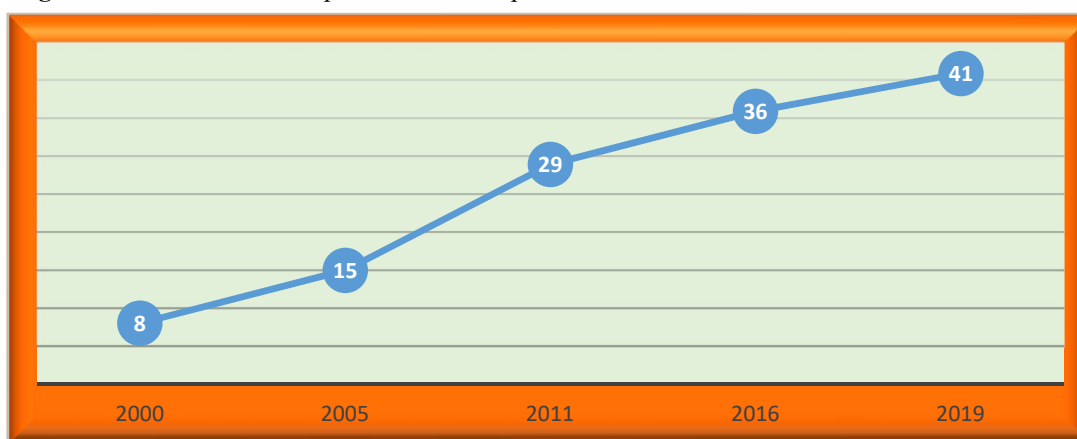
Source: *FDRE-MoH, 2016*

Improvement in health service infrastructure and manpower supply: In order to meet the minimum service coverage standard, the number of health posts, health centers and hospitals are increasing. For example, undergraduate students who were enrolled to attend medicine and health sciences in higher education institutions increased from 56,923 (37,186 male and 19,737 female) to 63,298 (38,438 male and 24,860 female) in 2015/16 and 2018/18 academic years respectively (MoE, 2016; MoSHE 2020). There are 181,872 health professionals in public health facilities in the country in which nurses, health extension workers and midwives constitute 21.59%, 15% and 7% respectively (FDRE-MoH, 2020b). Medical doctors/specialists constitute 4% of the health professionals of the country. The overall objective of HSTP II (2020-2025) is to improve the health status of the population through realization of accelerating progress towards Universal Health Coverage; protecting people from health emergencies; contributing towards transformation of households; and improving health system responsiveness (FMoH, 2020). Given the

current efforts, the FMOH believes that Ethiopia will achieve the minimum human resource for health target of 2.3 health workers per 1000 population by producing adequate health care providers, committing to deploy 43.5% of the total health workforce to HP would allow assigning 1 staff at HP for every 1000 population.

Improved contraceptive use: Concern with rapid population growth and the desire to intervene more directly in the process of fertility decline has prompted a greater focus on the proximate determinants of fertility (more importantly on family planning programmes). Ethiopia was able to increase the prevalence of contraceptive use among women of reproductive age from a low of 8% in the year 2000 to 41% in 2019 (CSA & ICF, 2019) (Figure 6).

Figure 6: Trends in contraceptive use in Ethiopia, 2000-2019.



Although women's use of FP methods has increased from 8% to 41% during the last 20 years, about a quarter of currently married women in the reproductive age group have an unmet need for contraception. Improving access to services, widening FP choices, reducing barriers, and improving the role of husbands in FP areas will play a significant role. The use of continuous community dialogue, individual counseling and behavioral change communication would be a useful tool to bring about changes in attitude and practices. Such interventions are particularly more important in regions with very low CPR (Somali and Afar).

IV. Conclusion and implications

It is needless to mention that Ethiopia has already started the demographic transition. If Ethiopia should harness the benefits of demographic dividend, the country should strive towards narrowing down the regional disparities in fertility levels. This can be done through maintaining and scaling up investments in human capital (education, health, and equity) and improving the socio-economic conditions. With increased attention to the priority intervention areas outlined above and with effective implementation of supporting policies, Ethiopia could attain below-replacement fertility level and ripe the benefits of demographic dividend.

References

- African Union Commission, NEPAD Planning and Coordinating Agency, UN Economic Commission for Africa & UWFP. *The Cost of Hunger in Africa: Social and Economic Impact of Child Undernutrition in Egypt, Ethiopia, Swaziland and Uganda*. Addis Ababa, Ethiopia; 2014.
- Alemu, Z.A., Dioha, M.O. Modelling scenarios for sustainable water supply and demand in Addis Ababa city, Ethiopia. *Environ Syst Res* 9, 7 (2020). <https://doi.org/10.1186/s40068-020-00168-3>
- Alene GD; Worku A. Differentials of fertility in North and South Gondar zones, northwest Ethiopia: a comparative cross-sectional study. *BMC Public Health*. 2008; 8:397.
- Amson Sibanda; Zewdu Woubalem; Dennis Hogan; David Lindstrom. The Proximate Determinants of the Decline to Below-Replacement Fertility in Addis Ababa, Ethiopia. *Stud Fam Plann*. 2003;34(1):1-7.
- Asresie MB; Fekadu GA; Dagnew GW. Contraceptive use among women with no fertility intention in Ethiopia. *PLoS One*. 2020;15(6):e0234474. doi: <https://doi.org/10.1371/journal.pone.0234474>.
- Assefa FMA. Assessment of Clients' satisfaction with health service deliveries at Jimma university specialized hospital. *Ethiop J Health Sci*. 2011;21(2):101–10.
- Assefa Hailemariam; Solomon Alayu; Charles T. The National Population Policy of Ethiopia: Achievements, Challenges and Lessons Learned 1993-2010.. In *The Demographic Transition and Development in Africa: The Unique Case of Ethiopia*. Edited by C. Teller and Assefa Hailemariam. Dordrecht: Springer. 2011:303-322.
- Banerjee K A O Carter. Waiting and interaction times for patients in a developing country accident and emergency department. *Emerg Med J*. 2006 Apr;23(4):286-90. doi: 10.1136/emj.2005.024695.
- Beyene, L. M., Ferede, T., & Diriba, G. (2020). The economywide impact of the COVID-19 in Ethiopia: Policy and Recovery options, Ethiopian Economic Association, Policy Working Paper 03/2020.
- Beyene, S., & Mekonnen, T. (2020). Projecting the impact of COVID-19 on exports in Ethiopia. International Growth Center. Retrieved from <https://www.theigc.org/blog/projecting-the-impact-of-covid-19-on-exports-in-ethiopia/>.
- Biya, M., Gezahagn, M., Birhanu, B. et al. Waiting time and its associated factors in patients presenting to outpatient departments at Public Hospitals of Jimma Zone, Southwest Ethiopia. *BMC Health Serv Res* 22, 107 (2022). <https://doi.org/10.1186/s12913-022-07502-8>.
- CAHF/ Center for Affordable Housing Finance in Africa. 2022. Housing Finance in Ethiopia. <https://housingfinanceafrica.org/countries/ethiopia/#:~:text=Affordability-,Ethiopia%20faces%20the%20challenge%20of%20not%20being%20able%20to%20supply,in%20the%20lower%20income%20brackets.>
- Central Statistics Authority and ICF/ CSA. *Demographic and Health Survey of Ethiopia*. Addis Ababa.; 2019.
- Central Statistics Authority and ICF/ CSA. *Demographic and Health Survey of Ethiopia*. Addis Ababa.; 2016.
- CSA (2015) *Urban Unemployment Employment Survey*, (Addis Ababa).
- Ethiopian Economics Association (EEA). 2021. *Economic Development, Population Dynamics, and Welfare*. Addis Ababa, Ethiopia. ISBN – 978-99944-54-81-5
- FDRE-MoH, 2020. *Annual Performance Report: 2012 EFY (2019/2020)*.
- Falkenmark, M. Landscape as life support provider: Water-related limitations. In: Graham-Smith, F., ed. *Population: The complex reality*. Golden, Colorado, North American Press. 1994. p.103-116.
- Fitaw Y; Berhane Y; Worku A. Impact of child mortality and fertility preferences on fertility status in rural Ethiopia. *East Afr Med J*. 2004;81(6):300-306.
- Gebremedhin S; Betre M. Level and differentials of fertility in Awassa town, Southern Ethiopia. *Afr J Reprod Heal*. 2009;13(1):93-112.
- Holden, Stein T.; Tilahun, Mesfin (2020) : Farm size and gender distribution of land: Evidence from Ethiopian land registry data, Centre for Land Tenure Studies Working Paper, No. 02/20, ISBN 978-82-7490-285-5, Norwegian University of Life Sciences (NMBU), Centre for Land Tenure Studies (CLTS), Ås
- Laelago T, Habtu, Y, Yohannes S. Proximate determinants of fertility in Ethiopia; an application of revised Bongaarts model. *Reprod Health*. 2019;16(13). doi: <https://doi.org/10.1186/s12978-019-0677-x>
- Mengistu Ketema and Getachew Diriba. Linkages among Economic Development, Urbanization, Population Dynamics and Urban Welfare in Ethiopia in” *Economic Development, Population Dynamics, and Welfare*. Addis Ababa, Ethiopia”.
- Ministry of Education (2019). *Education Statistics Annual Abstract 2011 E.C. (2018/19)*. Addis Ababa:
- Paulo Drummond, Vimal Thakoor, and Shu Yu (2014). *Africa Rising: Harnessing the Demographic Dividend*. IMF Working paper WP/14/143.
- Teklu Hailemariam; Alula Sebhatu; Tesfayi Gebreselassie. Components of Fertility Change in Ethiopia. Further

- Analysis of the 2000, 2005, and 2011 Demographic and Health Surveys. DHS Further Analysis Reports No.80. Calverton, Maryland, USA: ICF International; 2013.
- Teller C. and Assefa Hailemariam. The Demographic Transition and Development in Africa. Springer, Sci Media. 2011. doi:10.1007/978-90-481-8918-2_2
- UN Population Division. World Population Prospects: The 2012 Revision (New York: UN, 2013).
- USAID (2020). Agriculture and Food Security. <https://www.usaid.gov/ethiopia/agriculture-and-food-security>.
- World Bank (2020) World Development Indicators. Accessed online from
- World Bank. Capturing the Demographic Bonus in Ethiopia: Gender, Development, and Demographic Actions. Washington, DC: The World Bank; 2007.
- World Bank. Population Growth-Annual. <https://data.worldbank.org/indicator/SP.POP.GROW?locations=ET>. Published 2019.
- World Health Organization 2013 Ethiopia Health Profile (www.who.int/gho/countries/eth.pdf.)
- Wubegzier Mekonnen and Alemayehu Worku. Determinants of fertility in rural Ethiopia: the case of Butajira Demographic Surveillance System (DSS). BMC Public Health. 211AD;11:782.
- Yared. Patients Waiting Time and Associated factors at Outpatient Department in Tibebe Gion Specialized Hospital, Bahir Dar, North West Ethiopia, 2021 Yared, Baweke . 2021. <https://ir.bdu.edu.et/bitstream/handle/123456789/13865/Yared%20Baweke.pdf?sequence=1&isAllowed=y>.
- Zerihun Admit W; Haile Kibret and James Wakiaga. Ethiopia. 2015. African Economic Outlook.; 2015. http://www.africaneconomicoutlook.org/fileadmin/uploads/aeo/2015/CN_data/CN_Long_EN/Ethiopia_GB_2015.pdf.
- FRED (2020). Population, Total for Ethiopia. Available at: <https://fred.stlouisfed.org/series/POPTOTETA647NWDB>.
- UNICEF. Annual Report. 2017 [Internet]. Available from: https://www.unicef.org/publications/files/UNICEF_Annual_Report_2017.pdf.
- UNDP. (2020). Fast Facts. Retrieved from www.et.undp.org.
- Haileamlak A. How Can Ethiopia Mitigate the Health Workforce Gap to Meet Universal Health Coverage? Ethiop J Health Sci. 2018 May;28(3):249-250. doi: 10.4314/ejhs.v28i3.1. PMID: 29983523; PMCID: PMC6016355.
- UNDP (2019). Beyond income, beyond averages, beyond today: Inequalities in human development in the 21st century