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Demographic Transition in Sub-Saharan Africa: From Grassroots to Ivory Towers

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Abstract

The concept of *demographic transition* has been evident to European, North American and Japanese population since the early 1960's. It loosely followed natural patterns that were postulated as far back as 1795. However, scientists and policy makers, still erroneously consider *demographic transition* to be absent in sub-Saharan Africa. The aim of this chapter is to uncover the hidden truth behind population censa in sub-Sahara African countries using Statistical tools. The chapter analyses philosophical basis of sub-Saharan Africa demographic dividends from 1960 to 2000. It then cautiously highlights how *demographic transition* is emerging in sub-Saharan Africa. Specifically, it endeavours to highlight how different African countries are in different stages of demographic transition. The chapter also contrasts some of the prevalent misconceptions about Africans, especially the *delusional* idea of Africans as a *homogenous* population group on genetic basis. Lastly, it offers solution, to the current demographic chaos, and their relationship to future matured *demographic transition* in sub-Saharan Africa.

Keywords: Aging, Africa, Morbidity, Mortality, Demographic transition

1. Introduction

The sub-Saharan Africa is a vast land full of mystery. There is compelling indication, that the origin of man goes back to sub Saharan Africa (the Eastern part), [1–3] and the modern means of exchange in trade using money (in form of *coins*) also reported in the East African island of Kilwa [4]. There are several mysteries, that go unnoticed, whenever the topic of Africa is brought into the discussion tables. For instance, for quite sometimes, there appears to be no full attention paid *in pedagogic sense*, for population growth dynamics in the region. It is not entirely clear on factors for population growth dynamics in much of sub-Saharan Africa. Moreover, available population data have questionable reliability as it will be evident in later sections. Likewise, there is palpable evidence of *demographic transition*, in most of sub-Saharan Africa. Conversely, it is hypothesized that, the popular view on sub-Saharan Africa demographic data inter alia, reflects Western ideas, in terms of views and extrapolations.

The concept of *demographic transition* in sub-Saharan Africa seems to be a farfetched idea. At present, I consider important to be clear about what is meant by *demographic transition*, in order to avoid confusion to readers. Put simply, *demographic transition*, refers to that phenomenon, where by human population shifts its

pattern, from the high frequencies of fertility and deaths, to the one characterized by low fertility and deaths. The effects are to be observed at a group (e.g. society) level. It should not be interpreted at individual level. The rewarding effect of demographic transition being increased longevity at the level of the society. *Demographic transition* as it is known to date has its rich history.

As far back as 1930, there was already evidence in literature for the concept of *demographic transition*. Warren Thompson introduced the concept when he categorized the nations of the world to a three tier demographic patterns [5]. Little was known by the time of Thompson, that what he hypothesized, was in Actual sense, a *demographic transition* in its basic form. After the publication of Thompson back in 1929, various other scholars formulated the concept, in its elaborate features, as we know it today. It may be of benefit to highlight, some of the earlier works, that gave rise to this concept, as means to acknowledge earlier scientific work, as well as provision of the groundwork for deviation, when one wants to analyze, the concept of *demographic transition* in sub Saharan Africa.

Warren Thompson publication in the *American Journal of Sociology,* makes an exemplary published evidence on *demographic transition* in English literature [5]. According to Thompson, three types of countries exist [5]. The first (group A) was composed of nations characterized by a rapid drop in population growth [5]. These countries have a steep fall in birth rates (a marker of declining fertility), accompanied by relatively declining death rates [5]. This pattern initially masked the depopulation feature. In the long run, they were faced by net population drop. Thompson referred to these countries as mostly found in the Western & Northern Europe; like England, France, Germany, The Netherlands & Sweden; as well as parts of the present day United States, and Australia. The second set of countries (group B) were characterized by rapid decline, in both birth and death rates, but with earlier and more steep slopes in death rates reduction, relatively to the slopes of birth rates [5]. Thompson's estimations were such that, countries making the second set were likely to report rapid population growth, until a certain point, when birth rates would stagnate before actual depopulation occurs [5]. In this set, he referred to most Eastern & Southern Europe; like Poland, Bulgaria, Greece and Spain. On the other hand, the rest of the world; including Asia, Africa & Middle East; were to form group C [5]. Contained countries with characteristic high fertility and premature mortality at young age [5]. It is interesting to point out that, Thompson referred to group C countries as following *Malthusian* rule, [5] probably on an account that, neither birth nor death rates were under control in these countries However, he did not have data to substantiate most of the demographic patterns in Africa, and other members of group C, so he decided to use the sparse data, available from Japan and Russia, to account for them.

Audrey Laundry was perhaps the most important scientist in bio-demography during the 20th Century. His views have largely been adopted by demographers and bio-gerontologists alike, when describing *demographic transition*. Landry, who was a French demographer, managed to explain better, about the drivers of *demographic transition,* post-industrial revolution [6]. According to Landry, the entire world would ultimately follows the demographic pattern characteristic of contemporary society [6]. He viewed the human society to follow three distinct patterns, determined purely by the factor of time. According to Landry, the primitive society is composed of rather high levels of both fertility and early mortality; ultimately characterized by a society full of children and young adults [6]. From this stage, the society is said to undergo a "demographic revolution", characterized by delayed mortality but with relatively high fertility rates [6]. Lastly, the society becomes modernized, with characteristic features, of both delayed and falling fertility, as well as reduced mortality rates at the level of the society [6]. What Landry initially

termed as "demographic revolution", is what is referred to as *demographic transition* in present times. It is still ill-understood, whether Landry's hypothesis, on what we currently term as *demographic transition,* is original or a transformation of the earlier work by Thompson. However, in an optimistic view, this chapter will explain the differences in ideologies between the two scientists; that perhaps motivated the author, to consider their ideas to be distinct and original to each, in the next section.

2. Demographic trend in sub-Saharan Africa

2.1 Sub Saharan Africa: the basics

On a strict geographical context, sub-Saharan Africa is that region in Africa south of the Saharan desert [7, 8]. However, it is important to caution the reader, about the confusion associated with the term, found in published literature. For instance, while in actual sense (on the basis of geographical boundaries), all African countries, that are fully or partially located south of the Sahara desert, are referred to as sub-Saharan Africa, there exists a number of *currently acceptable definitions,* for sub-Sahara African countries. According to the so called "League of Arab States", countries like Mauritania, Somalia (and the current divided states of Somaliland & Puntland), Djibouti and Sudan; all of which located either in part of, or south of the Sahara desert, are sometimes included among the "North Africa & Middle East region"; together with Egypt, Libya, Morocco & Algeria; and therefore are considered to be out of sub-Saharan Africa. This is especially in matters involving politics of Islam and Islamic welfares. On a geographical sense per se, these states are part and parcel of sub-Saharan Africa. Not only are they geographically part of sub-Saharan Africa but also they share a number of cultural, socio and historical ties with the rest of sub-Sahara African states. This confusion renders the task of establishing the demographic trends and dynamics of sub Saharan Africa especially difficult, since facts & figures can change dependent on the source, even when no real differences exist. As of July 2017, the UN lists 46 countries out of the current 54 African independent states as belonging to the region identified as sub Saharan Africa [7].

The confusion highlighted in defining sub-Saharan Africa does not end with politics of the Arab world. It is rather comic, when one realizes that for some yet unknown reasons, the Republic of South Africa, and the islets of Mauritius and Reunion; are also generally left out, when discussing sub-Saharan Africa. To the best of the author's understanding, this rather *comic view* has a probable basis from the colonial past, as South Africa was considered a '*whites only*' territory until 1994. The effects of such 'post-truth politics', on the coverage of sub-Saharan Africa, have a direct impact on demographic estimates of the region. The same fact can be substantiated on statistical ground by reviewing the demographic share (5.6%) of population size of the Republic of South Africa to that of sub-Saharan Africa in 2018 [9].

Moreover, the story of the islands of Mauritius and Reunion is even more fascinating. Some of its neighbours (e.g. Malagasy & Seychelles), are annexes of the main continent. They are counted as part of sub-Saharan Africa. However, the two beautiful set of islets are left out independently. It is my opinion that, what so ever goes on with the exclusion of the Republic of South Africa, as well as Mauritius and Reunion, from the geographical regions of sub-Saharan Africa, to be a function of colonial history and attitudes, rather than real justifiable demographic phenomena. This is because there are more similarities, both in cultural traditions,

values and even history, say between the Zulu found in South Africa and The Shona of Zimbabwe. Likewise, there are perfect resemblances between the Zulu of South African Republic and the Ngoni of present day day Tanzania than are between the Zulu and the South African whites. Besides, there are a number of cultural and social connections between residents of Madagascar and their companions in Mauritius – and even between inhabitants of Mauritius with those in Reunion, than between Reunion residents and French. Thus, to remove the ambiguities, it is important to stick to geographical markers, when describing the region referred to as sub Saharan Africa.

2.2 Sub Saharan Africa: demographic trend from 1960 to 2000

2.2.1 The philosophical basis of sub Saharan Africa demographic dividends from 1960 to 2000

The demographic trend of sub Saharan Africa for the period encompassing 1960–2000 reflects socio-political picture of the region. On demographic grounds, the year 1960 to Africa is as important to demographers as it is to historians. The year 1960 marked the political independence of at least seventeen (17) African states from colonial rule. This same year, also saw the re-incarnation of some of the new countries. For instance, Somalia republic was born, on 1st of July 1960, after the so called *British Somaliland*, that was granted her independence on 25 June 1960 by the United Kingdom, united with *Italian trust territory of Somalia*. Thus, for the same reasons, all efforts have been made to measure population dynamics from that time on wards. Besides, it is important to caution the reader at this stage, that even though the region is composed of population with virtually the same skin color, Africans in sub Saharan Africa, tend to differ in a number of distinct ways, as explained later in this chapter.

The demographic divide in sub Saharan Africa reflects the anthropological variation, that has been evident in literature for a long time now [10–14]. Moreover, the genetic variation in modern day African population is causally related to demographic history [12]. Changes in short- and long-range migration patterns, as well as changes in population size and social interactions, across different parts of sub Saharan Africa, have shaped its demographic and even genetic history, into its current unique profile. The islands of Unguja and Pemba (famously referred to as Zanzibar), that are part of the present day Tanzania may offer the best vivid example. Immediately following the Zanzibar revolution of 1964, there are reports that the act was accompanied by mass upheaval, [15] that resulted to social unrest- where by women of Arab, Indian and Persian origins; reported to have been sexually assaulted, and a significant majority raped [15, 16]. Much to the same reported atrocity, others were forced into marriages, with the local African population or neighbors of different cultural base [15–17]. The results of the reported *social turmoil*, are to a large extent visible today, where by a growing select of the population of Zanzibari's with Indo-Persian, Afro-Arabic, Afro-Persian as well as Indo-African demographic identities are prevalent throughout the isles [15]. However, it is the ultimate belief of the author, that the factual information provided here, will be used for widening the scope of the demographic picture among sub-Sahara Africans, rather than a source of racial segregation-or *emotionally determined finger pointing*, as it has been the case, whenever the same concept is discussed. This is because, to a large extent, the facts above reflect human egoistic tendencies, just like the actions of Spaniards to the locals in parts of today's Latin America, during the medieval period. The same human egoistic tendencies can be reflected to previous actions by the Vikings, on Anglo-Saxon region of the past. Thus, it is important for the reader of sub Saharan Africa demography, to be knowledgeable in history, as well as

socio-political contexts of different times, in different sides of the continent; least of that he/she may be a potential victim of cognitive biases.

2.2.2 Trends of 65+ years population in different sub-Sahara African countries

Analysis of demographic transition in sub-Saharan Africa, needs constant attention and appraisal, for a variety of reasons. First, there exists a lot of confusion in merging data for demographic analyses across different sub-Sahara African states. This also goes hand in hand with data augmentation processes. The cause behind this being unpredictable and rapid population migration; from one state to another, for a multitude of reasons over time. The aftermaths of which, being failure to appreciate the population growth trends, as per standard principles of demographic analyses. This applies whether one studies *cohort* or *period* population data. For instance, when one wants to analyze the population growth trend of Tanzania for a period 1960–2000, s/he must take into consideration, not only what went on in Tanzania during the reported time, but also what went on in Rwanda & Burundi – especially in the early-to-mid 1990's; the socio-political avenue behind citizenship in Tanzania during the same time period; as well as the effects of HIV/AIDS; that was reported in Tanzania, for the first time back in 1983.

Besides, there appears to be a lot of what may safer be termed as *doctoring*; that includes both *data dredging* efforts, as well as *overt politicking,* in the national population census statistics in much of sub-Saharan Africa. Factors influencing these rather statistical manipulations, are inter alia, diverse- and beyond the objectives of this chapter. However, in order to enlighten the reader, I considered it important to uncover, some of the vivid examples, behind these allegations, that are available in published literature.

Nigeria, a country located in the mid-Western region of Africa, is currently the most populated of all in Africa. It is a federation comprising of 36 different states, with Lagos counted as the largest city; not only in Africa but in the entire continent [18]. In the past, and until very recently, Cairo (An Egyptian capital) was the most populated city in Africa. From a demographic stand point, Lagos may be termed as a *prototype*, of modern African metropolitan area, on both socio-political as well as demographic base. What fascinated me, to study the demographic pattern of Lagos, to say Cairo or Cape-Town; is the richness in *demographic puzzle*, that Lagos offers, compared to others in Africa. For instance, even though Lagos had estimates of population census, first reported by an American sailor, way back to 1789, [19] the real *head counts* in Lagos has never been known even to the closest ten percent to date [20–23].

It is especially interesting, for the reader to notice that, factors responsible for *data snooping,* in the population census of Lagos, have also changed over time. For instance, the attitude of household heads was the prime culprit in the past [19]. Accordingly, household heads in Nigeria previously perceived, that 'counting in-house children brings *bad luck* to the family' [19]. The current reported chaos of the questionable reliability, in the actual population size in Lagos, has something to do with politicians, who tend to benefit in *the Nigerian house of representatives*, based on population base of their sphere of influence [20]. Thus, in the past, Lagos used to have a population census figure, that grossly under-estimated the true value, while at present, the concept is that of over-counting, for revenue gains among politicians! Therefore, whenever one endeavours to compile statistics of population census in parts of Africa, there is a dire need to consider confusion matrix tables, least of that, it is highly unlikely to obtain any reasonably reliable estimates on statistical grounds.

From the above description, I considered it crucial to analyze individual national population growth trend over time. The motive behind this undertaking, using the best available/retrievable data, is to appreciate the coherent structural changes, in defined and politically bound, population trend over time.

2.2.2.1 Population growth trend over time for ≥65 years old in Tanzania

Tanzania is a country situated on the East African coast. It is an amalgamation of two (2) different independent former nation states of *Tanganyika* and *Zanzibar (Unguja and Pemba) islands*. Tanganyika, the largest inland structure, also commonly referred to as *Tanzania mainland*, is a former German colony that went under British protectorate, by the directives of the then League of Nations back in 1920. It gained her official political independence from the United Kingdom back in 1961. The Zanzibar archipelago – formerly part and parcel of the Sultanate of Oman, was a *de facto* British zone until her formal political independence in 1964. The overall population growth trend for the ≥65 years in Tanzania was mainly greater in Zanzibar than Tanzania mainland (former Tanganyika) up to 1988. From that point onwards, there was a switch in the pattern, as Tanzania mainland population growth surpassed that of Tanzania-Zanzibar. Moreover, one should be able to appreciate the drop in both mortality and fertility rates over time. **Figure 1** below highlights the population growth trend for ≥65 years in Tanzania over time.

It is important to realize that population growth trend for any demographic segment in Tanzania is likely to have a mixture distribution. There are key attributes, for this rather statistical picture, *namely the population structural differences, union segments* as well as *social & historical hallmarks*. Whereas Zanzibar, the demographic picture is likely to reflect the *islandic culture* (demographic mixture of culture and values) – just like today's Great Britain and/or Japan, the situation in Tanganyika reflects a subtle homogenous picture, characteristic of a typical continental nation. Besides, whereas in both cases, there are mixed population, as evidenced by the Swahili culture in Zanzibar, as well as the peasants-pastoralists in the mainland, one needs to appreciate that there are different ethnic groups in Tanzania; than say ethnic groups in her former colonial masters- namely Germany and Great Britain respectively. Thus, readers are reminded here, to exercise a great deal of caution, when analyzing the historical script that dictates the current population growth in today's Tanzania.

Moreover, and maybe of practical importance to any demographer and aging researcher, are the historical events that culminate important hallmarks for the elderly population growth changes in Tanzania. Tanzania, from its point of formation in 1964 (official union time) to early 1980's, exercised a uniform increase in population growth to all demographic segments over time. However, and this
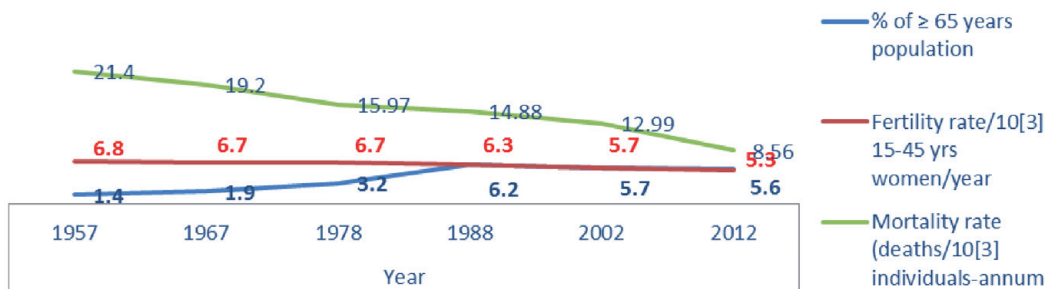
Figure 1.
Demographic trend in Tanzania (1960–2000). Source: Adapted from National Bureau of Statistics (NBS) and Office of the Chief Government Statistician (OCGS) Zanzibar, 2013 [24]. The trend above reflects a steady relative % increase over time out of a base total population that also grew positively over time.

comes as an important demographic hallmark, HIV/AIDS was first reported in Tanzania sometimes in 1983. It is highly likely, that immediate impact of HIV/AIDS, to be responsible for the *relative* sharp increase in the '≥ 65 years' cohort growth in Tanzania, for the period that includes 1978 up to and including 2012.

There are countless vivid evidence, that shows effects of HIV/AIDS, in the trend statistics of '≥ 65 years' population cohort in Tanzania [25–29]. Of paramount importance to bio-demographers and bio-gerontologists in the field, is perhaps trend statistics over time associated with demographic sect of '≥ 65 years' in Tanzania. It is important for one to recall that, HIV/AIDS in Tanzania, initially contributed to significant increase in mortality among youth and young adults. Thus, the relative increment in population of '≥ 65 years' in Tanzania, observed between 1978 to 1988, has been accounted before, to be likely a relative phenomenon, secondary to massive deaths in younger generations in the population pyramid, almost exclusively due to HIV/AIDS in the same period [25].

HIV/AIDS epidemic in Tanzania went on without any significant clinical course during 1980's to mid-1990's. HIV/AIDS victims died, simply by following the natural history of the infection. Ante-Retroviral Therapies (ART) against HIV in Tanzania started in mid-1990's [25]. These drugs do not cure HIV-infection. Rather, they slow down the progress, with newer varieties significantly preventing viral replications in human cells and tissues. The immediate impact at individual level being, regressing in the speed, to which HIV infection would otherwise cause death without intervention over time. That translates to, HIV-infected individuals living almost normal life, resembling those without HIV infection. However, their impact on mortality was not reflected in demographic data until around mid-2000's [25]. Thus, even though there are clues of a probable *demographic transition* in Tanzania, readers should not forget that all these global strategies on HIV/AIDS and Ante-Retroviral Therapies, at best postponed all morbid and mortal effects of HIV/AIDS to later ages!

At present, it is important to realize that, there are projections suggesting average life expectancy at birth for both Tanzania and *Tanzania mainland* to increase from 62 years in 2013 to 74 years in 2035 for both sexes [30]. Of course, just like in other areas, the projections confer a slight female advantage to the effects. Specifically, males will experience an average increase of about a decade (from 60 years in 2013 to 71 in 2035) while females will increase on an average of 13 years (from 64 years in 2013 to 77 years in 2035) [30]. Moreover, Total Fertility Rate (TFR) will experience a significant drop (from 5.3 to 4.1) between reported period of 2013 and 2035 respectively [30]. Whereas the author believes factors responsible for increased longevity in Tanzania over the reported time period to be multifactorial, it is no doubt, that overall, these statistics display a clear picture of a *demographic transition*.

2.2.2.2 Population growth trend over time for ≥65 years old in the Republic of South Africa

The Republic of South Africa (RSA) is a relatively new nation state under post-colonial African perspective. It was officially made a republic, under majority rule, independent nation in 1994. However, much as the goal of this chapter, is to inflict knowledge to readers, it is important to underscore, the fact that, no other country in Africa, is as a subject to *confusion* as the Republic of South Africa. Dependent on how you view it, the Republic of South Africa may be considered a higher income country, and hence far apart, other sub-Sahara African countries. Moreover, if one is interested in demography and sociology, the Republic of South Africa offers her own fair share of *confusion* as well, due to mixed racial & ethnic varieties. If one decides to enter RSA via the city of Durban, the country is more or less like Indian subcontinent.

Should one set foot in RSA via one part of Johannesburg or Cape Town; RSA is more or less like a European destination. Much of the other parts of RSA still reflect a typical African semi-rural structure. Much still, one needs to be cautious when reviewing the population base in RSA. Republic of South Africa has a rich mix of Indians, Africans and Caucasians living in the same geographical borders! The author almost always gets confused himself, whenever he visits the Republic of South Africa, since his first trip to a medical congress in Durban. More to the confusion, RSA is also home to a significant number of *illegal immigrants*! Thus, the author wishes to extend his sincere vote of caution, to any sensible reader, when analyzing the population dynamics, in the Republic of South Africa.

On a strict demographic sense, the Republic of South Africa is at the midst of a *demographic transition*. The *median age* of the general population has risen from 18 years to 25 years, in just about past three decades [31]. With the continuing aging of the population, this statistic is expected to rise, even further to about 31 years, in less than three decades time [31]. Besides, the sheer size of '*senior citizens*' as a distinct group, in the population pyramid, of the Republic of South Africa, has also increased tremendously. For instance, Statistics South Africa, an official central government statistical body, reported an increase of people ≥60 years in South Africa from 2.8 million to 4.1 million between 1996 to 2011 [32]. The proportional increase in the population pyramid was from 7.1% to 8.0% between 1996 to 2011 [32]. During the same reporting period, total fertility rate dropped from 3.5 to 2.57 [33]. It is worth noting however, that these reported statistics are averages, compiled out of an approximate mixture distribution. Thus, whereas there is a marginal increase in average life expectancy at birth, among the demographic sect identified as "*South African whites*", the magnitude is somehow different, and significantly lower, among those identified as "*Black African*". The bottomline argument – *confusion*!

Over time, Republic of South Africa has reported a relatively steady growth in her cohort of '*senior citizens*'. **Figure 2** below highlights the ≥65 years growth trend over time among South Africans. It is worth noting that, these grouped statistics reflect a probable increase in longevity, among resident South Africans. When these statistics are taken into consideration, together with those of fertility rate over time, they signify a typical *demographic transition* in that society.

There are a number of possible postulates readers are advised to consider, when analyzing the observed demographic trend in Republic of South Africa over time. First and perhaps the most important, is the fact that there are sharp differences in reported data between what happened in RSA prior to 1990 versus what ensured thereafter. The exact cause of this observation is not clear even to the author of this chapter. However, there are a number of speculations worth appraisal on forensic
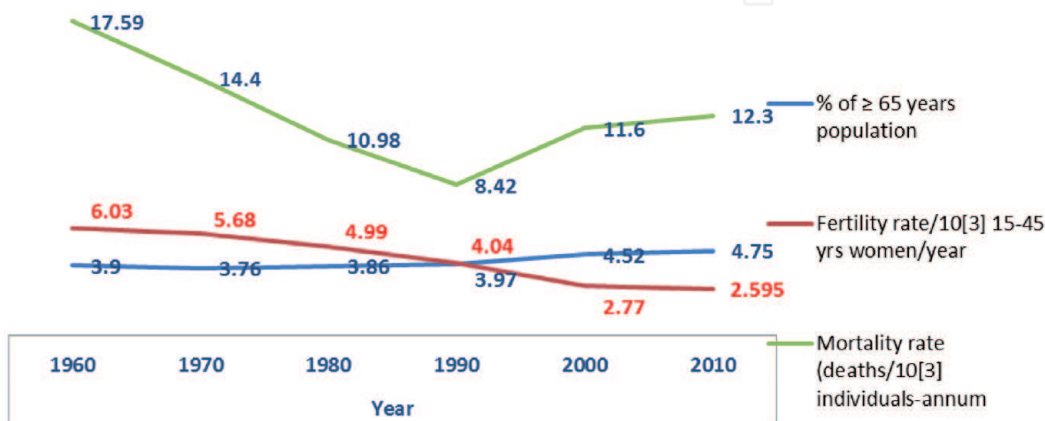
Figure 2.
Demographic trend in Republic of South Africa (1960–2010). Source: The World Bank [34].

grounds. For instance, it is highly likely, that reported data prior to 1990's, reflected a segment of South African population only. This is because, what is currently referred to as Republic of South Africa, was essentially under '*South African whites*' rule prior to 1994. Should this hypothesis be authentic, then caution needs to be exercised when one interprets the pattern of *demographic transition* vivid on reported South African data over time.

Otherwise, RSA is among countries worst affected by HIV/AIDS. Much as it is a multi-racial country on demographic sense however, "Black South Africans" are the majority. The same cluster has the highest all-time prevalence of HIV in RSA to date. Unlike other sub-Sahara African countries, RSA has the highest population inequality in their health system. "Black South Africans" are the largest population group without health insurance and/or reliable social security. By far, they are also the main segment of South African population with highest all-cause mortality rates of all. The fact that the largest mortality effects due to HIV/AIDS became vivid in RSA statistics around 1990's is also worth recognition. It is highly likely therefore, that the attenuated effects of mortality trend statistics from **Figure 2**, to reflect "Black South Africans" health inequalities, as a *latent variable*. Thus, RSA demographic trend over time is likely to be a reflection of societal inequities in a number of other social parameters, apart from health and/or HIV/AIDS alone.

Besides, readers should avoid the temptation to believe improved longevity (>65 years population growth) to be equivalent to improved health among South African population. It is currently common knowledge that South Africa is among countries with the highest per-capita consumption of ARTs for HIV in the world. Thus, just like Tanzania, a significant proportion of South Africans lives with HIV, and are likely to enter old age with the HIV-infection. The same 'cohort' is likely to suffer from significant morbid conditions, either associated with HIV itself or long term consumption of ARTs against HIV, some with known tolerable side effects, and therefore adding up in multi-morbidity statistics and reduced Quality of Life (QoL) in later life.

2.2.2.3 Population growth trend over time for ≥65 years old in Nigeria

Nigeria is a federal republic situated on the West side of Africa, North of the Gulf of Guinea. It is a multiethnic state, with more than two hundred ethnic groups. The main demographic clusters are dominated by Igbo (East), Yoruba (West) and Hausa-Fulani (North) [35]. Nigeria is the largest country by population size in the continent of Africa. About 3% of its current population is considered ≥65 years of age [36]. The '*gray cohort*' is projected to increase, to an all-time highest figure of 10% by 2050 [36]. To appreciate the impact of these figures, in less than 25 years, Nigeria's '*gray cohort*' is projected to be double the current population of Senegal [36]. The trend is worrisome, considering that little if any, has been planned ahead, To cater for this population growth changes in Nigeria.

The ≥65 population trend in Nigeria for the period encompassing 1960 to 2000 is as shown in **Figure 3** below. It is worth noting that the total population size of Nigeria has been continuously increasing over time, ever since it got her independence from Britain back in 1960.

From the **Figure 3** below, there are several research line of thinking to social researchers, demographers, policy makers and planners as well as to clinicians and clinician-scientists at work. First, it is still ill-understood how does the rapid aging population in Nigeria influences public health, social and economic milieu of Nigerian society at present and in the future? Moreover, given the over-burdening in the unprepared Nigerian economy, how to safely ensure resource allocation and utilization without causing ever-lasting damages in the Nigerian economy? Lastly, how does Nigerian public health system prepared to tackle the emergent epidemics
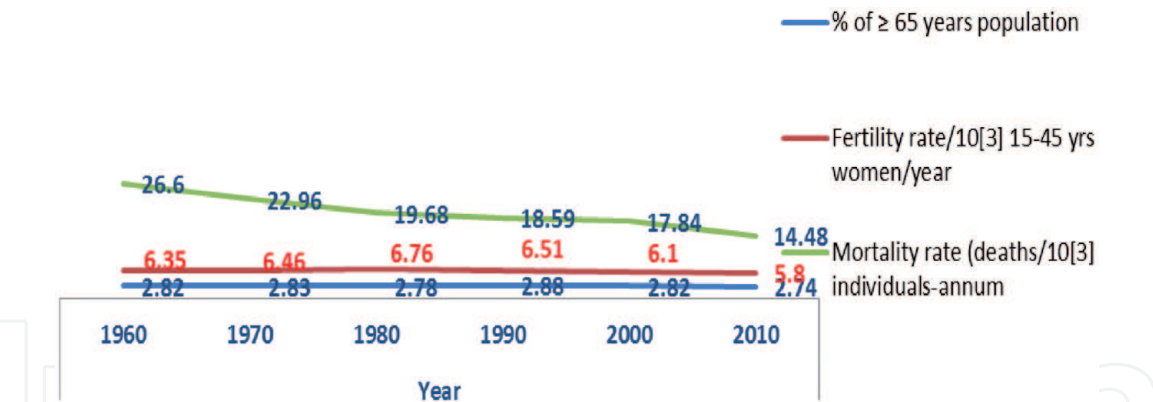
Figure 3.
Demographic trend in Nigeria for the period 1960–2000. Source: World Bank [36].

(all chronic diseases!) associated with conditions that occur almost exclusive in later ages? All these challenges are likely to become *insurmountable* (i.e. a conundrum) should their position be left to be appreciated at the time when little can be done.

2.2.2.4 Population growth trend over time for ≥ 65 years old in Egypt

Egypt, officially Arab Republic of Egypt, is colloquially referred to as *the grand-mother of Africa*, just as Denmark is to Europe. It is a trans-continental country, spanning from the North-Eastern corner of African continent to the South-Western parts of Asia. Egypt is so ancient to Africa and perhaps among the most ancient countries on earth. It is so rich in its history, spanning from mathematics and geometry to navigation and governance. The famous *Bibliotheca Alexandrina* (i.e. The Great Library of Alexandria) remains as one of the most notable features of pedagogic virtue from Ancient Egypt. It forms an important attraction site whenever the author visits the Egyptian coastal city. To the most part of Egypt, her rich historical background forms basis of its complex demographic pattern.

Egypt is the third-most populated country in Africa, after Nigeria and Ethiopia, with over 100 million inhabitants. It is among countries that are considered Afro-Arabic, as dependent on how you analyze Egypt, it may be part of Africa or Arab world. The decision to include Egypt as part of this analysis was not an easy task. For real, on geo-political sphere – Egypt is not part of sub-Saharan Africa. However, on a strict historical note, and perhaps considering Egyptian's ethnic groups, some have typical '*Nilotic*' features, prominent mostly to other sub-Sahara African states. In short, Egypt is to *river Nile* as Israel is to Jerusalem. It was on the basis of this "*Politics of river Nile*", Egypt has been included in this demographic analysis. **Figure 4** below highlights the ≥65 population growth trend over time in Egypt.
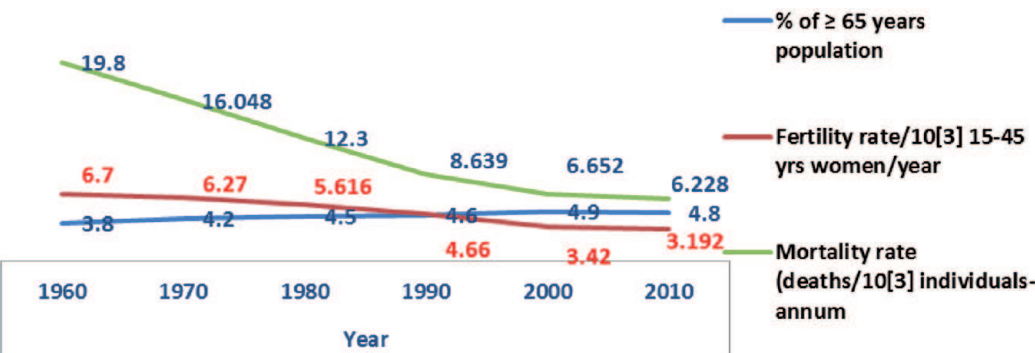

Figure 4.
Demographic trend in Egypt (1960–2010). Source: World data atlas [37].

3. Hallmarks in the pattern of *demographic transition* in sub-Saharan Africa

One silly mistake that scholars and researchers make about Africa; is the assumption that Africans are a homogenous cluster of human beings. Perhaps, there are probably few (if any) other overt gross mistakes on earth today than this! To put matters into perspectives, no other human race is as *genetically diverse* and with *less Linkage Disequilibrium (LD) among loci* as the African race [38–42]. It must be noted that, the observation of genetic variations in modern Africans, to be a function of history on a strict pedagogic sense. Of interest to demographers and aging researchers, being short and long migration events of the past; changes in population sizes as well as admixture [12]. Thus, the author considered it a selling point, to highlight this important fact that almost always goes unnoticed, prior to any subsequent African demographic trend analysis.

At present, there appears to be a disconnect, to appreciate that most of the political borders, that define African countries, are essentially a historical accident, with almost completely no role in identification of any distinct African ethnic group. Africa is at present identified solely based on what happened in the city of Berlin, Germany between November 1884 and early February 1885. To this end, while it is logical to assume distinct ethnicities across different geographical areas, say between Italians North of the city of Rome, from those in the South, it is a matter of total *confusion*, and in actual fact purely *illusionary*, to separate a Somali found in Somalia from another one in Puntland. In the same token, it must be considered completely futile to differentiate a maasai man in Tanzania from another one in Kenya on the basis of geographical location alone. Thus, the current analysis in the trend of >65 years population growth will dwell into viable known biological, clinical, historical or social constructs (e.g. tribes) than mere geographical markers.

It is worth noting that the pattern of *demographic transition* seems to occur at different pace among African nations. It is clear from the prototype nations, in this chapter, that Tanzania is perhaps at the beginning of demographic transition. In Tanzania, the proportion of >65 years cohort are yet to surpass fertility rate, there are clear markers, for mortality rate to drop over time. There are a number of other factors (e.g. HIV/AIDS), that are likely to stop the current pace, in accelerated >65 years population growth, in the near future. However, on a serious note, Tanzania seems to accelerate faster in *demographic transition* than the rest of studied African nations. It is quite vivid from the demographic estimates, that Tanzania had its >65 years cohort, almost doubling in quantity, in the last two decades of the 20th Century. During the same time, the there was also a relative slowing down of crude-mortality rates, a clear pattern to justify a probable *demographic transition*. The accelerated pattern in the '*gray cohort*' population in Tanzania in the 1990's has an elaborate explanation published in literature before, [25] and explained in the previous section in this chapter. Specifically, the author believe that, the effect of >65 years proportional growth to be relative, in that the 'observed' >65 years population growth between 1970's to early 2000's, was probably a result of increased mortality, secondary to HIV/AIDS among youth and middle aged groups. HIV/AIDS was first reported in Tanzania in 1983, and the disease was left to spread unabated, under just natural history of the infection, up until mid-1990's, when ante-retroviral therapies against HIV first became available in Tanzania [25]. Thus, according to this postulate, first published by the author back in 2017, [25] it is highly likely, that the '*middle-aged*' cohort back in 1980's, who was probably to enter '*gray cohort*' in 1990's, and reflected in the reported statistics, died before ante-retroviral drugs became available in Tanzania [25]. The drop was considered a relative picture secondary to high mortality rates associated with HIV/AIDS in Tanzania during the

mid-1980 to mid-1990's. However, HIV/AIDS alone cannot be a substantial reason to doubt the >65 years population growth, and therefore *demographic transition* pattern in Tanzania. Other parameters associated with *demographic transition*, like a significant drop in all-cause mortality as well as reduced fertility rates were also prominent during the same reporting period. Health system resilience in Tanzania may also a potential marker influencing vitality in middle aged and therefore ensuring longevity in later life. However, there are little studies to link the two variables at present. We have just started a research group, that aims among other things, in establishing the link between reproductive endocrinology and ageing process [43, 44].

From a bio-demographic point of view, HIV/AIDS pandemic picture that was introduced in this chapter is not unique to Tanzania. In fact, it is highly likely, that a similar situation, to be applicable to Republic of South Africa as well as Nigeria. However, additional information needs to be retrieved to prove this agenda; an activity that was considered beyond the objective of this chapter. However, as a matter of intellectual maturity, the author wishes to suggest that, HIV/AIDS effect on the demographic trends, is highly likely to create a more complex picture, in sub-Saharan Africa over time. For instance, whereas the earlier era, the picture adapted in this chapter was contributed by HIV-infection spread under natural history; present day and future patterns are likely to be significantly influenced by chronic and debilitating conditions, associated with ante-retroviral agents against HIV. Thus, whereas in the past, HIV contribution on demography was mainly on mortality statistics, future trend is highly likely to be dominated by prevalent chronic conditions, and therefore shifting the picture, from mortality to morbidity statistics. The author believes that, societal consequences of HIV/AIDS pandemic, to contribute significantly on demography of diseases and deaths, at later ages in future Africa.

If one considers later life success (i.e. *successful aging*) to have its basis from early life experiences, there is a desperate need for African governments to invest in primary and preventive healthcare for all. This can be effectively done using universal health care. At present, there is *palpable evidence* to warrant future disaster in Africa. This is because there are still a lot of illnesses affecting under-fives throughout Africa [45–48]. Most of these illnesses, have long term repercussions, to be evident even at old age [47, 48]. It is therefore a matter of intellectual maturity; for scholars, researchers, policy makers and decision makers in general, to consider effective primary and preventive healthcare strategies. Short of that, Africa is likely to have an uncertain future, full of *frail* people in later life, out of disease states that can be prevented, using relatively cost-effective and proven interventions. The cornerstone of all these efforts being *successful aging* process starts from earlier life primary care prevention.

Moreover, by analyzing the current trend in *demographic transition* among selected African countries, policy makers and decision makers alike, should consider effective ways to mitigate effective established and proven intervention strategies. This will accommodate the ever increasing 'gray cohort'. Short of that, African nation states should prepare for a disaster; that is likely to become unmanageable, given the weak African economic base, and poor health and social security systems. Part of the interventions, by African governments and local institutions, could be resource allocation and utilization, in the direction of old age sociology. They may include items like enhanced social security measures (e.g. pension system), universal health coverage (to serve as a pool of funding for old age cohort in future) as well as capacity building in old age arts and sciences.

On clinical grounds, and this serves as an important alert notifications, to healthcare decision makers and healthcare workers, *demographic transition* is prevalent in Africa. Whereas it is about to start in Nigeria, it is on its infancy stage

in Tanzania, and already matured in Egypt as well as Republic of South Africa. There is a need for substantial investments in geriatric care, as well as all branches of bio-and social-gerontology. The idea that, *senior citizens* can be effectively managed by internists from general internal medicine is likely to prove disastrous over time. Quite often, even in Europe and the USA to date, *senior citizens* are prone to be victims of poly-pharmacy, adverse drugs effects as well as a number of other iatrogenic effects- almost always fatal [49–54]. There are barely significant clinical research findings on geriatrics from Africa. This is a rather disappointing finding. Orthodoxy medical practice has entered the era of precision medicine that entails treatment of patients from as far down as their genetic composition. Capacity building and effective legislations (e.g. enforcing a sizable % of GDP on Research & Development) are part of the short term solution to an otherwise long term foreseeable conundrum.

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