Introduction

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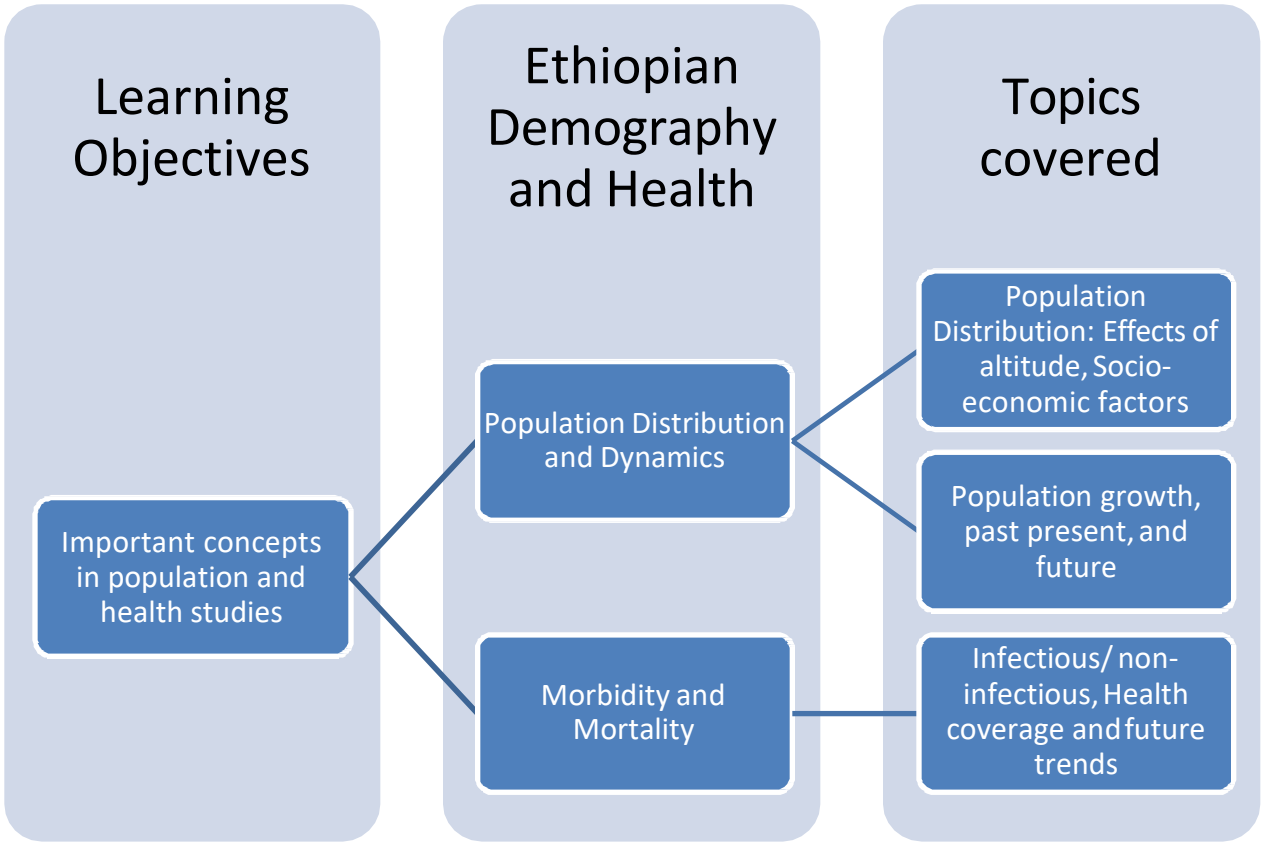
LEARNING OBJECTIVES



Introduction

Population Size and Distribution

With an estimated population of **104.34** million in 2017 [1] Ethiopia has the second largest population in Africa (see Fig. 1.1). A crude birth rate of 40 per thousand, and a fertility rate of 4.6 (a reduction from 5.4 in 2000) attest to the prevailing high fertility regime, which, coupled with the very high proportion of people under 19 years of age (50.0%), suggests an explosive growth in the future, tempered only by heavy disease burden imposed by infectious illnesses including malaria and HIV/AIDS and increasingly by the so-called life-style diseases including heart disease, stroke and diabetes.

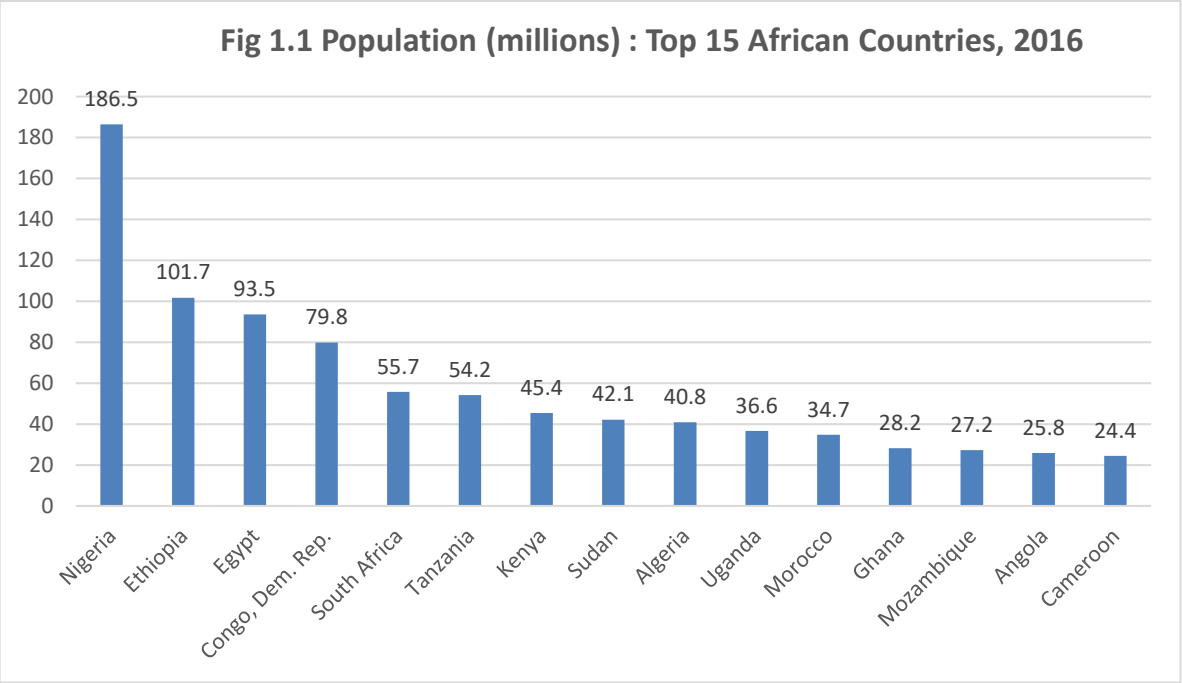
Population of Ethiopia (2017 and historical)

Year	Population	Yearly % Change	Yearly Change	Median Age	Fertility Rate	Density (P/Km²)	Urban Pop %	Urban Population	Country's Share of World Pop	World Population
2017	**104,344,901**	2.45 %	2,491,633	18.9	4.46	104	20.3 %	21,174,205	1.39 %	7,515,284,153
2016	**101,853,268**	2.48 %	2,462,518	18.9	4.46	102	19.8 %	20,202,815	1.37 %	7,432,663,275
2015	**99,390,750**	2.57 %	2,365,787	19	4.59	99	19.4 %	19,265,898	1.35 %	7,349,472,099
2010	**87,561,814**	2.71 %	2,190,677	18	5.26	88	17.2 %	15,083,947	1.26 %	6,929,725,043
2005	**76,608,431**	2.89 %	2,032,966	17	6.13	77	15.6 %	11,958,476	1.18 %	6,519,635,850
2000	**66,443,603**	3.03 %	1,841,275	17	6.83	66	14.6 %	9,731,656	1.08 %	6,126,622,121
1995	**57,237,226**	3.56 %	1,836,026	17	7.09	57	13.8 %	7,884,886	1 %	5,735,123,084
1990	**48,057,094**	3.34 %	1,456,219	17	7.37	48	12.6 %	6,063,524	0.91 %	5,309,667,699
1985	**40,775,997**	2.96 %	1,107,205	17	7.42	41	11.5 %	4,670,398	0.84 %	4,852,540,569
1980	**35,239,974**	1.59 %	534,287	18	7.18	35	10.4 %	3,668,755	0.79 %	4,439,632,465
1975	**32,568,539**	2.77 %	830,708	18	7.1	33	9.5 %	3,081,000	0.8 %	4,061,399,228
1970	**28,414,999**	2.58 %	680,290	18	6.87	28	8.6 %	2,440,175	0.77 %	3,682,487,691
1965	**25,013,551**	2.46 %	572,467	18	7.17	20	7.6 %	1,897,833	0.75 %	3,322,495,121
1960	**22,151,218**	2.12 %	440,791	18	6.9	22	6.4 %	1,425,092	0.73 %	3,018,343,828
1955	**19,947,265**	1.93 %	363,846	18	7.17	20	5.4 %	1,085,994	0.72 %	2,758,314,525

Source: [1]

The reported birth and death rates translate into **3,168,840** births per year (**8682** births per day), and **1,188,315** deaths per year (**3255** deaths per day). Simple subtraction shows an annual population increase of roughly 2 million nationally. Given the regional differences in resource, climate, levels of environmental degradation, food dependency, regional politics, and security/stability, birth and death rates as well as overall growth rates are likely to show significant regional variations. Eighty five percent of the population lives in the countryside [2], a testament to the country's continuing status as an agrarian society with a backward economy.

The first national census was conducted in 1984, and the second in 1994. However, changes in administrative units and boundaries make comparison of data from the two censuses difficult, if not impossible. Simple analyses such as the growth rate of the population between the two censuses cannot be made because of altered administrative boundaries.



Source: Based on [3]

Administratively, the county is divided into eight ethnic-based rural majority regions – Afar, Amhara, Benishangul-Gumuz, Gambella, Oromia, Southern Nations Nationalities and Peoples (SNNP), Tigray, Somali – and three urban-majority regions – Addis Ababa, Dire Dawa, and Harari, further subdivided into"….62 Zones, 8 Special Weredas and 523 Weredas" [4]

An article offering a "concise summary" of the country's history [5] describes Ethiopia as "unique among African countries" adding that "the ancient Ethiopian monarchy maintained its freedom from colonial rule with the exception of the 1936-41 Italian occupation during World War II". At the other extreme is its image as a place with enormous suffering and hardship, continually, and shockingly displayed on television screens in most living rooms of the Western world. These images relate to the various segments of its population, especially those in the northern and, more recently, the southern and eastern regions, which have repeatedly fallen victim to drought, famine, and war. The article goes on to state that a military junta seized power in 1974 but that, buffeted by "…. uprisings, wide-scale drought, and massive refugee problems, the regime was finally toppled in 1991…" [5] and was replaced by the EPRDF - the ruling party currently in power.

Many analysts, including the UN [6] have tried to present the country as a living proof of what the population-environment disequillibrium would do to nations (see the quote below), if centuries of misuse of available land resources through outdated subsistence farming practices were not curbed.

> There has not been any time, since the early 1980s when the [Ethiopian] economy grew at a rate higher than that of the population. GDP grew at an average rate of 2.7% between 1965 and 1980 and at 1.9% between 1980 and 1989. Available data indicate that the population increased fourfold between 1900 and 1988. At the beginning of the present century the crude rate of natural increase was estimated at 0.3% per annum. This was a far cry from the 2.9% a year suggested by the 1984 census. The total population in 1900 was estimated at 11.8 million. It took 60 years for this to double to 23.6 million in 1960. It took only 28 years for the population in 1960 to double to 47.3 million in 1988.

As can be expected on the basis of its status as one of the poorest countries in the world (GNP per capita of US$100.00), the crude death rate is high but declining (15 per thousand), as is the infant mortality rate - 77 infant deaths per thousand births – [7], and life expectancy at birth is low - 46 years for both sexes. Economic mismanagement, war, recurrent droughts and famine (in all decades since the 1950's), have taken their toll on the country and its people. Sadly, this is draining the meager resources that, otherwise, could have been directed toward socio-economic development. Moreover, natural disasters have been operating in tandem with man-made catastrophes. Civil strife still

continues, as does the relentless bite of hunger and malnutrition. As a result, millions of people still need emergency food assistance and rural Ethiopia faces widespread poverty and disease. Sanitation coverage reaches only 15 percent of rural households, and only 24 percent have access to safe drinking water [8]. The World Bank's report puts the maternal mortality ratio at 1800 per 100,000 births - among the highest in the world - [8] but the DHS survey results which gave a ratio of 871 appear to be more accurate [7]. Over 17,000 women die each year due to complications related to pregnancy and childbirth. Ethiopia has one of the highest death rates of abortion related deaths of young women.

Resettlement and villagization were among the former Marxist government's response to the crisis. Programs were launched in the mid-1980s as part of a national goal to combat drought, avert famine, and increase agricultural productivity. Resettlement was considered by the regime as a long-term solution to the drought/famine problem. This involved the permanent relocation of an estimated 1.5 million people from the drought-prone North to the relatively sparse and so-called virgin arable lands of the South and West. The effort was welcomed at first. However, once the process had begun in earnest, there was widespread criticism of the program's poor planning and execution, which actually increased the number of famine deaths. Another remedy sought by the government was villagization [9].

> The villagization program, the regime's plan to transform rural society, started in earnest in January 1985. If completed, the program might have uprooted and relocated more than 30 million peasants over a nine-year period. The regime's rationale for the program was that the existing arrangement of dispersed settlements made it difficult to provide social services and to use resources, especially land and water, efficiently. The relocation of the peasants into larger villages (with forty to 300 families, or 200 to 2,500 people) would give rural people better access to amenities such as agricultural extension services, schools, clinics, water, and electricity cooperative services and would strengthen local security and the capacity for self-defense. Improved economic and social services would promote more efficient use of land and other natural resources and would lead to increased agricultural production and a higher standard of living.

This was one of the greatest exercises in government population redistribution efforts the world has seen in the last century. The result was predictably catastrophic. Tens of thousands fled to avoid forcible relocation; others died or lived in inhuman conditions after being forcibly moved. According to available estimates, "… by the end of 1988, over 12 million people had been relocated in twelve of the fourteen administrative regions of the country; Eritrea and Tigray were the only exception" [9]. The number may have risen to 13 million by 1989. Expectedly, different regions, known, then, as ***Kiflehager***, carried out villagization at different pace; some took quick action as required by the government while others slackened off.

> "For example, in Harerge province, where the program began early (1985), over 90 percent of the population had been relocated by early 1987, whereas in Gonder and Welo the program was

> just beginning to take hold. In Ilubabor province over a million peasants had been relocated to over 2000 villages between the end of 1985 and spring of 1989."[9]

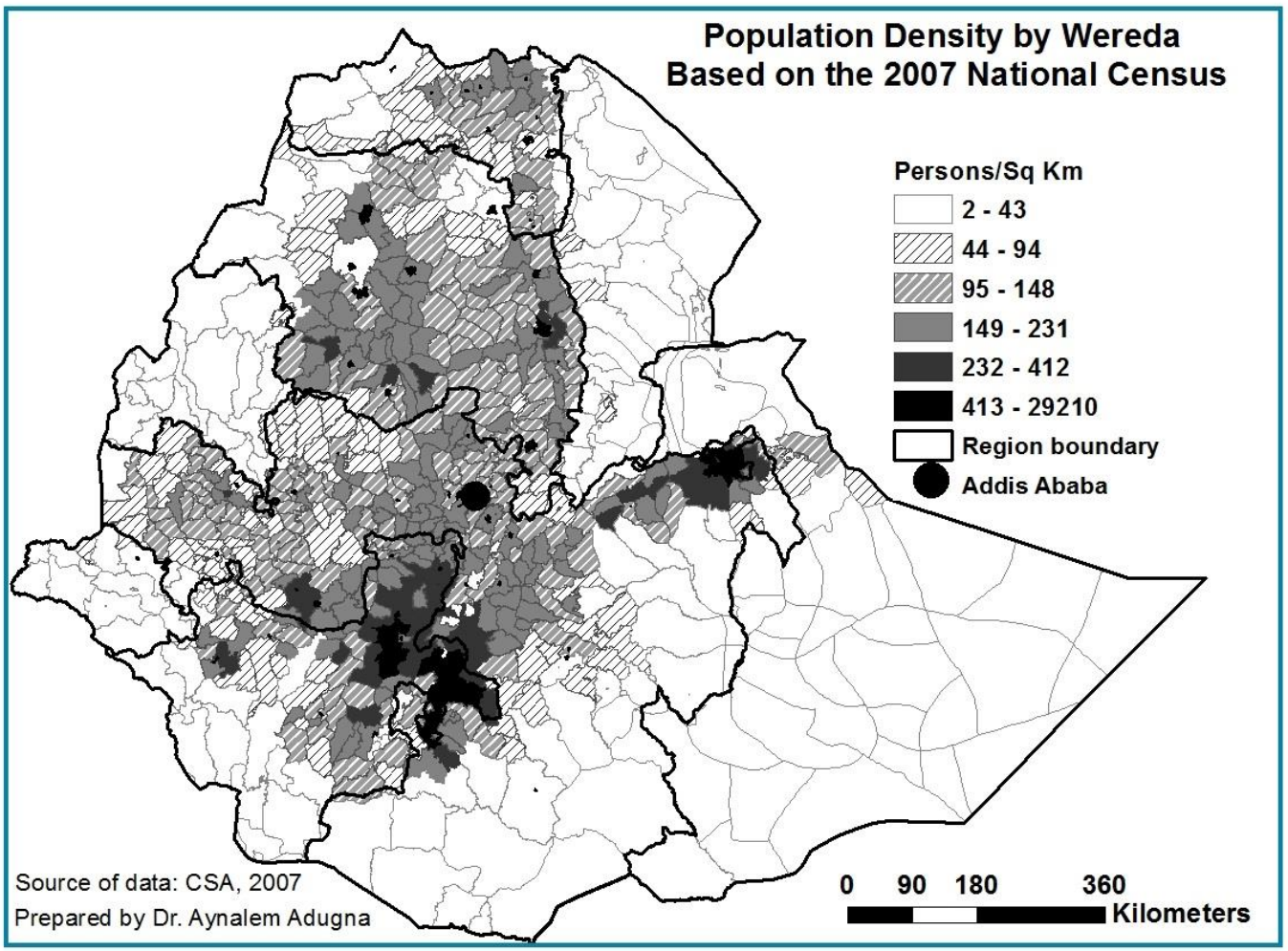
The highly mobile nomadic groups in Eastern and Southeastern regions as well as shifting cultivators, were illusive targets, and remained largely unaffected by the scheme.

In a dramatic reversal of fortunes the government announced new economic policies early in 1990 and peasants were given the freedom to abandon cooperatives and, equally, importantly, to bring their produce to market. In this way, the Mengistu Hailemariam regime completely abandoned one of the strong rationales for villagization – communalization of farms and farm products [9]. The effects of this futile exercise involving millions of unwilling citizens, on current population distribution patterns and other demographic characteristics of the Ethiopian population, have not been studied thoroughly.

An estimated 80 percent of Ethiopia's population still earns its livelihood through labor intensive, but low-yielding employment in agriculture and nomadic herding. Government-sponsored population redistribution is still continuing. A new program was launched in 2004 with the goal to move 2 million people [10].

The major ethnic groups include the Oromo whose proportion has been reported variously ranging from 30 per cent to 40 percent and inhabit the central, western, southwestern, and eastern regions, and the Amhara (30%) in the central, northern, and northwestern regions [11]. Other major ethnic groups include the Tigray in the north (6.2%) and the Somali in the Ogaden region (6%) [11] of the east, the Afar in the northeastern lowlands, as well as the Shanquila, Gurage, Kembata, Wolayita, Sidama, and tens of other smaller groups in the western, central and southern regions. The Wolayita region is among the high-density enclaves due, in part, to the high carrying capacity afforded by the high-yielding inset (a root crop) cultivated in the area.

The distribution of Ethiopia's population is influenced greatly by altitude, climate, availability of good soil, and the presence or absence of infectious diseases such as malaria. These physical factors explain the high concentration of population in the highlands. About 14 percent of the population lives in areas above 2,400 meters in climates similar to the temperate zones. About 75 percent live between 1,500 and 2,400 meters where temperature is moderate, and only 11 percent below 1,500 meters where temperatures are high. The hot zone encompasses more than half of Ethiopia's territory. In other words, localities above 3,000 meters and below 1,500 meters of elevation are sparsely populated, the first due to cold temperatures and rugged terrain, which limit agricultural activity, and the latter because of high temperatures and low rainfall.



Population: A Brief Introduction

Statisticians use the term "population" to denote a collection of things. Demographers, however, use it in reference to "the collection of persons alive at a specified point in time who meet certain criteria" [12]

"We entered the 20thcentury with a population of 1.6 billion people. We entered the 21st century with 6.1 billion people" [13]. There are 6.6 billion people in the world today. Two countries – China and India – have over a billion people each. Almost two-thirds of humanity (4.1 billion) lives in the Asian continent. If we add Africans in the continent of Africa now numbering nearly a billion, we cover four-fifths of humanity.

This year, 81.6 million people will be added to the world population, and all but 1.6 million will be added to the population of the less developed countries (LDC). Some of the developed countries (DC) are actually experiencing a slowdown in population growthrates, or an actual decline. The world is also on the eve of a major urban-rural shift. For the first time in human history more people will be living in urban, rather than rural, areas. This is projected to happen in 2008 [13].

The following table shows important population milestones – estimates of when each billion was, or will be reached:

Fig. 1.3 World Population Growth

Population	1 Billion	2 Billion	3 Billion	4 Billion	5 Billion	6 Billion	7 Billion	8 Billion	9 Billion
Year	1804	1927	1961	1974	1987	1999	2011	2024	2042
Year Until Next Billion	123	34	13	13	12	12	13	18	

Source: Based on [14]

POPULATION DISTRIBUTION AND DYNAMICS

Population Distribution

Population distribution refers to the manner in which population numbers are spread over a geographical area. A prominent characteristic of the distribution of human populations anywhere in the world is its unevenness. One of the many measures of population distribution is ***Population Density***. This relates the number of people inhabiting an area, to the land size of the area. Such calculations form the basis of Choropleth (shading) maps available for all countries of the world. Advanced graphic softwares such as the Geographic Information System (GIS) have made this task much easier. "Places which are **sparsely** populated contain few people. Places that are **densely** populated contain many people"[14]. Sparsely settled areas of the world tend to be those with harsh physical environments, and present formidable obstacles to human activities, needed for survival; activities such as farming. Good examples are the major deserts like the Sahara, or relatively smaller ones like the Ogaden, as well as permanently frigid lands such as Antarctica. Densely settled places include most of Europe, southern and southeastern Asia, as well as western Africa and north eastern North America. In Ethiopia many Weredas in the Amhara, Ormomiya, and SNNRP region, have high densities. Much of the settled lands in these regions tend to be less hostile, less forbidding to human habitation, and pose fewer challenges to the main economic activity – farming.

Factors Determining Population Distribution

In this online course, we have made extensive use of online sources to put together all of the salient facts of human population including its distribution. The table below shows one such effort. There are two classes of determining factors: Physical, and Human [14].

What determines population distribution and density?

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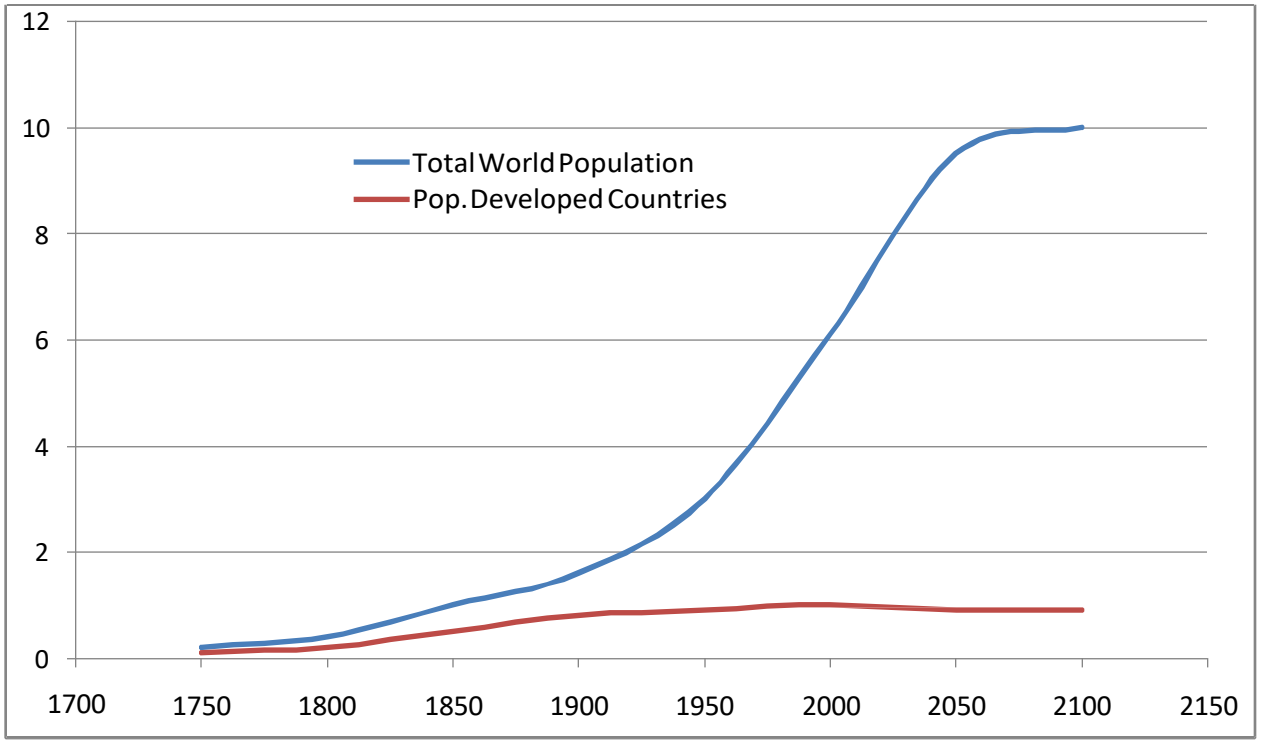
Topography (the size, height and shape of a local land mass)	Low-lying, undulating plains that are flat e.g. The Nile River Valley and Delta in Egypt.	Rugged and mountainous landmass, e.g. Semien Mountains and the Arssi-Bale massif.
Resources	Places endowed with abundant resources (e.g. fertile land, easily extractable minerals, fuel and construction wood, fishing etc.) tend to densely populated This has been the case with most densely populated areas of Ethiopia, but overpopulation, land degradation and resource depletion are posing major challenges.	Areas with low resource base tend to be sparsely populated e.g. Much of the rugged and barren mountain sides of northern and eastern Ethiopia where volcanic rocks predominate.
Climate	Areas with optimum temperature and precipitation such as in the temperate climatic regions of the world tend to be densely populated. Example: most of the densely populated Weredas of the Amhara, Oromia, and SNNPR regions of Ethiopia	Places of extreme temperature tend to be sparsely populated. Example: the Ogaden and other lowlands in the Somali and Afar regions.
Human Factors	**High Density**	**Low Density**
Political	Stable and democratic governments foster favorable a political climate for economic growth and expansions there by	Political instability could push people out and lead to lesser densities. Moreover, the lack of a stable

	enabling people to make long-term plans about where to live. The population itself is stable due to a lesser need to cross borders, whether local or international, to escape persecution. There are enumerable examples of such dislocations in the recent political history of Ethiopia.	environment precludes long-term investment in time and energy to create a favorable habitation for individuals and families. Several examples could be cited from Ethiopia's past.

Fig. 1.4 World Population (Billions), 1750 to 2100



Sources: Based on [5]

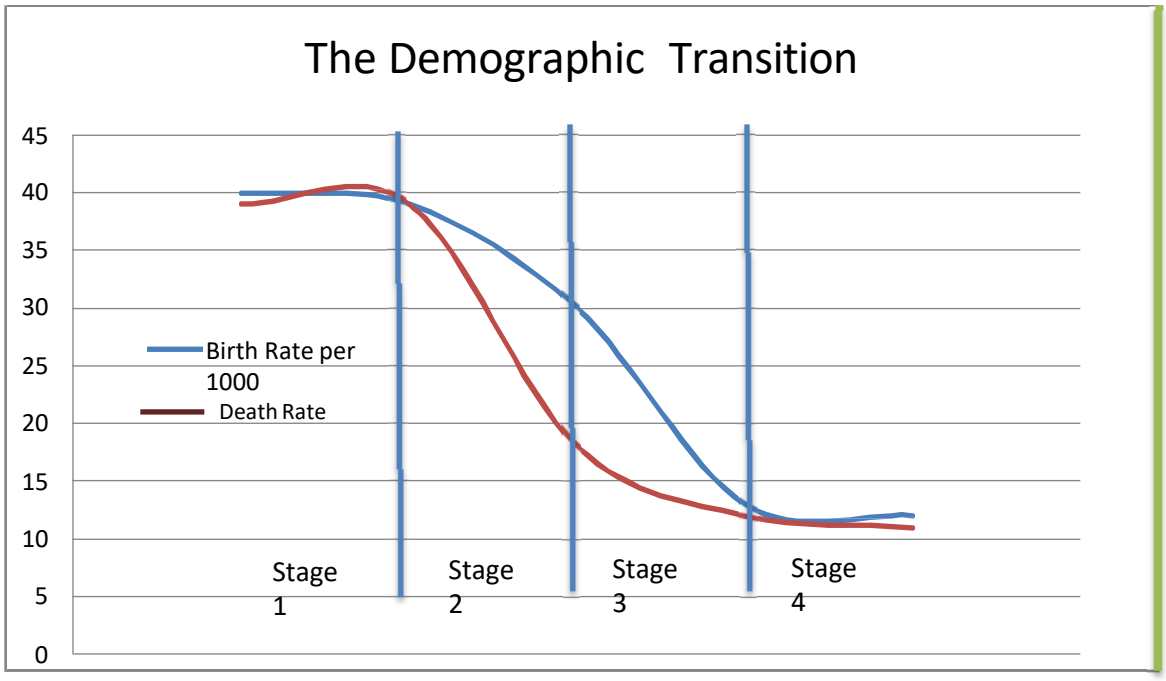
Population Dynamics

"It took all of human history until 1830 for world population to reach one billion. The second billion was achieved in 100 years, the third billion in 30 years, the fourth billion in 15 years, and the fifth billion in only 12 years"[14]. Opinions are divided when it comes to global (or national) population numbers and growth rates. There are two camps. One camp decries what it views as the un abating acceleration in the number and growth rates of world/national populations. The other camp is unconcerned, or even views population growth as a good thing.

The good news for those advocating population control is that, with expanded use o birth control in the second half of the 20t century, developing countries including the population giants China and India have managed to substantially reduce their population's growth rates. The average number of children born to women in the LDCs has fallen from about six in the 1960s to less than three today. In other words, the LDCs are undergoing a transition from high birth/death rate regimes to low birth/death rate regimes already undergone by the developed countries of the world (see the graph below)

[14]. This transition is known to demographers and all other students of population as the ***Demographic Transition***, and the theory behind it is known as The Demographic Transition Theory. Is Ethiopia undergoing a transition? We will examine this briefly in this chapter, and more comprehensively in the Mortality and Fertility chapters.

Fig. 1.5 The Demographic Transition



Source: Based on [14]

Why Study Populations?

Statistics on population are vital to a country's development and for planning of future needs such as schools, hospitals, fiscal and economic planning, as well as overall governance. Population denominators are needed to assess pressure on land, infection rates of a new epidemic, birth rates, per capita income, dependency ratios, etc. Calculations of direct and 'standardized' mortality or morbidity rates, life expectancies at various ages, also require detailed breakdowns by age and gender. It is important to note, however, that population estimates are merely a snap-shot in time, a cross-sectional look at possible underlying causes of the population dynamics, and by no means a longitudinal motion-picture-like image of all population processes [15].

Demography Defined

The Population Reference Bureau defines demography/population studies as follows [16] [17]:

> "Demography, or more generally, population studies, is the study of human populations: their size, composition, and distribution, as well as the causes and consequences of changes in these characteristics. Demography is clearly a discipline because it is a field with its own body of interrelated concepts, techniques, journals, departments, and professional associations. It is also an interdisciplinary field because it draws from many disciplines, including sociology, economics, biology, geography, history, and the health sciences. Nearly all the major events of people's lives have demographic implications: birth, schooling, marriage, occupational choices, childbearing, retirement, and death"

A term often used in population studies/demography is "dynamics". This relates to a basic population fact: that it is never static. Populations don't always grow, however. They decline at times (think of all of the civilizations that have come and gone) through the interplay of major population events, also referred to as vital events - mortality, fertility, and migration. These three form the core structure of the main page of this website, and of the online course you are now taking. Different elements within the same population could be changing at different pace or rate. This fact introduces us to another important concept in population, namely, composition.

The genetic make-up of Ethiopians: A Brief Introduction

A recent work sought to unravel the genetic makeup of Ethiopians. Pooled samples were collected from a total of 77 unrelated males (19 Oromos, and 58 speakers of the Semitic languages Amharic, Tigrigna and Guragigna) [18]. The data had been pooled because the two groups did not show important differences – so much for the ethnic hatred and sense of distinctness, even supremacy, harbored by some. To the delight (or dismay) of those seeking to amplify an African or non-African connection when tracing their roots, the test,

"……led to the hypothesis that the Ethiopian population (1) experienced Caucasoid gene flow mainly through males, (2) contains African components ascribable to Bantu migrations and to an in situ differentiation process from an ancestral African gene pool, and (3) exhibits some Y-chromosome affinities with the Tsumkwe San (a very ancient African group)." A related finding also showed "… a high (20%) frequency of the 'Asian' mtDNA haplotype in Ethiopia is discussed in terms of the 'out of Africa' Model'**. [18]**

The Cradle of Mankind

Given that the oldest known human ancestor "Lucy"/ "Dinkinesh" was found in the Afar region of Ethiopia, all of humanity can claim to be Ethiopians. "It is in the Afar region of Ethiopia where scientists discovered the remains of 'Lucy' or Dinkenesh, meaning 'thou art wonderful,' as she is known to the Ethiopians. 'Lucy' lived more than three million years ago, and her bones now rest in the Ethiopian National Museum" [19]

Ethiopia's unique status as a country of three thousand years of history and independence is a source of pride for its citizens. At first blush, this would suggest a stable political environment with favorable implications for demographic change and transition. A more detailed look reveals a different reality, however. Underneath the façade of millennia of quite historical calm prevailed centuries of violent upheavals and turmoil in the form of external invasions, internal expansionist moves, and power struggles. The 19th and 20th centuries are notable examples. The question here is: did these have effects on the country's population dynamics? If yes, what were/are the consequences for population distribution and change? Answers are hard to come-by given the focus of Ethiopian history books on leaders – emperors, empresses, and princes - as well their conquests and military prowess, rather than the lives of everyday Ethiopians – the great grandparents of today's generation.

A few online publications on the country's history make a brief mention of its population matters [20, 21]:

> "…… recent research in historical linguistics--and increasingly in archaeology as well--has begun to clarify the broad outlines of the prehistoric populations of present-day Ethiopia. These populations spoke languages that belong to the Afro-Asiatic super-language family, a group of related languages that includes Omotic, Cushitic, and Semitic, all of which are found in Ethiopia today. Linguists postulate that the original home of the Afro-Asiatic cluster of languages was somewhere in northeastern Africa, possibly in the area between the Nile River and the Red Sea in modern Sudan. From here the major languages of the family gradually dispersed at different times and in different directions--these languages being ancestral to those spoken today in northern and northeastern Africa and far southwestern Asia".
>
> "The first language to separate seems to have been Omotic, at a date sometime after 13,000 B.C. Omotic speakers moved southward into the central and southwestern highlands of Ethiopia, followed at some subsequent time by Cushitic speakers, who settled in territories in the northern Horn of Africa, including the northern highlands of Ethiopia. The last language to separate was Semitic, which split from Berber and ancient Egyptian, two other Afro-Asiatic languages, and migrated eastward into far southwestern Asia".

Historical events that have had clear but unknown impacts on population numbers, dynamics, and distribution include, but are not limited to:

- ***Wars***
- ***Large-scale population movements (migrations)***
- ***Famine***
- ***Disease (including animal diseases)***

- ***Rural urban migrations of the post-World War II period with the Italian invasion as the trigger point***
- ***Forced relocations: Case in point, socialist resettlement and "villagization" during the 1980's, as well as resettlement by the current government***
- ***Political instability, civil-war/war of independence (Eritrea), and the resulting elevated mortality of the last quarter of the 20th century with possible fertility impacts***

Ethiopian Population Trends 1900 - present

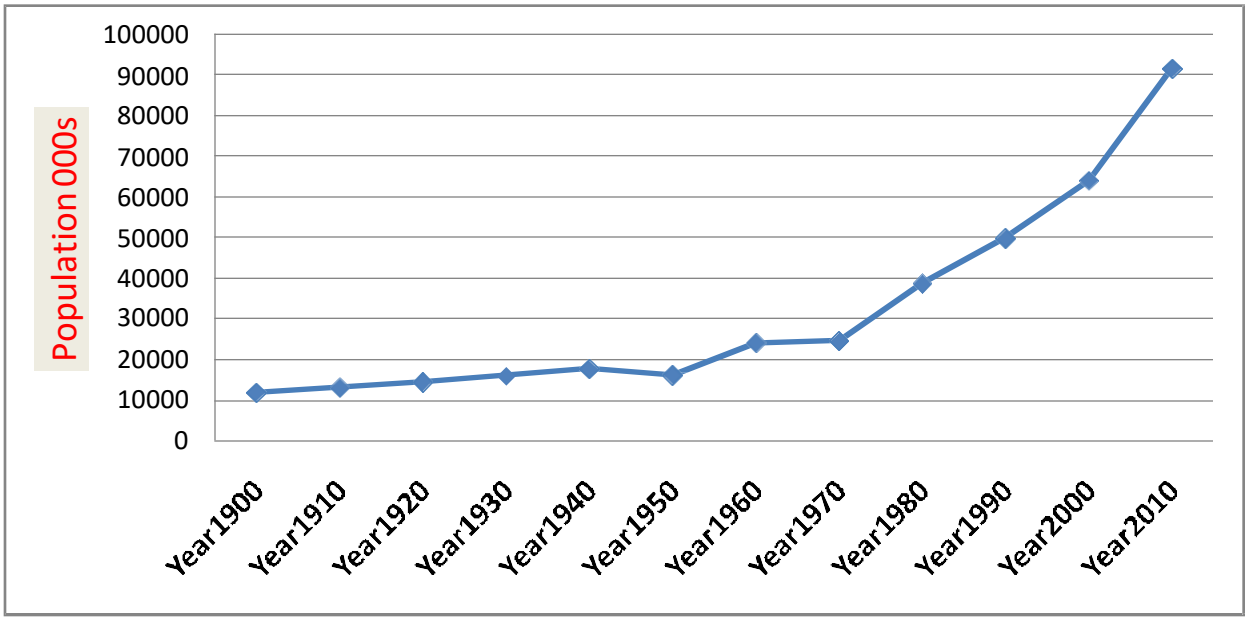
Some have ventured an estimate of the country's population in different historical periods. A recent UN report [22] states that the population increased fourfold between 1900 and 1988.

The rate of natural increase was estimated at 0.3% for the early part of the 20th century – only a tenth of the 2.9% annual growth suggested by the 1984 census. The estimate of the population total for 1900 was 11.8 million (see Fig 1.6 below). The report also adds…"it took 60 years for this to double to 23.6 million in 1960. It took only 28 years for the population in 1960 to double to 47.3 million in 1988".

Ethiopia conducted its first ever population census in 1984. The census covered 81 percent of the population. The rest had to be estimated due, mainly, to security concerns spawned by the secessionist wars in the north. It gave a total count of 42 million and a growth rate of 3.1 percent [1, 23].

The figure below is based on (a) estimates for all the years prior to the 1984 census, (b) estimates for the intercensal years, and (c) projections to the year 2010. The fact that we are using the words "estimates" and "projections" suggest that we should not place full trust on the numbers for the decades shown, or in future numbers suggested by the trend line.

Fig.1.6. Ethiopia: Population Trends: 1900 to 2010

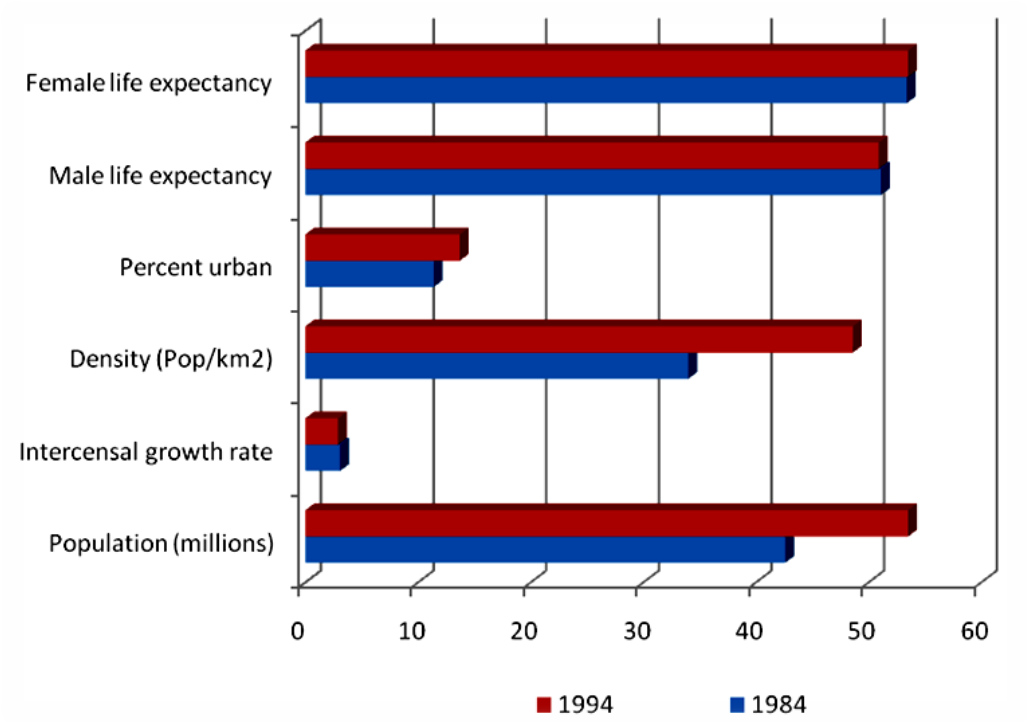


Source: Based on [24]

The second census was conducted 10 years later in 1994 and, unlike the first, this one covered the entire country (Eritrea had broken away and become independent by then). The second census gave a population total of 53.5 million. The growth rate at this time had declined somewhat, down to 2.9 percent [23]. The graph below shows changes during the intercensal period.

Most of the estimates for the pre-1984 period came from sample surveys - the 1964-67 National Demographic Survey 1st round, the 1968-69 National Demographic Survey 2nd round, and the 1981 demographic survey. Subsequently, better organized surveys analyses have been conducted including the 1990 National Family and Fertility Survey (NFS), the 1995 Fertility Survey of Urban Addis Ababa, and the 2000 and 2005 Ethiopia Demographic and Health Surveys (EDHS).

Fig 1.7 Ethiopia: Population change between the 1984 – 94 censuses



Source: Based on [23]

Figure 1.7 shows changes between the two censuses. Expectedly, not much movement was observed in life expectancies (defined in the mortality chapter) of males or female Ethiopians. However, substantial differences are observed in population numbers as well as density.

Urbanization

The table below shows percentage changes in the population sizes of 85 cities and towns with populations of 10,000 and above in 2006. Two urban centers – Moyale and Gambella - experienced a population increase of over 500 percent during the study period, and three towns – Boditi, Jinka, and Ziway - grew by over 400 while an additional five towns – Adigrat, Asosa, Jijiga Kombolcha and Shakiso, gained between 300 and 400 percent. If the data is correct, this shows a phenomenal growth whose underlying causes and correlates need to be studied and documented. A total of 21 towns grew between 200 and 300 percent while an additional 50 towns more than doubled their population (100 – 200 percent growth). There is no clear indication of a link between location and growth rate as the towns in the various classes of growth are spread all over the regions.

The spectacular growth suggested by Table 1.1, gives, at first glance, the sense that Ethiopia's urban population has grown so much and so fast (Addis Ababa, the capital doubled in population between 1984 and 2006) that the country is now predominantly urban. However, with only 16.5 percent of the population living in urban areas (2008) this is far from the truth.

Table 1.1 Percentage growth rate of cities and towns* – 1984 – 2006

City/Town	% Growth Rate	City/Town	% Growth Rate	City/Town	% Growth Rate
Adet	225	Debre Zeyit	157	K'olito (Alab	208
Adigrat	300	Degeh Bur		Korem	213
Addis Ababa	110	Dembi Dolo	148	Maych'ew {Maychew}	142
Adis Zemen	172	Derwernache (Derwonaji)		Mekele	175
Adwa	208	Dese	146	Mek'i {Meki}	228
Agaro	121	Dila	155	Metahara	247
Agere Maryam	211	Dire Dawa	187	Metu	176
Aksum	166	Dodola	199	Mojo	182
Alamata	225	Dolo		Mot'a {Mota}	143
Aleta Wendo	111	Fiche	122	Moyale	519
Arba Minch	215	Finote Selam	194	Nazret	200
Areka	427	Gambela	597	Negele	28
Arsi Negele	222	Genet (Holata)	155	Nekemte	193
Asayita		Gimbi	180	Robe	241
Asbe Teferi	194	Ginir	151	Sawla (Felege Neway)	280
Asela	130	Giyon (Waliso)	171	Sebeta	150
Asosa	386	Goba	121	Shakiso	302
Awasa	246	Gode		Shambu	146

Awubere		Gonder	141	Shashemene	195
Bahir Dar	205	Hagere Hiywet (Ambo)	185	Shewa Robit	154
Bati	142	Harer	51	Sodo	167
Bedele	205	Hartisheik		Softu	
Bichena		Himora	143	Weldiya	172
Boditi	452	Hosaina	279	Welenchiti	183
Bure	185	Inda Silase	243	Welkite	253
Butajira	171	Jijiga	323	Wenji Gefersa	-34
Chagne	267	Jima	161	Werota	205
Dangila	152	Jinka (Bako)	402	Wik'ro {Wikro}	119
Debark' {Debark}	195	Kebri Dehar		Yirga 'Alem {Yirga Alem}	174
Debre Birhan	161	Kembolcha	336	Yirga Chefe	153
Debre Markos	115	Kibre Mengist	151	Ziway	445
Debre Tabor	156	Kobo	167		

Source: Based on [25]

* Only cities with a population of 10,000 and above in 2005 are included

As can be inferred from the quote below the rapid population increase is not limited to the contemporary urban scene:

> "The period 1967-75 saw rapid growth of relatively new urban centers. The population of six towns--Akaki, Arba Minch, Awasa, Bahir Dar, Jijiga, and Shashemene--more than tripled, and that of eight others more than doubled. Awasa, Arba Minch, Metu, and Goba were newly designated capitals of administrative regions and important agricultural centers. Awasa, capital of Sidamo, had a lakeshore site and convenient location on the Addis Ababa-Nairobi highway. Bahir Dar was a newly planned city on Lake Tana and the site of several industries and a polytechnic institute. Akaki and Aseb were growing into important industrial towns, while Jijiga and Shashemene had become communications and service centers". [26]

Contrary to the evidence from most other African countries, in Ethiopia, more females than males migrate to cities and towns. Moreover, the country's recent history of warfare and political upheavals is often cited as a contributing factor leading the influx into urban centers, of thousands of men, women, and children seeking safety and better economic prospects. "In addition to beggars and maimed persons, the new arrivals comprised large numbers of young people. These included not only primary and secondary school

students but also an alarming number of orphans and street children, estimated at well over 100,000." [26]

AGE STRUCTURE

With 43% of the population in 0 – 15 age group [3] the Ethiopian population can be described as young, but recent trends in the fertility rate suggest the beginning of a reversal, and a slight shift from a population that has been "***younging***" to that with early signs of a trend toward ***aging***.

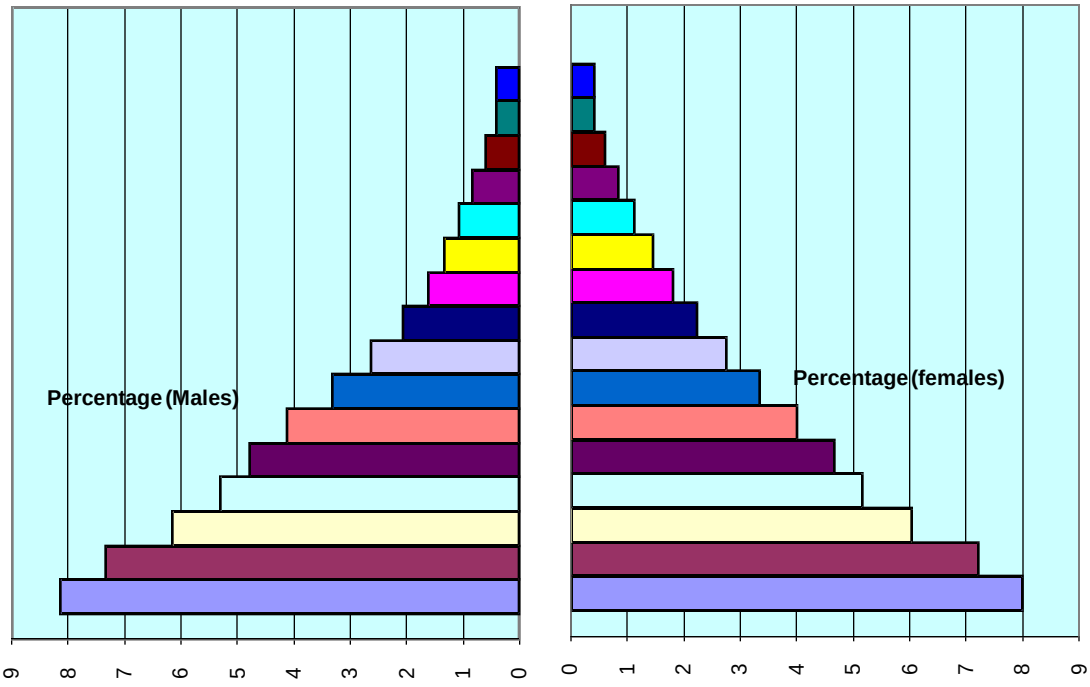


Fig 1.2 Ethiopia: Percentage Distribution by Age (July 2007)
Source: Based on [1]

The horizontal bars represent a five year age group: 0 – 4, 5 – 9, 10 – 14…..etc, from bottom up. The very top bar represents the 75+ group. Ethiopia's age pyramid displays a classic shape of a wide bottom (due to high fertility) with a quickly tapering middle and top where-by the bars decrease in size significantly from one age category to the next higher category due to high mortality.

Health and Diseases in Ethiopia

Introduction

Ethiopia's weak health infrastructure results in inadequate and uneven access to health services and leads to health outcomes favoring urban areas. About eight in ten illnesses in Ethiopia are due to preventable communicable illnesses and nutritional diseases, both of which are associated with poverty and low socio-economic development [27]. The diversity of socio-economic and physical environments pose significant challenges to health care delivery in Ethiopia as does the feeble transport and access systems to rural villages with roads that are generally impassable except during the dry seasons. "With about 0.43 km per 1000 people, the Ethiopian road network is among the least developed in the world. Only 20% of Ethiopia's land area is located within a 10 km range of an all-weather road. Not only is the network limited in outreach, but much of it is also in poor condition". [28]

Poverty and lack of institutional infrastructure severely limits the availability of, and access to health care, and other services. Low level of education, lack of access to improved sanitation and clean drinking water underlie much of the adult and childhood illnesses Ethiopians suffer from [29].

> Only 15 percent of Ethiopians have access to improved sanitation compared to SSA [Sub Saharan Africa's] average of 55 percent. Access to clean drinking water is slightly better at 24 percent but it is still much lower than the SSA average (55 percent). Fifty-nine percent of the adult population is illiterate, which is higher than the SSA average of 36 percent, and females have a higher rate of illiteracy. The primary school enrollment rate is 49 percent, also below the SSA average. More than 50 percent of Ethiopians also remain food insecure, particularly in rural areas.

Women face the added risk of pregnancy and delivery complications. Barely more than a quarter of pregnant women receive perinatal care and "almost all births take place at home in Ethiopia (94 percent)", with 5 per cent of home births self-delivered with no assistance even from relatives or other household members. "One in 14 Ethiopian women faces the risk of death during pregnancy and childbirth" due, in part, to a tradition that allows early marriage of girls [27]. Women also face a higher risk of HIV infection and "young women are particularly vulnerable to HIV infection compared with young men" [30].

Significant variations are observed in vaccination coverage. It is three times higher in urban that rural areas.

> "Ethiopia's immunization performance is mixed. The percentage of 12-23 months-olds who have received one or more of the EPI vaccines is high at 83 percent. However this percentage largely reflects the coverage

> achieved through the polio eradication program. Other important indicators reflecting the contribution towards a reduction in child mortality by immunizations (such as DPT 3 which, according to 2000 DHS and MIS data are 21 percent and 42 percent, respectively) place Ethiopia among the low performers by SSA [Sub-Saharan Africa] standards, far behind Malawi, Zambia, Benin or Ghana. This is largely due to a high drop-out rate between the first and subsequent vaccination, showing that it is difficult for the Ethiopian health system to ensure continuity of services."

Malaria represents the most serious health problem, and a major cause of morbidity and mortality in Ethiopia. It is the leading cause of outpatient visits, as in the rest of Sub-Saharan Africa. The mortality burden of 3 million deaths per year at the continental level [31] is staggering. With an estimated 672 million people at risk the cost of fighting this scourge in Sub-Saharan Africa is estimated at US$3.00 billion a year ($4.02 per African at risk) [31].

Ethiopia has a very ambitious goal of a universal primary health care for all by the year 2009.

> By 2009, a total of 30,000 extension health workers will receive one year training and will be deployed in villages to provide basic curative and preventive health services. Prevention and control of communicable diseases such as providing malaria bed nets, health education, and contraceptives, with active community participation, are priorities of the HEP [Health Extension Program] [27]

Ethiopian children remain the most vulnerable of all age groups with nearly one in two children under five years of age in the "stunted" category (short for their age), "….11 percent wasted (thin for their height), and 38 percent underweight" [30]. A recent government report embellished the numbers on changes between 2000 and 2005. This is how they presented it [32].

> "The percentage of stunted children fell by 10 percent, from 52% in 2000 to 47% in 2005. Similarly, the percentage of children underweight declined by 19% from 47% in 2000 to 38% in 2005" .

This is simple arithmetic, and the correct numbers are 5% and 9% respectively – a respectable gain still.

> "While malaria is one of the leading causes of morbidity and mortality in Ethiopia, it is estimated to represent only 4.5 percent of the causes of child mortality. According to recent estimates, most deaths among children under five years in Ethiopia can be attributed to pneumonia (28 percent) and diarrhea (24 percent)—a disappearing cause of death in many poor countries.

Non-vectored infectious

The newest, and potentially deadliest non-vectored infectious disease responsible for a five-year decline in life expectancy of Ethiopians, is HIV/AIDS. A 2004 estimate put the number of infected Ethiopians at 1.6 million [33]. The report put the annual number of new adult infections (2003) at 105,000. The adult (age 15 or older) prevalence rate is much higher in urban areas (12.5%) that rural (2.8%). An estimated 740,000 children (2005) have been orphaned by HIV/AIDS. [34]

On the opposite end of the disease-age spectrum is one of oldest causes of human ailments on record – Tuberculosis (one of the major causes of morbidity and mortality in Ethiopia). It is the third leading cause of admissions into health care facilities and "…the leading cause of in-patient deaths (10.1%) in 2001". [35]. Ethiopia is ranked number 8 among the world's top 22 countries with a high tuberculosis burden. An estimated 267,000 TB cases were detected in 2004, with an incidence rate of 353 cases per 100,000 people. The country has instituted a new treatment regime [36]

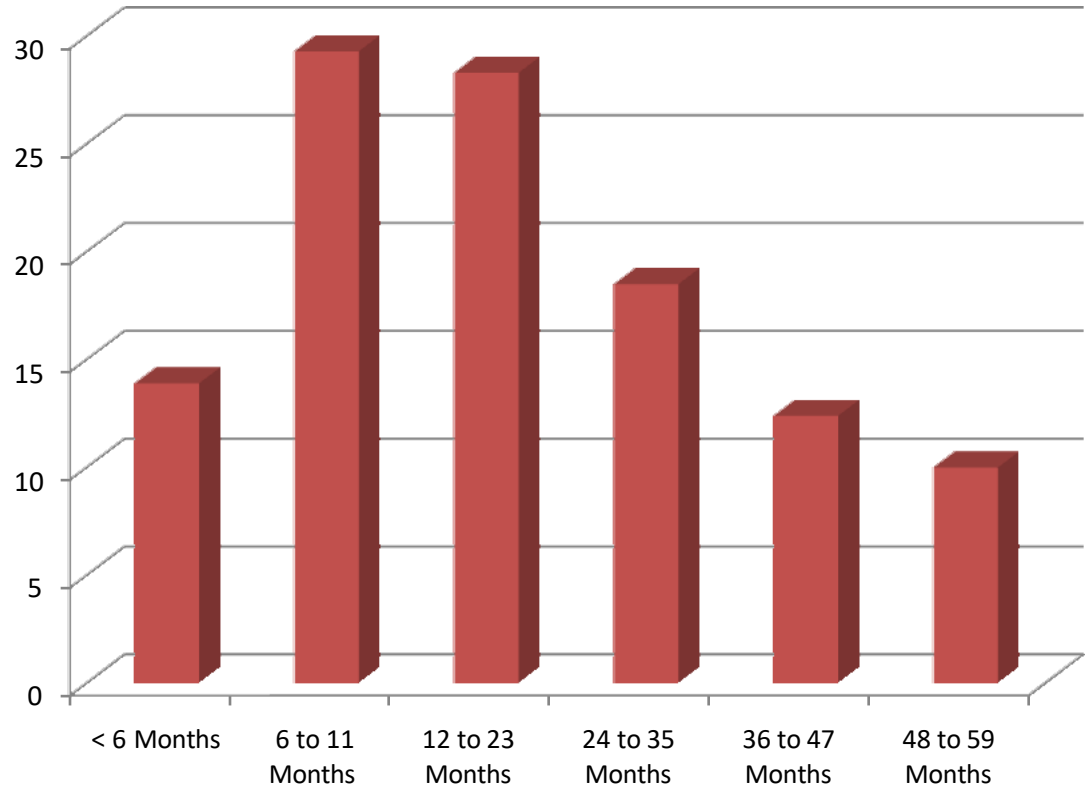
> Ethiopia's TB and Leprosy Control Program (TLCP) began to implement Directly Observed Therapy, Short-Course (DOTS) in two zones in 1991, and in 2004, DOTS coverage was 70 percent in areas where health services had adopted the strategy. TB treatment is integrated into general health services, although only 40 percent of Ethiopia's people have true access to DOTS. [36].

Over 377,030 Ethiopians have active TB and 36% of the population (24.5 million in 2005) are infected (latent infection) [37]. Co-infection with HIV/AIDS amplifies the severity of both "…thus accelerating the progression to AIDS" and the onset of death. [37]. The co-infection rate is "over 45% among outpatient TB clinic attendees" and 'the prevalence of TB among pediatric AIDS patients is 61%..." [33].

A major health risk in Ethiopia, especially at the bottom of the age pyramid is acute respiratory infection (ARI) which represents a major cause of morbidity and mortality for Ethiopian children. The 2005 Demographic and Health Survey asked mothers if their children had the symptoms of ARI. About 13 percent were found to have had the classic symptoms of a cough accompanied by short rapid breathing in the two weeks before the survey [7]. Babies 6 – 11 months old are most affected with incidences higher in urban than rural areas, and in homes that use wood/straw or animal dung for fuel than in homes with alternative fuel sources. Minimal medical intervention was observed during the study period: "Only 19 percent of all children under five with symptoms of ARI were taken to a health facility or provider" [7]

Diarrhea is among the major causes of childhood mortality and morbidity in Ethiopia with seasonal ebbs and swells. The survey mentioned above also solicited information on the subject. The result is shown in Fig. 1.8.

Fig. 1.8 Percentage of Children under 5 with Diarrhea in the Last Two Weeks Before the 2005 DHS survey by age (in months).



Source: [7]

There is no difference in incidence between boys and girls but the usual urban-rural difference persists with an incidence rate of 12% and 19% respectively. Diarrhea is also a common occurrence among HIV/AIDS patients, both adult and pediatric, with 51% of patients showing symptoms in a southern Ethiopian study [37].

Although not as life-threatening as HIV/AIDS which, in Ethiopia, is primarily transmitted during sexual intercourse, other sexually transmitted infections (STI) also affect millions, some with severe health effects including sterility and life-long disabilities. "Sexually transmitted infections (STI) include not only the common classical STIs (gonorrhea, syphilis, cancroids, and lymphogranuloma venereum) but also about 20 infections often referred to as 'second generation' sexually transmitted infections caused by bacterial, viral, parasitic, protozoal, and fungal agents" [38]

Vectored infectious

Malaria is by far the deadliest and the most widespread vector-borne disease in Ethiopia covering three quarters of the country's land area and threatening the health and lives of

millions of people. About 68% of the Ethiopian population (52.5 million) is at risk [29] and "over 5 million episodes of malaria are estimated to occur annually…" [39]. The disease accounts for 27% of hospital deaths [38]. A UNICEF report paints an even gloomier picture:

> Malaria… contributes up to 20% of under-five deaths. Tragically, in epidemic years, mortality rates of nearly 100,000 children are not uncommon. In the last major malaria epidemic in 2003, there were up to 16 million cases of malaria - 6 million more than an average year. Out of an estimated 9 million malaria cases annually, only 4-5 million will be treated in a health facility. The remainder will often have no medical support. It is estimated that only 20 per cent of children under five years of age that contract malaria are treated in a facility. [41]

The two most common strains of malaria parasites are the ***P. Falciparum*** and ***P. Vivax***, the latter representing a milder form of the disease. Almost all deaths are caused by the P. Falciparum strain. " ***P. Falciparum*** can rapidly become resistant to malarial treatment and poses a significant challenge to malarial medicine"[41].

> Children and pregnant mothers are among the most vulnerable. Drought related malnutrition, poor health and no sanitation can leave a weak immune system open to attack from malaria. It can also worsen the effects of malnutrition through malaria-related diarrhea and anemia. Malaria is also known to speed up the onset of AIDS in anyone who is HIV positive. Those living with HIV in high-risk areas are also amongst the most vulnerable. [41]

In April 2006 the government of Ethiopia announced a malaria control plan with a budget of $447 million that envisaged, among other things, the training of 37,000 health extension workers [41] and a substantial reduction in the disease burden and its detrimental impacts on the country's economy and society.

Other vector-borne diseases in Ethiopia with significant area coverage and impacts on public health have been studied and analyzed in a recent publication on Ethiopian epidemiology and ecology [43]. These include Trypanosomiasis, Onchocerciasis, Lymphatic Filariasis (LF), Leshmaniasis, Yellow Fever, Relapsing Fever, Typhus and related Rickettsial diseases, schistosomiasis, Dracunculiasis, and Zoonotic diseases with direct implications for human health and indirectly through their effects on domestic animals. Included in this group are Hydatidosis, Fascioliasis, Anthrax, Brucellosis, Toxoplasmosis, and Rabies.

Intestinal Parasitic Infections

Intestinal parasitic infections associated with poor hygiene and transmitted usually by the "fecal-oral route" are widespread in Ethiopia [43]. Unfortunately, there is no national surveillance, or nation-wide study, to unravel the extent of the illness. The pictures that emerge from the scant in-depth research outcomes fail to give a holistic national picture of the disease burden as well as its socio-economic impacts. The most common pathogens identified in stool samples of Ethiopian adults and children include Amebiasis, Giardiasis, Intestinal helminths including Taeniasis, Ascariasis, Trichuriasis, and hookworm infection. Regarding Taenia infections, Belete and Kloos [43] add that the infection is widespread in Ethiopia due to the practice of eating raw meat "…and the

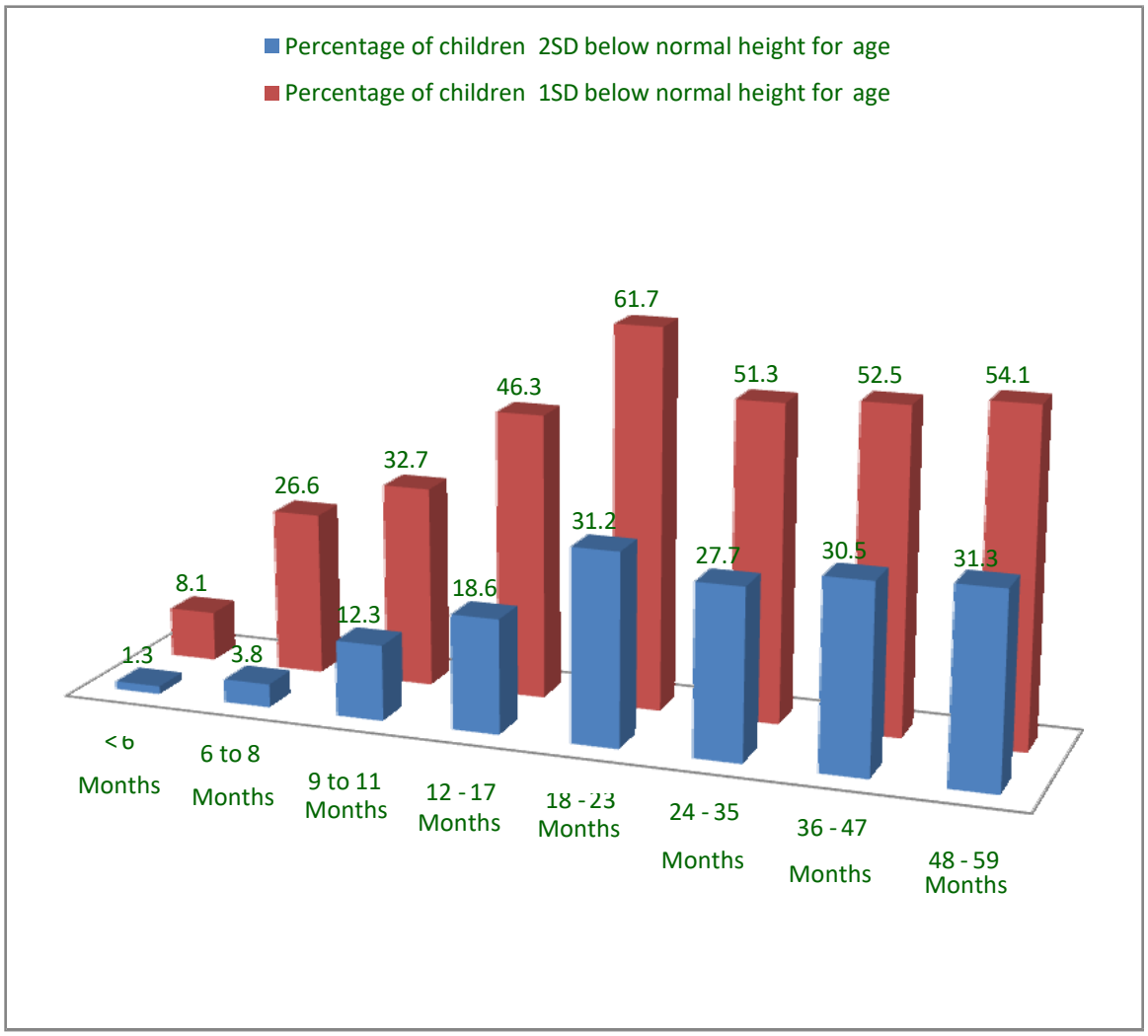
tradition of self-treatment is so well established that most people, especially in rural areas, treat them with various traditional plant medicines including *Kosso* (Hagenia abyssinica), *enkoko* (embelia schimperi) and *metere* (Glinus lotoides), usually every two months." [43].

Malnutrition

A recent World Bank report, details past efforts to monitor the evolution of child malnutrition over the past two decades. The authors were stuck by what they thought of as "…the sheer magnitude of the prevalence of malnutrition of children under 5 in Ethiopia". They also noted that "… the incidence of underweight children has been consistently reported at about 45 percent" and that "…more than half the children under five [are] stunted, with stunting rates most often attaining more than 60 percent". [44]. Insufficient food production, recurrent draughts and famine, falling GNP, infectious diseases, and political instability have been cited as the main contributing factors to the two categories of malnutrition in Ethiopia – protein energy malnutrition, and micronutrient deficiency disorders [45].

Figure 1.9 shows the percentage of children under five that are 1 and 2 standard deviations below the normal height for age by the number of months since birth. The graph clearly shows a major lag in growth starting at age 6 months where supplementary food (other than breast milk) needs to be introduced, to age 24 months, and then a gradual stabilization. The percentage of children 1 standard deviation below normal stabilizes at about 50 % starting at age 24 months and that of children 2 standard deviation below the normal height for age stabilizes at about 30% starting at the same age (Fig. 1.9).

Fig. 1.9 Percentage of children under five, 1 and 2 standard deviations below the normal height for age



Source: Based on [7]

Chronic non-infectious diseases

Chronic non-infectious disease (also referred to as life-style illnesses in the Western world) such as cardiovascular diseases, various malignancies, and diabetes mellitus, chronic liver diseases, nephritis and nephrosis, etc. are a relatively recent phenomena in Ethiopia and are mainly urban-based.

> "A prospective study of Ethiopian medical patients 60 years and older found cardiovascular diseases, especially hypertension and its complications in 20% of patients, neurological diseases

in 9%, liver diseases in 5% and malignancies in 6%. Of these elderly people, 9% were diabetic." [46].

The numbers of older Ethiopians with chronic non-infectious diseases are likely to rise for three reasons:

1) As the overall population size increases the number (not necessarily the percentage) of the elderly increases.
2) If the Ethiopian government's claim of an improving economy is to be believed, the adage "a rising tide lifts all boats" will apply, and more seniors will get to enjoy the amenities of a better economy which, as we have seen in the Western world, lead to a sedentary life style, weight gain, and all the attendant complications and ill-health.
3) An increasing number of the elderly have children in Diaspora, and are reaping the benefits of remittances sent back home, and have changed their consumption patterns to reflect recent increases in disposable income which can be spent on previously inaccessible food items such as meat and butter.

Terms You Need to Learn Quickly

The following section familiarizes you with technical terms often used in the study of demography/ population studies.

GLOSSARY OF DEMOGRAPHY AND POPULATION

(adapted from The Dictionary of Demography, by Roland Pressat, edited by Christopher Wilson. Oxford: Blackwell Reference, 1985)

Copied from : www.bestlibrary.org/ss11/files/glossary_of_demography_and_population.doc

Abridged life table. 'A life table in which values of the life table functions are presented for certain age groups only, rather than for every single year of age.'

Acute illness. An illness arising suddenly and lasting only days or weeks.

Age heaping. Concentration of population numbers in certain ages, especially those ending in zero or 5. Age heaping in demographic data may occur when people do not know when they were born or when they are inclined to understate or exaggerate their ages.

Age standardization. A technique for adjusting rates to remove the effects of differences in the age composition of populations.

Aged dependency ratio. The number of people aged 65 years and over per hundred aged 15-64 years.

Ageing index. The number of persons aged 65 and over, or 60 and over, per hundred children under 15. The older the population, the higher the index; indices greater than 100 show that older people outnumber children.

Age-specific death rate. The number of deaths in a year of persons aged *x*, per thousand persons age *x* in the mid-year population

Age-specific divorce rate. The number of divorces at age *x* in a year, per thousand persons aged *x* in the mid-year population.

Age-specific fertility rate. The number of births in a year to women aged *x*, per thousand women aged *x* in the mid-year population.

Age-specific marriage rate. The number of marriages of persons aged *x* in a year, per thousand persons aged *x* in the mid-year population.

Area graphs. Graphs in which lines representing data for different categories at a series of dates are 'stacked' upon each other, so that the uppermost line represents either 100 per cent or the size of the total. Variations in the width of horizontal bands on the graphs show differences in the numbers or percentages in each category.

Arithmetic change. A population changing arithmetically would increase (or decrease by a constant number of people in each interval .

Average annual increase (or decrease. The average number of people added to (or subtracted from the population each year. Being based on the concept of arithmetic change, it assumes constant annual gains or losses, ignoring the notion that growth is self-reinforcing.

Birthplace method. A procedure for estimating migration from statistics on the state or province of birth of the native-born. Potentially, it can provide information on life-time migration, net migration and gross migration, as well as origins and destinations.

Caretaker ratio. The ratio of females aged 50-64 years to persons 80 years and over.

Cartogram. A map employing proportional symbols to represent areas, such as through drawing squares or circles proportional to the population sizes or other characteristics of the population of each place. Alternatively, the original shape of areas may be scaled up or down in proportion to their population totals 10.8. Cartograms provide a means of emphasising larger populations or the most relevant information.

Cause-specific death rate. A rate measuring the incidence of death from a particular disease.

Census survival ratios. Census-based measures of the proportions surviving from one age group to another. The ratios compare the numbers of males or females in one age group at the first census with their numbers in a later age group at the second census.

Census. A national enumeration of a population at the same time.

Chain migration. Chain migration is the process whereby immigrants encourage and assist relatives and friends to join them. It can have a considerable influence on the origins of immigrants as well as their destinations.

Child dependency ratio. The number of children aged 0-14 years per hundred people aged 15-64 years.

Child-woman ratio. The number of children aged 0-4 per thousand women aged 15-49 in the mid-year population.

Choropleth map. A map employing shading of areas to portray distribution.

Chronic illness. An illness of long duration, lasting months or years.

Closed population. One with no migration arrivals or departures.

Closed population. One with no migration arrivals or departures.

Cohort analysis. An approach to demographic analysis employing data for cohorts to study the experiences of the same groups of people at different points in time.

Cohort component method of projection. A projection method that entails calculating the future size of individual birth cohorts through taking into account the effects of fertility, mortality and migration – that is, the components of change.

Cohort life table. Life tables describing the mortality through time of real cohorts rather than mortality in one period. They are also known as *generational life tables*.

Complete life table. Life tables for single years of age. They are also known as *unabridged life tables*.

Completed fertility. The total children ever born to women at the end of their reproductive years.

Components of growth. The sources of population gains and losses, namely natural increase and net migration.

Conference posters. Posters used at scientific and professional gatherings to provide summaries of.

Cross-sectional analysis. An approach to demographic analysis employing data for years or points in time, such as from censuses, vital statistics and surveys. Also known as *period analysis*.

Crude birth rate. The number of live births in a year per thousand people in the mid-year population.

Crude death rate. The number of deaths in a year per thousand people in the mid-year population.

Crude divorce rate. The number of divorces in a year per thousand people in the mid-year population.

Crude marriage rate. The number of marriages in a year per thousand people in the mid-year

population.

CSR method. A procedure for estimating net migration using *census survival ratios*.

Cumulative frequencies. The number of cases or observations in each category or group are called frequencies. For any category, the cumulative frequency is the total number of cases in that and previous categories.

De facto census. A census that counts people at their locations on the night of the census.

De jure census. A census that counts people where they usually live.

Deductive research. Research that proceeds from a theory to its testing with observations.

Demographic balancing equation. An expression stating that population growth is equal to the sum of its components, namely natural increase and net migration.

Demographic transition. Refers to the movement of death and birth rates in a society, from a situation where both are high – in the pre-transition stage – to one where both are low – in the post-transition stage. The interval separating the two is the transition itself, during which substantial and rapid population growth often occurs.

Demographic translation. Techniques for establishing the relations between cohort and period measures of demographic processes.

Demography. The scientific study of human populations.

Dependency ratios. The number children and aged persons per hundred people of working age.

Direct standardization. A technique for calculating comparative rates by assuming that each population has the same 'standard' composition in terms of age structure or another characteristic.

Disordered cohort flow. The movement of distinctive cohorts through the age structure, occasioning sudden changes rather than the maintenance of a continuous trend.

Dot map. A map employing dots of uniform or varying sizes to portray distribution patterns. Each dot may represent individuals or aggregates such as 100 or 1,000 people 10.3.

Doubling time. The number of years that a population would take to double; the doubling time provides a readily understood measure of the pace of change that a particular growth rate implies.

Duration-specific divorce rate. The number of divorces after *n* years of marriage per thousand people married *n* years.

Dwelling occupancy rate. A measure of the average number of persons per dwelling, obtained by dividing the total number of persons in private dwellings by the total number of occupied private dwellings. Also known as the *housing occupancy rate* .

Economic dependency ratio. The number of people not in the labour force per hundred in the labour force.

Endogenous causes of death. Causes due to internal agents operating within the body, such as sensesence. *Exogenous causes*, however, are now known to cause degenerative and other diseases once attributed to endogenous factors alone.

Epidemiologic transition. A theory describing and explaining variations in countries' experience of mortality changes through time.

Exact age. A person's actual age in years, months and days. Demographic use of the term is most common in life tables, where certain functions refer to ages on birthdays. In contrast, everyday usage measures people's ages mainly in completed years, as age last birthday.

Exogenous causes of death. Causes arising from agents outside the body, including infections, accidents, environmental pollution and lifestyle factors, such as diet and smoking.

Exponential change. A constant rate of increase or decrease in which change is compounding at every moment. While exponential change recognizes that growth is self-reinforcing, populations seldom experience constant rates of growth or decline for very long

External migration. A synonym for *international migration*.

Familism. A family-oriented lifestyle.

Family. A grouping based on kinship. Demographers conducting research on the family study co-resident kin and wider networks of kin who are in contact with each other.

Fertility differentials. Differences in the fertility of people according to socio-economic and other characteristics.

Fertility. 'The childbearing performance of individuals, couples, groups or populations'.

Fetal death. A death of a fetus; includes stillbirths, miscarriages (spontaneous abortions, and abortions.

Fictitious cohort. See *synthetic cohort*.

Flow map. A map employing arrows or flow lines of different widths to depict linkages between places – in terms of the movement of people, or of goods and services, between them. The most common demographic application is in the mapping of migration.

Forward survival. An approach to estimating age-specific net migration in which survival ratios (from life tables or censuses are applied to the initial population to estimate the number of survivors at the end of the period, that is working forward through time. The net migration is the difference between the estimated number of survivors at each age and the total enumerated in each age group at the end of the interval.

General divorce rate. Divorces in a year per 1000 people aged 15 years and over in the mid-year population.

General fertility rate. Live births in a year per 1000 women aged 15-49 years in the mid-year population.

General marriage rate. Marriages in a year per 1000 people aged 15 years and over in the mid-year population.

Generation. A term with different meanings in different contexts, including the time interval between birth and parenthood, a birth cohort and an age-group of descendents within a family.

Geocoding. An approach to recording the locations of areas or addresses by expressing locations as co-ordinates on a standard reference grid. Geocoding aims to facilitate accurate tabulation and mapping.

Geographic information systems (GIS. A GIS consists of a database of spatially referenced information, together with the procedures for storing, retrieving, analysing and displaying it.

Geometric change. A constant rate of increase or decrease in which change is compounding at constant intervals, such as at the end of every year.

Gini index. 'A quantitative estimate of the extent to which certain characteristics (e.g. income are unequally distributed between subgroups of the population'.

Gross growth. The sum of all additions to a population during a period of time, arising from births and inward migration.

Gross reproduction rate. The sum of the (single year age-specific fertility rates for female births in a given year. It represents the average number of daughters a woman would have if she experienced, over her reproductive years, the age-specific fertility rates of the given year.

Growth rate. The annual rate of change in the size of a population.

Household headship method of projection. A method for calculating household projections using an existing population projection by age and sex, together with statistics on the proportion of household heads belonging to each age-sex group.

Householder. An individual who owns or rents a dwelling.

Housing density. A measure of the relationship between land area and the number of dwellings.

Housing occupancy rate. A synonym for *dwelling occupancy rate*.

Housing unit method of projection. This method uses information on existing dwellings and projected dwelling commencements and demolitions. The projected population is obtained by multiplying the projected number of occupied dwellings by the average number of persons per occupied dwelling.

Human development index. A measure of the relative socio-economic progress of countries, published by the United Nations. The index is a composite of three components of human

development, namely longevity, knowledge, and standard of living.

Hypothesis. A testable statement describing the relationship between two or more variables.

Immediate cause of death. The final disease or condition resulting in death, as distinct from the *underlying cause of death*.

Incidence of a disease. The number of new cases of a disease counted in the period of observation.

Incidence rate. A rate measuring the likelihood of developing a disease or health condition. It is calculated by dividing the number of new cases by the mid-period population, and multiplying by 1,000 or 100,000.

Index of concentration. A measure of the degree of correspondence between population and land area. It is based on the index of dissimilarity and compares the percentage of the population in each region or place with the percentage of the total land in each region.

Index of dissimilarity. A measure of the extent of non-overlap, or dissimilarity, between two percentage distributions. It provides a single figure summarizing the overall difference between two or more populations in relation to their age structures, occupational distributions, ethnic composition or other characteristics. It also has applications in comparing the same population at different dates .

Index of diversity. A measure of the heterogeneity of populations. It is employed in the analysis of nominal data, such as statistics on languages and religions, for which there is no gradation between categories. In its standardized form, the index of diversity ranges from 0 (homogeneity – all members of the population are in one category to 1 (heterogeneity– the population is evenly distributed through all categories.

Index of excess male mortality. Another name for the *sex-ratio of age-specific death rates*.

Index of segregation. A form of the *index of dissimilarity* measuring the extent to which an ethnic group differs in its spatial distribution from the rest of the population, or from another group in the population. Typical applications are comparisons of white and non-white populations, or immigrants and the native-born. The greater the dissimilarity between the spatial distributions of the two groups, the greater the ethnic segregation.

Index or redistribution. A measure, based on the *index of dissimilarity*, summarizing the extent of changes in population distribution. It is calculated from percentages denoting the spatial distribution of the same population at two dates.

Indicator methods. Estimating and projecting population numbers with reference to 'indicator variables', such as the number of housing units and electoral roll registrations, changes in which are associated with changes in the total population.

Indirect standardization. A technique for calculating comparative rates by assuming that each population is subject to the same 'standard' set of age-specific, or other characteristic-specific, rates.

Inductive research. Research that proceeds from observations to the construction of a theory.

Information literacy. Knowing how to find, evaluate and use needed information. Information literacy comprises skills in library research as well as in information technology.

Intercensal estimates. Estimates of population numbers between two existing censuses. They are more accurate than *postcensal estimates*, because there are two reference points together with observed data on births, deaths and migration for all of the intervening years.

Internal migration. Migration between communities within the same country.

International migration. Migration between countries.

Intrinsic birth rate. The birth rate of a stable population.

Intrinsic death rate. The death rate of a stable population.

Intrinsic rate of natural increase. The rate of natural increase of a stable population. The rate is 'intrinsic' to, or inherent within, the population concerned because it is based solely on its age-specific fertility and mortality in the year of observation.

Key terms and formulae related to population growth

Labour force projections. Calculations of the future size of the labour force. The simplest approach to labour force projections, as well as that most consistent with other projections, is to take figures for the total population produced by the cohort component method and calculate from them the projected population in the labour force. This is accomplished by multiplying the projected numbers in each age-sex group by an assumed labour force participation rate for each group.

Lexis diagram. A square grid depicting the location of demographic events in time.

Life expectancy. 'The average number of additional years a person would live if the mortality conditions implied by a particular life table applied.'

Life table functions. The measures of mortality and survival in a life table.

Life table survival ratios. Life table measures of the proportions surviving from one age group to another, calculated from the L_x function .

Life table. A detailed description of mortality in a population through a set of age-specific measures of deaths, survival and life expectancy.

Living arrangement method of projection. An approach to household and family projections using statistics on the proportions of the population in different types of living arrangements. The projections are obtained by partitioning projections of the total population by age and sex into the required categories of living arrangements.

Local migration. Migration within a community, such as a city, town or village. Also known as *residential mobility*.

Location quotient. A statistic obtained through dividing a percentage for one population by a corresponding percentage for another (base or standard population. It measures whether a characteristic is under-represented or over-represented in the first population compared with the second.

Logistic curve. A mathematical model of population growth which envisages that population growth follows an S-shaped curve – from slow initial growth to more rapid growth and, finally, to a plateau in population numbers. Although the logistic curve recognizes that numbers cannot increase indefinitely, it has had little success in forecasting national population growth

Longitudinal analysis. A synonym for *cohort analysis*.

Lorenz curve. A curve showing the extent to which a given distribution is uneven compared with an even distribution. The curve is plotted on a scatter diagram, with axes of equal length, from data on the cumulative frequency distributions of two variables. The greater the curvature of the line, the greater the deviation from an even distribution.

LTSR method. A procedure for estimating net migration using *life table survival ratios*.

Male excess mortality. The excess of male deaths over female deaths, measured by the *sex ratio of age-specific death rates*.

Market segmentation. A concept describing a situation where there is not a single mass market for goods and services, but multiple markets – each consisting of groups of consumers with different needs and purchasing behaviours.

Marriage. Either 'a legal union of persons of the opposite sex' or, more broadly, a commitment to a union, whether or not formally recognized through a legal or religious ceremony.

Maternal mortality rate. The number of maternal deaths per 10,000 or 100,000 live births. Maternal deaths are those due to causes connected with pregnancy, labour or the puerperium (lying-in period – the period of approximately six weeks after childbirth, during which the uterus returns to normal.

Mean age at childbearing. 'The mean age of mothers at the birth of their children.'

Mean age. The average age of a group or population.

Mean length of a generation. 'The average age of mothers at the birth of their daughters. This is regarded as the mean interval separating the births of one generation from those of the next.'

Median age at divorce. The age above and below which half the divorces occur.

Median age at marriage. The age above and below which half the marriages occur.

Median age. The middle age in a group or population; the age which half are above and half are below.

Mid-year population. The observed population total at mid-year, or the average of the population at the start and end of the year; often employed as the denominator for demographic rates.

Migration effectiveness. The ratio of net migration to gross migration, the lower the ratio the less the effectiveness of migration as a process of population redistribution.

Migration expectancy. An estimate, derived using life table methods, of the average number of migrations individuals at each age may be expected to make during the rest of their lives.

Migration interval. The interval during which migration is observed, such as between two censuses.

Migration. Population movement entailing a change in the usual place of residence.

Mobility. All forms of population movement, whether temporary or permanent.

Modal age. The most frequently occurring age in a group or population.

Model life tables. Sets of hypothetical life tables spanning a wide range of life expectancies as well as different patterns of age-specific mortality .

Model stable populations. Sets of stable populations corresponding to a wide range of mortality patterns, mortality levels and intrinsic rates of natural increase. They have been produced in conjunction with *model life tables* .

Morbidity. 'The state of illness and disability in a population.'

Mortality differentials. Mortality differences between population groups defined in terms of age, sex, marital status, socio-economic characteristics or place of residence.

Mortality. 'The process whereby deaths occur in a population.'

Movers. A synonym for migrants.

Multiregional projection model. A technique that uses the methods of matrix algebra to produce cohort component projections simultaneously for a number of sub-populations.

Natural fertility. 'The fertility of populations not practising contraception or induced abortion.'

Natural increase. The excess of births over deaths.

Negative momentum. This occurs when the projected stationary population is smaller than the present population. It denotes potential for decline inherent within the age structure, arising when smaller cohorts are destined to replace large cohorts at older ages in the future..

Neonatal mortality rate. A measure of the risk of mortality among the newborn, expressed as the number of deaths in the first 28 days of life per 1,000 live births.

Net growth (or decline. The difference between the size of a population at the start and the end of an interval; in a growing population it is the excess of gains over losses.

Net migration. The difference between the numbers of inward and outward migrations.

Net reproduction rate. A measure of the number of daughters who will live to replace their mothers in the future. It is the sum of the (single year age-specific fertility rates for female births in a given year, multiplied by the probability of daughters surviving to the age of mothers at their birth.

Nodal regions. Nodal regions consist of central places and their hinterlands. They are delimited with reference to spatial interactions, through identifying places that are linked together economically, socially or politically, such as through trade, commuting, shopping or use of medical and educational services.

Open population. A population experiencing inward and outward migration.

Open-ended age interval. An age interval, such as '85 years and over' for which no upper age limit is specified.

Outlining. Preparing an outline of a paper or report to establish its overall structure, either through writing a synopsis or through creating a set of headings and subheadings.

Paradox of the life table. An increase in life expectancy with age, which occurs because life expectancy at birth is often lower than life expectancy at age one, and sometimes even at age five. The paradox reflects high rates of infant and child mortality; those who survive the high-risk period have better prospects.

Partial displacement migration. Migrations that result in only a partial change in the locations visited regularly for work, shopping, schooling and recreation. Housing is often the main consideration in such movement. See also *total displacement migration.*

Percentage change. The absolute change in the size of a population per hundred people in the initial population. Percentage change provides a means of comparing developments in different populations, or different periods of time, by gauging the amount of change relative to initial numbers. It is always based on numbers at the start of the period.

Percentage. A proportion multiplied by 100.

Perinatal mortality rate. A measure of mortality between 28 weeks gestation and one week after delivery. Use of this combined figure for stillbirths and early neonatal mortality mainly reflects that the causes of death are similar.

Period analysis. A synonym for *cross-sectional analysis*.

Period life table. A life table based on the age-specific mortality observed in a particular period of time, such as a single year or a three year interval.

Person years. The sum of all the years members of a population have lived, during a fixed interval or over their whole lives.

Pie graphs. A graph in which a circle represents a total and sectors within it represent components

of the total.

Population ageing. A process entailing an increase in the percentage of the population in older ages. Also known as *demographic ageing*.

Population ageing. Population ageing, or *demographic ageing*, entails an increase in the percentage of the population in older ages, often taken as 65 years and over.

Population at risk. The population that could potentially experience a particular demographic event, such as giving birth or migrating, in a specific period of time.

Population density. 'A comparative measure of the number of people resident within a standard unit of area', such as persons per square kilometer or per square mile.

Population estimates. Calculations of the size of a population, usually for the present year or the recent past. Statistical agencies prepare estimates of the current population, to provide up-to-date information for years in which there is no census. Estimates are based on observed data about population changes (births, deaths and migration, whereas projections refer to dates for which there are no observed data, especially future years.

Population forecast. A projection representing what is considered to be the most likely future course of change in the population.

Population momentum. The potential for growth (or decline that is inherent within an age structure, assuming that the population experiences replacement level fertility (as well as constant mortality and zero migration in the future, and ultimately becomes stationary. Whereas the *intrinsic rate of natural increase* indicates the growth rate implicit in current fertility and mortality, ignoring the age structure, population momentum shows the growth potential implied by the age structure alone (Pressat 1985: 150. Population momentum is measured as the difference in size between the present population and the future stationary population..

Population projections. Calculations of population numbers at dates for which there are no observed data, especially future years. Reverse, or backwards, projection for past years is also possible.

Population pyramid. A bar graph depicting the numbers or percentages of males and females in each age group.

Population replacement. The share of gross growth absorbed in replacing deaths and migration departures. Population replacement is equal to *gross growth* minus *net growth*.

Population surveys. These collect data from a sample of the population on an aspect of demography such as fertility, mortality, migration, employment, families, health and housing. Compared with a full census, they can provide more detailed data on certain subjects and are less costly to conduct.

Population turnover. The sum of all population losses and gains during a period of time. Population turnover captures the total magnitude of changes in membership that a population experiences – the total of births, deaths, migration arrivals and migration departures, all of which are treated as positive numbers.

Positive momentum. This occurs when the projected stationary population is larger than the present population. It denotes growth potential inherent within the age structure, arising when large cohorts are destined to replace smaller cohorts at older ages in the future.

Postcensal estimates. Estimates of population numbers since the last census. See also *population estimates* and *intercensal estimates*.

Post-neonatal mortality rate. A measure of the risk of mortality beyond the neonatal period, expressed as the number of deaths from 29 days to one year of age per 1,000 live births.

Prevalence of a disease. The total number of cases of a disease counted in a period of observation.

Prevalence rate. A rate measuring the likelihood of having a disease or health condition in a specified period. It is obtained by dividing the total cases by the mid-period population, and multiplying by 1,000 or 100,000.

Primary data. Data collected for specific purposes, by or for those who wish to use the information.

Probability of dying. The relative frequency of death, such as between adjacent ages. In life tables it is measured by the q_x function.

Probability of surviving. The relative frequency of surviving, such as from one age to the next. In life tables it is measured by the p_x function.

Probability. The ratio of the number of demographic events to the initial population at risk of experiencing them.

Proportion. A ratio in which the denominator includes the numerator.

Proximate determinants of fertility. The immediate causes of fertility change through which the underlying social and economic causes operate. Bongaarts and Potter (1983 attributed variations in the total fertility rate mainly to the influence of four proximate determinants influencing the duration of the reproductive period and the rate of childbearing within it namely: marriage (or first cohabitation, contraception, induced abortion and post-partum infecundability.

Rate of natural increase. The annual rate of change in the size of the population resulting from the excess (or deficit of births over deaths.

Rate of net migration. The annual rate of change in the size of the population resulting from the excess (or deficit of inward migration over outward migration.

Rate ratio. The ratio of two rates, used to measure their relative magnitude.

Rate. A measure comparing the number of demographic events (e.g. births with the size of the population at risk of experiencing the event.

Ratio method of projection. A technique for projecting small area populations. It assumes either that the proportion of the total population living in each subarea remains constant through time, or that it varies according to a predefined pattern. Small area projections are obtained by subdividing the projected total population according to the specified proportions.

Ratio. The size of a number relative to another convenient number.

Real cohort. A cohort for which there is actual observed information through time.

Rectangularization of the survival curve. The tendency over time for the proportions surviving at younger and middle ages to approach 100 per cent, with the proportions declining only in the oldest ages.

Relational model life tables. A technique for calculating further life tables from a 'standard' life table. This is accomplished by varying two or more parameters that describe the relationship between the 'standard' l_x values and the 'predicted' l_x values.

Relative risk. A measure of the extent to which a particular characteristic is associated with an increase in the prevalence of a disease, or in mortality from it. It is calculated from ratios of incidence rates or mortality rates.

Replacement-level fertility. The level of childbearing at which women of reproductive age have sufficient daughters to replace, exactly, their own numbers in the population. It takes into account the survival of daughters to the age at which their mothers bore them, and occurs, therefore, when the levels of fertility and mortality produce a net reproduction rate of one.

Research design. 'A system of test environments or conditions'.

Residential mobility. See *local migration*.

Reverse survival. An approach to estimating age-specific net migration in which reverse survival ratios are applied to the end-of-period population to estimate the size of the initial population, that is working backwards through time. The net migration is the difference between the estimated initial numbers at each age and the total enumerated in each age group at the start of the interval. Compared with *forward survival*, this method tends to yield higher estimates because they include migrants who died during the interval.

Room occupancy rate. A measure of the crowding of dwellings, calculated as the average number of persons per room.

Second demographic transition. A theory which seeks to describe and explain family building behaviour in post-transition Europe and, by extension, circumstances in a number of other low fertility societies. A particular concern is the shift to below-replacement fertility.

Secondary data. Information originally intended for other purposes, or collected by another researcher or organization. It includes data intended for general administrative and research use, including population censuses, vital statistics and surveys undertaken by government statistical agencies.

Settlement hierarchy. A set of urban centres in a country or region, sorted into categories according to the size of their populations. Also known as an *urban hierarchy*.

Sex ratio of age-specific death rates. Ratios of the male age-specific death rates to the corresponding female age-specific death rates. Since male mortality is commonly higher, the figure is also known as the *index of excess male mortality*.

Sex ratio. The ratio of the number of males to the number of females, usually expressed as males per hundred females.

Stable population. 'A population which is closed to migration and has an unchanging age-sex structure that increases (or decreases in size at a constant rate.'

Standardized mortality ratio. The ratio of observed to expected deaths, the latter being obtained through assuming that the population is subject to a standard set of age-specific death rates (see indirect standardization).

Stationary population. 'A population closed to migration with unchanging age structure and mortality in which the annual number of births is equal to the number of deaths, producing a zero growth rate.'

Statistical reporting. Producing an article or report that summarises and interprets a given set of statistics. The data, such as in a newly-published statistical bulletin, define the scope and content of the report.

Stayers. People who did not move during a migration interval.

Stillbirth rate. The rate of fetal deaths, after 28 weeks gestation, per 1000 live births and stillbirths.

Survival ratios. Measures of the proportions surviving from one age to the next. See also *census survival ratios* and *life table survival ratios*.

Symmetrical and asymmetrical age distributions. Symmetrical age distributions have similar numbers of males and females in corresponding age groups. Asymmetrical age distributions have dissimilar numbers of males and females in corresponding age groups.

Synthetic [hypothetical] cohort. 'A theoretical concept by which measures can be calculated for a particular period analogous to those calculable for a true [or real] cohort.'

Theory. 'A set of logical and empirical statements that provides an explanation of some phenomenon.'

Time: point, interval, duration. Measures of time referring, respectively, to (i specific dates), (ii

the period between two dates), and (iii the time since the date of an event, such as birth or marriage).

Total displacement migration. Migrations in which the movers sever links with all the locations they once regularly visited on a daily or weekly basis, such as places of work, shopping, schooling and recreation. See also *partial displacement migration*.

Total fertility rate. The sum of the (single year age-specific fertility rates in a given year. It represents the average number of children a woman would have if she experienced, over her reproductive span, the age-specific fertility rates of the given year.

Total marital fertility rate. The sum of the (single year age-specific fertility rates of married women in a given year. It represents the average number of children a married woman would have if she experienced, over her reproductive span, the age-specific marital fertility rates of the given year.

Underlying cause of death. The disease or injury that initiated the train of events leading directly to death.

Uniform regions. Areas that are relatively homogenous in terms of the phenomenon in question.

Unimodal and bimodal age distributions. Unimodal age distributions have a pronounced peak in one age group, such as may occur in populations with many recent immigrants. Bimodal age distributions have two peaks, for instance when a population has a predominance of parents and their children.

Vital statistics. Statistics on events that change the composition of the population, especially births and deaths. Other events – marriages, divorces, adoptions and migration – are sometimes included as well. The statistics are products of official registration systems.

VS method. A method of estimating net migration from vital statistics on births and deaths, together with census data. Since population change is equal to natural increase plus net migration, net migration is equal to population change minus natural increase.

Young, mature and old populations. Terms used to describe age pyramids according to their representation of children, middle-aged and older persons.

Zero population growth (ZPG. Denotes a situation where a population has a growth rate of zero. ZPG is achieved if additions to the population from births and inward migration exactly balance losses from deaths and outward migration.

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