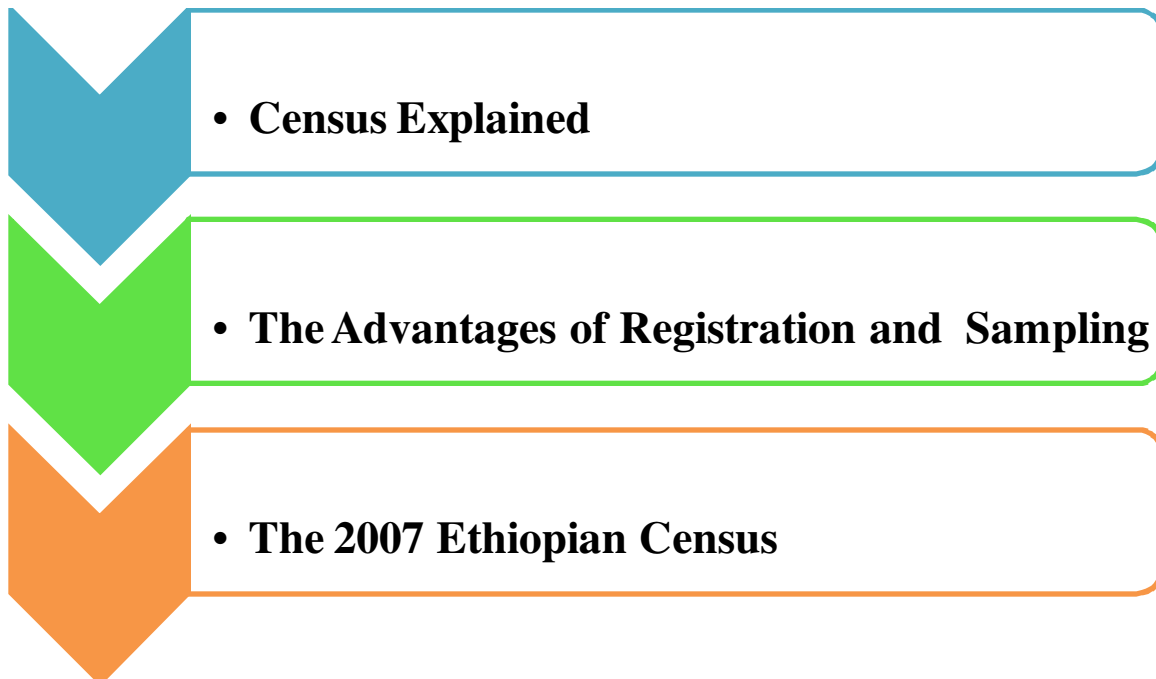


Lesson 2: Population Data Sources

Learning Objectives:



Introduction

There are three sources of population data:

- Censuses
- Vital Registration Systems
- Sample Surveys

I - Population Censuses

Censuses taking started nearly 6000 years ago [1]. Babylonians are said to be the pioneers in the field, followed later on by Persians and other civilizations, including the Greeks, Romans and the various Chinese dynasties. The practice also underlies a fundamental belief in Christianity regarding Jesus Christ's place of birth. "It was the five-yearly census ordered by Caesar Augustus which required every man in the Roman Empire to return to his place of origin, thus

ensuring that Joseph and Mary travelled to Bethlehem for the birth of Jesus” [2]. The 1841 census of England and Wales is widely regarded as the first truly modern census.

The following paragraphs are based on United Nations recommendations on census taking [3]:

Census: Definition

Population

“ A population census is the total process of collecting, compiling, evaluating, analysing and publishing or otherwise disseminating demographic, economic and social data pertaining, at a specified time, to all persons in a country or in a well delimited part of a country” [3]

Housing

“A housing census is the total process of collecting, compiling, evaluating, analysing and publishing or otherwise disseminating statistical data pertaining, at a specified time, to all living quarters¹ and occupants thereof in a country or in a well-delimited part of a country” [3].

A census must have the following essential features [3]:

Individual enumeration – each individual and living quarter has to be enumerated separately.

Universality – A census must cover every individual or housing unit present within the defined census area.

Simultaneity – Each person and housing unit must be canvassed within a defined point in time.

Defined periodicity - There should be a defined time gap between censuses. The most commonly used interval is 10 years.

What are censuses useful for?

- To provide facts to policy makers and planners
- Policy development and management/evaluation of programs
- Gerrymandering or redistricting – delimitation of election boundaries to insure adequate representation
- Scientific research
- Industry – to determine consumer demand and availability of labor

Other Censuses

- Agriculture
- Livestock
- Industry and commerce

Two Types of enumeration:

- Canvasser (enumerator) method – information on each individual or housing unit is entered by a census official.
- Household method: responsibility for entering information given to an individual in the housing unit.

List of Census Topics

1. Geographical and internal migration characteristics

- (a) Place of usual residence
- (b) Place where present at time of census, Locality
- (c) Place of birth
- (d) Duration of residence
- (e) Place of previous residence
- (f) Place of residence at a specified date in the past

2. Household and family characteristics

- (a) Relationship to head or other reference member of
- (b) Household and family composition household
- (c) Household and family status

3. Demographic and social characteristics

- (a) Sex
 - (b) Age
 - (c) Marital status
 - (d) Citizenship
 - (e) Religion
 - (f) Language
 - (g) National and/or ethnic group
-

4. Fertility and mortality

- (a) Children ever born
- (b) Children living
- (c) Date of birth of last child born alive
- (d) Deaths in the past 12 months
- (e) Maternal or paternal orphanhood

Principles and recommendations for population and housing censuses

Topics collected directly Derived topics

- (f) Age, date or duration of first marriage
- (g) Age of mother at birth of first child born alive

5. Educational characteristics

- (a) Literacy
- (b) School attendance
- (c) Educational attainment
- (d) Field of education and educational qualifications

6. Economic characteristics

- (a) Activity status
- (b) Time worked
- (c) Occupation
- (d) Industry
- (e) Status in employment
- (f) Income
- (g) Institutional sector of employment
- (h) Place of work

7. International migration characteristics

- (a) Country of birth
- (b) Citizenship
- (c) Year or period of arrival

8. Disability characteristics

- (a) Disability
- (b) Impairment and handicap
- (c) Causes of disability

Source: [3]

II. Vital Registration Systems

“Although local or parish registers were kept by some churches in Europe from the 14th century onwards, civil or state registration systems did not develop until the 19th and 20th centuries.....Unlike censuses that describe the state of the population at a fixed point in time, vital statistics are collected on a continuous basis” [4]

Life events registered under a complete registration system include [5]:

- Live Births
- Deaths
- Foetal deaths
- Marriages
- Annulments/ Legal separations
- Adoptions

Important principles of a Vital Registration system:

Universal coverage: A vital statistics system should include all vital events occurring in every geographic area and in every population group comprising the national area.

Continuity: Continuity is important to insure that short-term fluctuations including seasonal movements, as well as long-term movements will be accounted for.

Confidentiality: It is important to safeguard confidentiality of personal information and vital records to insure that use of information and data for specific administrative and statistical purposes is consistent with the intended uses of the records.

Regular dissemination: The minimum requirements for using vital statistics should include a) the provision of monthly or quarterly summary, and b) “the production of detailed annual tabulations of each type of vital event across classified by its demographic and socioeconomic characteristics.”

Definition of Vital Events [3]

“LIVE BIRTH is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, which after such separation, breathes or shows any other evidence of life”

“DEATH is the permanent disappearance of all evidence of life at any time after live birth has taken place (this definition excludes foetal deaths, which are defined separately below).”

“MARRIAGE is the act, ceremony or process by which the legal relationship of husband and wife is constituted”.

“DIVORCE is a final legal dissolution of a marriage”.

“ANNULMENT is the invalidation or voiding of a marriage by a competent authority”,

“ADOPTION is the legal and voluntary taking and treating of the child of other parents as one's own, in so far as provided by the laws of each country.”

“LEGITIMATION is the formal investing of a person with the status and rights of a person born in wedlock, according to the laws of each country.”

Summary Definition of Civil Registration Systems

“Civil registration is defined as the continuous, permanent, compulsory and universal recording of the occurrence and characteristics of vital events”. These events pertain to the population as decreed in accordance with the legal necessities of a country. It is carried out first and foremost for the purpose of putting in place the legal documents provided by the law. Vital registration records are also a main source of vital statistical data. Data quality requirements for vital statistics include completeness of coverage, timeliness, and accuracy, of civil registrations.

Locality

According to a UN report a locality is defined as “a distinct population cluster (also designated as inhabited place, population centre, settlement etc.), in which the inhabitants live in neighboring sets of living quarters and which has a name or a locally recognized status”[3]. These entities should not be confused with the smallest administrative divisions of a country (a Kebele, in the case of Ethiopia). There might be an overlap between the two in some instances. But, “in others, even the smallest civil division may contain two or more localities”. [5]

The recommended classification of localities by size-class is as follows:

- All localities
- 500,000 or more inhabitants
- 100,000 - 499,000 inhabitants
- 50,000 - 99,999 inhabitants
- 20,000 - 49,999 inhabitants
- 10,000 - 19,999 inhabitants
- 5,000 - 9,999 inhabitants
- 2,000 - 4,999 inhabitants
- 1,000 - 1,999 inhabitants
- 500 - 999 inhabitants
- 200 - 499 inhabitants
- Less than 200 inhabitants
- Population not in localities

Vital registration in Ethiopia: a Brief History

Tentative and largely symbolic efforts to establish a registration system in Ethiopia include the following: [6]

- The 1900 proclamation by Emperor Menelik to institute a registration system. This was well-intentioned but failed to materialize.
- The 1960 Civil Code: This too remained unimplemented for lack of institutional support and enforcement.
- The city of Addis Ababa started birth registration in 1942. It started registering marriages and deaths in 1953 and 1970 respectively. However, this took place at the whim of individual residents with legal and other needs for a certificate.
- A 1980 proclamation stipulated that the Central Statistical Authority (CSA) will begin to undertake registration of vital events. All of the preliminary efforts and attempts to lay the groundwork for a national registration system proved costly and the plan was shelved in 1999.
- The proclamations of 1983/88 by the Derg to register births, deaths, marriages and population numbers did not come to fruition.
- The 1995 FDRE constitution considered the naming of a child and record of his/her birth a fundamental right, “but the law on civil registration has not come into effect.” [6].

Ongoing activities:

- Continuing efforts by CSA to develop the ground rules for a national program assisted by the UN and other donor agencies.

- CSAs continued efforts at model building, and testing.
- Continued canvassing by the tens of thousands of health care workers, who are supplying vital health information to a national database.
- The 2006 National Conference on registration of vital events entrusted the Ethiopian Human Rights Commission with the task of setting up a national- level task force.

III Sample Surveys

The following are obtained from a UN “Studies in Methods” series on population sampling [26]. “Household surveys provide a cheaper alternative to censuses for timely data and a more relevant and convenient alternative to administrative record systems”.

Sample surveys are used for the collection of detailed data on:

- Socio-demographic characteristics
- Conditions under which people live
- Their well-being
- Activities in which they engage
- Demographic characteristics and cultural factors which influence behavior,
- Social and economic change

They provide the structure within which other variables such as education, health status, labor force, disability, nutrition status, migration, fertility, mortality and even seemingly fringe topics such as criminal victimization are studied. Survey data often complements those obtained from registration records, or from censuses.

Planning and execution of surveys requires all of the following steps below and many more that have to precede the training of interviewers, such as the selection and specification of the subject matter, development of survey design, design and printing of questionnaires, pre-testing, and preparation of instructional and training materials for field use:

- Training interviewers
- Data collection
- Field administration
- Data processing
 - Systems planning
 - Computer programming
 - Clerical coding
 - Key-to-disk operations
- Data review and publication

The Sample design should insure the following [3]:

- The sample must be conducted in stages to identify accurately the locations where interviews are to be conducted and to select the study households efficiently.
- It has to be stratified in such a it is spread over target geographic sub-areas and population sub-groups
- It has to make use of clusters of study households in order to keep costs down to a manageable level.
- The size of the study sample to try and optimally balance the competing needs of cost-cutting and accuracy of results.

History of Sample Surveys in Ethiopia:

As discussed above, census taking is a costly and time-consuming undertaking. The continuous and complete registration of vital events – births, deaths, marriages, etc. is even costlier and beyond the financial and technical reaches of a poor country like Ethiopia. The solution has been the use of sampling. Sampling is a statistical technique, and is defined as “the analysis of a group by determining the characteristics of a significant percentage of its members chosen at random.” [7]

The organization charged with the collection, analysis, and dissemination of sample and census data in Ethiopia is the Central Statistical Authority (CSA), formerly known as the Central Statistical Office (CSO) established in 1960. In the agency’s own words, its functions are anchored in “.... running a National Integrated Household and Enterprise Survey Program (NIHESP), undertaking ad-hoc surveys, conducting census, and compilation of secondary data from administrative records” [8]

“The Agency has carried out several socio-economic and demographic surveys that include agriculture, price, household income, consumption and expenditure, welfare monitoring, large and medium scale manufacturing and electricity industries, small scale manufacturing industries, cottage industries, construction, mining and quarrying, transport and communications, informal sector, distributive trade and services, manpower, demography, family and fertility, health and nutrition, child labour, etc.... These days sample surveys undergoing by CSA cover about 2,072 rural EAs and 790 urban EAs (enumeration areas)..” [8]

The first national demographic surveys were conducted between 1964 and 67 (first round) and 1968 – 1969 (second round). Others ample surveys hitherto undertaken by the agency include the:

- Addis Ababa manpower and housing survey 1976

- Population and housing characteristics of 17 major towns 1978
- The rural labour force survey 1981/2
- The rural labour force survey 1987/8
- National Rural Nutrition Survey of 1992
- 1998 Health and Nutrition Survey
- National Labour force survey 1999
- Disability Survey of Selected Weredas
- Demographic and Health Survey 2000
- Child labor survey 2001
- Biannual employment 2003
- Biannual employment 2004
- Demographic and Health Survey 2005

Data Quality

Just how reliable are the data put out by the CSA? There is no quick answer. Data quality would lie on a spectrum of measures ranging from somewhat reliable to unreliable, depending on the variable being measured. Moreover, data quality has to be viewed within the context of the social, educational, and economic environments within which the agency operates. None are favorable for the production of highly dependable data. How is quality measured anyway? The answer lies in the following crucial ingredients forming the corner-stones of a high-quality survey data. [9].

Relevance: This refers to the degree to which the data produced meets all of the real objectives of the survey.

Accuracy: This measures the extent to which the data collected, as well as the knowledge gained “.....correctly describes the phenomena it was designed to measure” [9] The usual spoilers include errors in statistical estimation, bias (or systematic error) and variance (often described as random error), as well as other errors including interviewer error, and respondent error or non-response. We can add to this coverage error, and sampling error.

Timeliness: Pertains to the time-gap between the reference point (or the end of the survey) to which the information relates, and the date at which the data is made available.

Accessibility This relates to the ease or difficulty with which data can be obtained as well as the form or medium of access to the data. To some users, the cost of acquiring the data becomes one aspect of accessibility.

Interpretability Listed underneath the interpretability heading are issues such as: the underlying concepts, types and number of variables and classifications used, and methodology adopted to collect the data.

Coherence: “ The *coherence* of statistical information reflects the degree to which it can be successfully brought together with other statistical information within a broad analytic framework and over time” [9]. Remember, however, that coherence does not necessarily entail total numerical consistency.

The 2007 Population and Housing Census of Ethiopia

Total Population

A cursory evaluation of the quality of the 2007 Ethiopian census data is shown below (Table 2.1) using the following assumptions:

- Both the 1984 and 1994 censuses under-estimated the population size nationally and regionally.
- The Central Statistical Authority’s projections for July 2008 – based on the 1994 census – most likely gave lower population estimates for that year nationally and regionally.
- Given the above two assumptions, the 2007 population census should have given at least as high a number nationally and regionally as the projected numbers for 2008.

The third assumption would not hold if there are reasons to believe that there have been marked declines in growth rates in some regions when compared to others, or significant rises in population growth rates in some regions (and not in others) between 1994 and 2007. The most likely causes of such unevenness would be highly dissimilar regional rate changes in fertility and mortality. Both fertility and mortality rates have declined in the intercensal period but there is no evidence showing that regional differences in reductions in birth and death rates have been significant enough to produce marked differences in regional growth rates. Given these facts it would be proper to assume that the divergence between the 2007 census and the 2008 projections would be similar across regions unless there have been appreciable regional differences in the completeness/accuracy of the 2007 census count. Table 1 presents a comparison of the 2007 census and projected numbers for 2008. [11]

The 2007 census numbers show a shortfall in all regions except Benishangul Gumuz and Gambella (Table 2.1). The undercount in these two regions (see the assumptions above) may have been more than compensated for by significant migrations, including settler migrations. The Gambella census results are 16% above the 2008 projections and Benishangul Gumuz counted 2 % more in the census than is projected for 2008. Census numbers are much lower in all of the other regions with the highest difference (25%) in Dire Dawa. Dire Dawa may rank highest percentage-wise but the total undercount comes to about 100,000 people – not an insignificant number for a place the size of Dire Dawa but somewhat low compared to what the table says about the Amahara region where the difference is more than 2.5 million. Addis Ababa too is short by more than half a million. There is only one of two ways to explain the numbers for Addis Ababa and Amhara:

- a) The 2008 projections over estimated the population numbers in Addis Ababa and Amhara by levels markedly higher than in all other regions except Dire Dawa.

- b) The 2007 census grossly undercounted the population of Addis Ababa and Amhara where the percentage differences are the second and third highest (after Dire Dawa) in the country. It also gave somewhat lower numbers than projected for Oromiya, SNNPR, Tigray, Afar and Somali, but unlike the double digit differences in Addis Ababa and Amhara the discrepancy in these five regions averages only around 5 percent.

There are evidences that **b** is a more likely answer than **a**. All an investigator has to do is look for inconsistencies and make comparisons and computations based on data put out by the various ministries. One such example comes from the estimated number of pregnancies by region reported by the Ministry of Health [12] as part of their periodic statistical reports on maternal health services.

Let us just compare Amhara and Oromiya. The reported number of expected deliveries in these two regions during the census year of 2007 was 731,176 and 990,427 respectively. A simple question to be posed is this: if it took a population of 27,158,471 people (Oromiya's reported census population) to produce 990,427 babies, what would be the required population size to achieve the outcome of the estimated 731,176 births in Amhara? If we assumed that the fertility rate in Amhara is the same as that in Oromiya the answer would be 19,555, 979 but, in fact, the birth rate in Amhara is lower. This means that a population size greater than 19.56 million would be required to produce the number of deliveries reported for Amhara.

The total fertility rate, TFR in Oromiya (6.2) is much higher than the rate in Amhara (5.1). It is difficult to state what this difference would translate into in terms of crude birth rates (CDR) in the two regions because CDRs are not simply the function of birth rates. However, if one is to make a very conservative assumption of just a 5% difference, it would take five percent more people in Amhara to produce the reported number of births. This comes to 0.98 million additional people for a total population of about 20.5 million in the Amhara region, very close to the number projected for 2008 (Table 2.1), and about 3 million higher than the census figure.

**Table 2.1 Comparison of the 2007 Census and Projections for July 2008
(based on the 1994 census)**

	2007 Census	2008 Projection	Difference (Census)
Addis Ababa	2,738,248	3,147,000	-0.15
Afar	1,411,092	1,449,000	-0.03
Amhara	17,214,056	20,136,000	-0.17
Benishangul Gumuz	670,847	656000	0.02
Dire Dawa	342,827	428000	-0.25
Gambella	306,916	259000	0.16
Harari	183,344	209000	-0.14
Oromiya	27,158,471	28,067,000	-0.03
SNNPR	15,042,531	15,745,000	-0.05
Somali	4,439,147	4,560,000	-0.03
Tigray	4,314,456	4,565,000	-0.06
	73,821,935	79,221,000	

Source: [11]

Of minor significance (while we are still on the subject of total population numbers), is that the breakdowns by age and sex groups do not give the advertised total population size when added (Table 2.2). The CSA's reported total numbers by sex (37,205, 040 males and 36,612,055 females) is incorrect. The true numbers (when the various age and sex groups are added up) are 37,296,657 and 36, 621, 848 for males and females respectively.

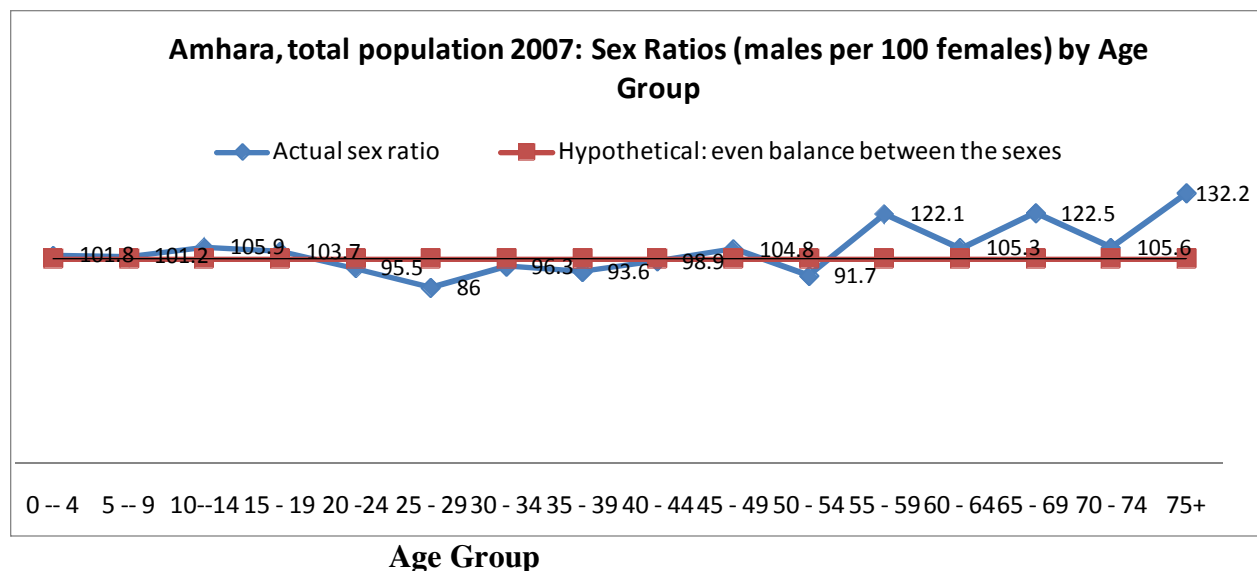
A recent news articles reported the government's contention that the census numbers in Amhara and the shortfall of more than 2.5 million from the projected population size reflected a true decline caused by HIV/AIDS which was not foreseen by earlier projections [13]. Let us first establish one important fact; there are more female Ethiopians living HIV than males. "According to the latest report by Ethiopia's Federal HIV/AIDS Prevention and Control Office, women in 2005 accounted for 55% of the 1.32 million people in the country living with HIV/AIDS. In addition, 54.5% of deaths from AIDS-related illnesses and 53.2% of new HIV infections occurred among women during the same year" [14]. Secondly, new infection rates among females are twice as high as male infection rates (five times as high in the 15-24 age group). In some locations, especially urban centers, the rate is up to three times higher among females (see the table below), and up to ten times higher in the 15-24 age group. The table below is based on the 2005 Demographic and Health Survey in Ethiopia [15]. Granted, it relates to all of Ethiopia, not just Amhara, but there is no proof of a significantly higher rate of HIV/AIDS infection or death in the

Amhara region than others; significant enough to account for a 17% shortfall in the population of the Amhara region from the projected numbers.

HIV prevalence (%) among young people (age 15-24)						HIV Prevalence (%) among the general population					
Total		Urban		Rural		Total		Urban		Rural	
Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.	Male	Fem.
0.2	1.1	0.3	3.3	0.2	0.6	0.9	1.9	2.4	7.7	0.7	0.6

Source: [15]

In the sections below we will test the above claim of higher HIV/AIDS deaths in Amhara by using a simple measure called sex ratio. This is the ratio of males to females (by age group) multiplied by 100, and shows the number of males at a given age (or age groups) per 100 females at that age (age group). A ratio greater than 100 shows more males than females (a masculine sex structure) and below a 100 shows more females than males (a feminine sex structure). We will use this method for a start instead of more rigorous techniques because it is easy to understand while, at the same time, offering a robust insight into whether the sex balance of young Amhara adults has been distorted profoundly as can be expected in a population that has been massively impacted by the epidemic (which kills far greater percentages of females than males) as the government reports contended. The graph below does not support the CSA/government's report.



HIV/AIDS is a serious health issue. It has killed hundreds of thousands of Ethiopians and has orphaned a million children. Given its differential mortality impacts on Ethiopian males and females, the claimed impacts of substantial reductions in life expectancy and population numbers in Amhara (if true), should now be reflected in a distorted sex distribution by age in which

males far outnumber females in the young adult age groups, but the reverse is observed in the above graph:

There are 95.5 males for every 100 females in the **20-24** age group.

There are 86 males for every 100 females in the **25-29** age group.

There are 96.3 males for every 100 females in the **30 – 34** age group.

There are 93.9 males for every 100 females in the **35-39** age group.

There are 98.9 males for every 100 females in the **40-45** age groups.

It is a known fact that more young Amhara females out-migrate to urban centers than young Amhara males and females suffer other mortality disadvantages including maternal mortality related to pregnancy and child birth. Their inferior social position also puts them at a disadvantage in the quantity and quality of nutritional intake and health care use. This, together with the known differential mortality impacts of HIV /AIDS on Ethiopian females should have raised the sex ratios in the five age groups listed above far above 100 to, may be, 110 or higher. It should also be noted that there is a large age gap between male and female Amhara couples – typically five to ten years, and that the death of a husband and wife is registered in, and affects, different age groups. For example, seventeen year old Amahara girls infected by 25 year old husbands will cause an increase in sex ratio among 27 year-olds upon death ten years later (assumed incubation period of ten years) while the increased mortality impact of the dying husbands will be among the 35 year olds (ten-year incubation period assumed), causing a reduction in sex ratio at this age. High sex ratios of well above 100 in the age groups listed above would have been one among the many indicators we can look for to support a claim of a massive HIV/AIDS impact on the Amhara; enough to cause a substantial decline in population size, of more than two and a half million. In fact, HIV prevalence is higher in Tigray than Amhara [16].

There is another important message from the graph. The low sex ratios in the young adult age groups show that even though (we contend) that the Amhara have been undercounted at every age, for reasons unknown to us, the undercount of males may have been particularly egregious in the five age groups listed above, and hence the low sex ratio in those age groups.

Further Examination of the National Data: Age and Sex Distribution

Early evidence of data error in age-sex distributions can be found in the 1-4 age group where the sex ratio is higher than for infants under 1 (see Table 2.2 below), and gets worse in the 10-14 age group. There is a clear indication that girls were undercounted. Since male infants face a higher risk of dying than females, nature's remedy is a lopsided sex ratio at birth in which 4 to 5 "extra" boys are born for every 100 female births.

The sex ratio at birth hovers around 104 in infancy and drops slightly in early childhood for every human population groups (absent selective female infanticide) whether in Tanzania, or Mongolia, or Armenia, and it should be the same in Ethiopia. But an increase rather than a decrease is shown in Table 2.2. Males continue to face "mortality disadvantage" for most of the human lifespan (which is about 100 years). The exception would be the reproductive age groups in some countries where excess female mortality due to high maternal deaths in pregnancy and childbirth produces sex ratios above 100. Where did the missing Ethiopian girls (especially those

in the 10-14 age group) go? In addition, the expected sex ratio of below 100 (more females than males) which starts at age 25 (Table 2.2) does not continue into later ages. The ratio climbs above 100 again in the 45-55 age group and becomes significantly higher than 100 in the age groups above 60 until it reaches 138 in the 75-79 group. Moreover, the sex ratio among the “oldest old” (above 75+) is predominantly feminine in almost all countries of the world but not in Table 2.2. Is Ethiopia an exception, or is this an artifact of data error? We think the latter but this is a topic to be picked up by other demographers, and could make an excellent thesis towards a graduate degree in Ethiopian Demography. The sex ratios (last column) show the number of males in the age group per 100 females.

Table 2.2. Age and Sex Distribution of the Total Population (All regions), 2007 Census

Age Group	Male	Female	Sex Ratio
Under 1	881065	860418	102.4
1--4	4596226	4447394	103.3
5 -- 9	6117281	5887456	103.9
10 -- 14	5437318	5020863	108.3
15 - 19	4474378	4313362	103.7
20 - 24	3110675	3314489	93.9
25 - 29	2631202	3049367	86.3
30 - 34	2091932	2137536	97.9
35 - 39	1825390	1949109	93.7
40 - 44	1465605	1410506	103.9
45 - 49	1149510	1097820	104.7
50 - 54	928329	964015	96.3
55 - 59	633409	537279	117.9
60 - 64	646290	589902	109.6
65 - 69	446338	359857	124.0
70 - 74	359371	317044	113.4
75 - 79	490721	355638	138.0
Total	37205040	36612055	
CSA total	37296657	36621848	

A further analysis of the age and sex distribution is given in Table 2.3. The population size in an age group (x) is divided by the number in the next higher age group (x+1). This gives numbers that approximate (but are not the same as) life table survivorship rates. For example, for every 100 males and females in the 5-9 age group, there are 88.88 males and 85.28 females in the 10-14 age group. Given the male mortality disadvantage discussed above, the reverse is expected. Moreover, the numbers take a huge dive in the transition from the 15-19 to the 20-24 age groups, and increase significantly, before they plunge again in the transition from the 25-29 age group to the next higher group. This is mainly due to data inaccuracy in which the number of people is

shifted (up or down) randomly from one age group to the other due, most likely, to respondent error. A glaring example is the avoidance of the 55-59 category in favor of the 60-64 age category. This led to a low survivorship in the 55-59 age group but an observation of “immortality” in the 60-64 group with a “survivorship probability greater than 1.

Table 2.3 Proportion in an age group x surviving to the next age group (x+1), all regions.

Age group (x)	(x+1)/x	(X+1)/x
5 -- 9		
10 -- 14	0.8888	0.8528
15 - 19	0.8229	0.8591
20 - 24	0.6952	0.7684
25 - 29	0.8454	0.9201
30 - 34	0.7951	0.7009
35 - 39	0.8724	0.9185
40 - 44	0.8029	0.7237
45 - 49	0.7843	0.7783
50 - 54	0.8076	0.8781
55 - 59	0.6823	0.5573
60 - 64	1.0203	1.0979
65 - 69	0.6906	0.6101

Source: [11]

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