

# Estimation of the total fertility rates and proximate determinants of fertility in North and South Gondar zones, Northwest Ethiopia : An application of the Bongaarts' model

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# Introduction: Global situation

- ♣ Fertility refers to the actual number of births in a population. It is one of the **three principal components** (births, deaths and migration) **of population dynamics** that determine the size and structure of the population of a country.
- ♣ Among the various measures of fertility, the **total fertility rate (TFR)**, is a **common measure of fertility** and is defined as the **total number of births a woman would have by the end of her childbearing period if she were to pass through those years bearing children at the currently observed age specific fertility rates.**
- ♣ Each year, about 80 million new people join the human race. This is roughly equivalent to adding the size of the Ethiopian population to the world annually.
- ♣ A rate of growth that will swell human numbers from today's (mid-2009) **6.8 billion** to about **8.1 billion** by 2025 and to **9.4 billion** by 2050.
- ♣ Developing countries will account for about **90%** of the increase in world population projected by 2050, while the populations of most developed countries will decrease.



# Introduction: The Ethiopian situation

- ♣ It ranks 2<sup>nd</sup> only to Nigeria with a projected population of 82.5 million in mid-2009 (PRB, 2009). The same source indicates that the TFR of Ethiopia is **5.3** with a **2.7%** rate of natural increase.
- ♣ **Nearly two million people** are added to the country's population each year.
- ♣ The population of Ethiopia in **1900** was estimated at **11.8 million**.
- ♣ It took **60 years** for this figure to double to **23.6 million** in **1960**.
- ♣ After **28 years** (i.e., in **1988**), the population doubled to **47.3 million**.
- ♣ In about **10 years**, the country will hit the 100-million mark.

# Introduction: The Ethiopian situation

- ♣ Proportion of persons <15 years of age (census of Ethiopia, 2007)

Ethiopia	Amhara region
45%	43%

- ♣ According to the 1984 census, the proportion of total population (Ethiopia) under the age of 15 was 48%.  
⇒ A slight drop (only 3%) in the past 23 years (48% vs. 45%).
- ♣ Ethiopia developed a population policy in 1993 which aimed to reduce the total fertility rate to 4.0 and increase the CPR to 44% by the year 2015 (poorly implemented).

# Introduction: Amhara region / North and south Gondar zones

- The Amhara region had a population **estimated at 20 million in mid-2008**. The population increases on the average by 500,000 every year.
- About 85% of the population lives in rural areas.
- The infant and under5 mortality rates are estimated to be **94 and 154 per 1000 live births**, respectively (EDHS, 2005).
- The total fertility rate of this region was estimated at **5.1** children per woman (EDHS 2005).
- The population of North and South Gondar Zones (5.6 million) where the present study was conducted is about **28%** of the population of the Amhara region and account about **40%** of the area of the region.
- **The population of these zones has increased by about 45% in the last fourteen years (from 1994 to 2008).**
- **Many studies including that of the world bank strongly argue that rapid population growth acts as a brake on development among poor developing countries**



**Map of Africa highlighting Ethiopia**



**Map of Ethiopia highlighting the Amhara region.**



**Map of Amhara region highlighting the two Gondar zones**

# Methods

- ♣ **A cross-sectional study (undertaken in North and South Gondar zones from mid October to mid December, 2007 )**
- ♣ **A multi-stage cluster sampling** technique was applied to select the required study units from the urban and rural areas of the study zones.
- ♣ From the **twenty rural Woredas (districts)** of North Gondar, **five Woredas** were selected by simple random sampling technique. Together with the town of Gondar, a total of six *Woredas* were considered in North Gondar.
- ♣ Similarly, from the **ten rural Woredas** of South Gondar, **three Woredas** were selected by simple random sampling technique. Together with the town of Debre Tabour, a total of four *Woredas* were considered in South Gondar.
- ♣ Consequently, a total of **eight rural Woredas** and **two big urban centers** (having the status of *Woreda administration*) were included in the present study.

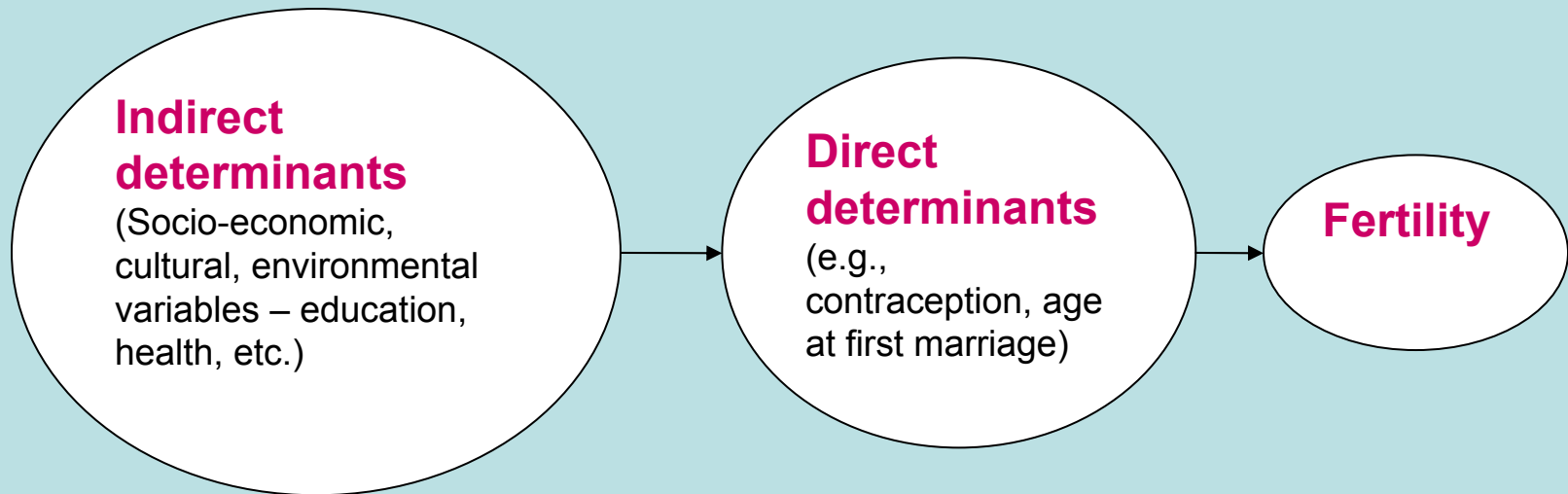
# Methods

- ♣ A total of **3547** women aged 15 to 49 years residing in both urban and rural areas of the randomly selected clusters and *kebeles* were registered and data were collected from **3512** of them.
- ♣ Data collection was carried out by **twenty health professionals** who were given a three-day intensive training with practical exercises. **Five health officers/sanitararians** were assigned to supervise the data collection process.
- ♣ Data entry into the computer was carried out using the Statistical Package for Social Sciences (SPSS) for Windows version 15. The **Bongaarts' model** was applied to analyze the given data and to estimate the required fertility rates and proximate determinants of fertility.

# Methods:

- According to the Bongaarts' model, fertility differences among populations and trends in fertility over time can always be traced to variations in **four** of the intermediate fertility variables.

$$TFR = TF \times C_m \times C_c \times C_a \times C_i$$



**Schematic presentation showing the determinants of fertility**

# Results and Discussion

**Table 1: Socio-demographic characteristics of the study subjects distributed by type of living place (big towns/small towns/rural villages), North and South Gondar zones, Northwest Ethiopia, 2007**

Characteristics	Big towns (n=756)		Small towns (n=479)		Rural areas (2277)		Total (n=3512)		
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
Age (years)	15 – 19	115	15.2	87	18.2	285	12.5	487	13.9
	20 – 24	168	22.2	83	17.3	350	15.4	601	17.1
	25 – 29	189	25.0	94	19.6	475	20.9	758	21.6
	30 – 34	99	13.1	72	15.0	435	19.1	606	17.2
	35 – 39	95	12.6	75	15.7	381	16.7	551	15.7
	40 – 44	51	6.7	41	8.6	217	9.5	309	8.8
	45 – 49	39	5.2	27	5.6	134	5.9	200	5.7
Educational status									
	No education	259	<b>34.3</b>	191	<b>39.9</b>	1950	<b>85.6</b>	2400	<b>68.3</b>
	Primary	207	27.4	145	30.3	279	12.3	631	18.0
	Secondary and above	290	<b>38.3</b>	143	<b>29.8</b>	48	<b>2.1</b>	481	13.7
Marital status									
	Never married	136	18.0	76	15.9	146	6.4	358	10.2
	Married	461	61.0	310	64.7	1875	82.4	2646	<b>75.3</b>
	Divorced	108	14.3	60	12.5	162	7.1	330	9.4
	Widowed	41	5.4	30	6.3	82	3.6	153	4.4
	Separated	10	1.3	3	0.6	12	0.5	25	0.7
Religion									
	Orthodox Christian	677	89.6	385	80.4	2217	97.4	3279	<b>93.4</b>
	Muslim	72	9.5	93	19.4	57	2.5	222	<b>6.3</b>
	Protestant	4	0.5	1	0.2	1	0.0	6	0.2
	Other	3	0.4	0	0.0	2	0.0	5	0.1

# Results and Discussion

**Table 2: The socio-economic characteristics of the households from which the study subjects had come from distributed by type of living place (big towns/small towns/rural villages), North and South Gondar zones, Northwest Ethiopia, 2007**

Characteristics	Big towns (n=659)		Small towns (n=422)		Rural areas (2097)		Total (n=3178)	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Monthly expenditure of the HH								
≤ 320	189	28.7	122	28.9	901	43.0	1212	38.1
321-500	209	31.7	156	37.0	663	31.6	1028	32.3
501- 999	182	27.6	110	26.1	425	20.3	717	22.6
≥1000	79	12.0	34	8.0	108	5.1	221	7.0
Source of drinking water								
Pipe	609	92.4	394	93.4	527	25.1	1530	48.1
Protected spring/well	43	6.5	23	5.4	459	21.9	525	16.5
Unprotected spring/well	7	1.1	3	0.7	514	24.5	524	16.5
River water	0	0.0	2	0.5	597	28.5	599	18.9
Availability of toilet facilities								
Yes and use it	584	88.6	289	68.5	602	28.7	1475	46.4
Yes, but don't use it	0	0.0	6	1.4	170	8.1	176	5.5
No	75	11.4	127	30.1	1325	63.2	1527	48.1
Availability of radio in the HH								
Yes, functional	536	81.3	315	74.6	543	25.9	1394	43.9
Yes, but non-functional	40	6.1	24	5.7	265	12.6	329	10.3
No	83	12.6	83	19.7	1289	61.5	1455	45.8
Availability of farm land								
Yes	17	2.6	52	12.3	1960	93.5	2029	63.8
No	642	97.4	370	87.7	137	6.5	1149	36.2

# Results and Discussion

- ▶ The emergence of households with **no farmland** in the typical rural areas is indicative of the **seriousness of the population pressure** and its adverse effect on the local environment of the Amhara region in general and the two Gondar zones in particular.
- ▶ The current use of family planning methods (27.3% among married women) and the intentions to use in the future are **appreciably higher than the findings of earlier studies** undertaken in the Amhara region (2005 EDHS, Amhara region, **CPR =15.7%** among married women).
- ▶ On the other hand, an **unmet need of 38%** obtained in the present study together with the relatively low level of contraceptive use is indicative of the fact that the **family planning program in the two Gondar zones is lagging behind.**
- ▶ In this regard, in order to achieve significant changes in the demographic transition (such as, **replacement level**) there appears a need to **increase the current CPR by nearly 3 times** among **married women.**

# Results and Discussion

**Table 3:** Indices for proximate determinants of fertility, North and South Gondar zones, Northwest Ethiopia, 2007

Index/Measure	North and South Gondar zones	Gondar and Debre Tabour towns	All towns	Rural areas
$C_m$	0.83	0.72	0.75	0.88
$C_c$	0.75	0.53	0.56	0.83
$C_i$	0.55	0.59	0.58	0.54
<b>Predicted TFR<sup>1</sup></b>	<b>5.24</b>	<b>3.44</b>	<b>3.73</b>	<b>6.03</b>
<b>Observed TFR<sup>2</sup></b>	<b>5.34</b>	<b>2.93</b>	<b>3.52</b>	<b>6.31</b>

<sup>1</sup> Predicted by Bongaarts formula

<sup>2</sup> Estimated using births in the last 3 years preceding the survey

# Results and Discussion

- ♣ The observed total fertility rate estimated for the **rural areas** was about twice of that of the **big towns** (Gondar and /Tabour towns).
- ♣ The observed rates were very **close** to the ones predicted using the Bongaarts' formula.
- ♣ However, the predicted rates in urban centers were relatively higher than the observed ones indicating the absence of an intermediate fertility variable (**most probably, induced abortion**)
- ♣ Overall, the total fertility rates obtained in this study were relatively **higher** than the ones estimated by the 2005 EDHS for the Amhara region.

# Results and discussion

- ♣ In the present study the **dependency ratio** was observed to be **100%** and the illiteracy rate was **68.3%**. **Early marriage was a typical phenomenon in the study areas** (mean age at first marriage – in urban centers, 17 years; rural areas, 14 years)
- ♣ The immediate effect of a **successful population program** should be **to reduce this dependency ratio**. The problem with this kind of situation is reflected both on the deterioration of quality of life and **constrained capacity for saving and investment at the household and national levels**.
- ♣ An excellent example, in this regard is, **the “Asian Miracle”**. According to the reports of World Bank (April 2008), the “Asian miracle” is attributable to a large extent (**40%**) to **rapid declines in fertility and dramatic changes in the age structure**.
- ▶ Melakehiwot M. (Menelikism, 2007) suggests a **maximum of two children** for Ethiopian couples in their lifetimes.

# Recommendations

- ♣ The promotion of breastfeeding should continue by all concerned bodies.
- ♣ The implementation of the family law of the region which asserts the minimum age as 18 years should be ensured particularly in rural areas. Those parents who break or individuals who break this marriage law should be fined.
- ♣ Use of contraception among women (particularly, married women) was encouraging. However, the **CPR among the rural women is still very low.** Therefore, the **family planning programs of the two Zones should be strengthened** in such areas where over 85% of the population lives.
- ♣ The existing monitoring and evaluation systems (if any) aimed at assessing the on-going opulation-related activities need to be activated and strengthened. Particularly, **the 1993 population policy of the country needs evaluation.**

# Some facts

*“...we have not so much inherited the earth from our grandparents, we have borrowed it from our grandchildren....”*

**(John Guillebaud :Professor of Family Planning and Reproductive Health, University College, London , 1994)**

*“The Millennium Development Goals, particularly the eradication of extreme poverty and hunger, cannot be achieved if questions of population and reproductive health are not squarely addressed”*

**(Kofi Annan, UN Secretary General, 2001)**

**THANK YOU**