

Explaining an African Fertility Mystery: Below Replacement Fertility in Addis Ababa, Ethiopia*

Abstract

Between 1990 and 2000 the total fertility rate (TFR) in Ethiopia declined moderately from 6.4 to 5.9 children per woman. During the same period, the TFR in the capital city of Addis Ababa declined from 3.1 to 1.9 children per woman. Even more striking than the magnitude of this decline and the presence of below replacement fertility in an African city is that the decline occurred in the absence of a strong and effective national family planning program. In this paper we identify the components of this fertility decline using the proximate determinants of fertility framework. The results of a decomposition analysis indicate that a decline in the age-specific proportions of women who are married, followed by a rise in contraceptive use are the most important mechanisms by which fertility has declined in Addis Ababa. We suspect that poor employment prospects and relatively high housing costs are encouraging couples to delay marriage and reduce marital fertility.

Background

At the outset of the 1990s Ethiopia was among the African countries with the highest fertility. During the subsequent decade the total fertility rate (TFR) dropped from 6.4 to 5.9 children per woman. Early studies on the fertility transition in sub-Saharan Africa documented significant declines in fertility in countries such as Botswana, Kenya, South Africa, and Zimbabwe (van de Walle

and Foster 1990; Caldwell 1993; Cohen 1993), however, Ethiopia was not considered among the countries at or near the start of the transition to low fertility. Using data from retrospective birth histories collected in a 1990 national survey, Lindstrom and Berhanu (1999) identified a pattern of moderate but steadily declining fertility in the second half of the 1980s, but they could only speculate as to the long-term prospects of this decline. In a national context of high fertility, an unexpected sharp decline in fertility was underway in the capital city of Addis Ababa. Between 1990 and 2000 the total fertility rate in Addis Ababa dropped by 38 per cent, from 3.1 to 1.9 births per woman. The already low fertility in the capital (by national standards) had become even lower, and for the first time ever below replacement fertility was recorded in an African city (Kinfu 2000; CSA and ORC Macro 2001).

The sharp contrast in fertility patterns between Addis Ababa and the rest of the country is unusual by any measure, and even more remarkable given that Ethiopia still has one of the highest levels of fertility in sub-Saharan Africa. Ethiopia has one of the lowest levels of contraceptive use in the world, with a contraceptive prevalence rate for modern methods of just 6 percent. In contrast, use of modern methods in Addis Ababa is 34 percent (CSA and ORC Macro 2001). Although substantially higher than in rural areas, the contraceptive prevalence rate in Addis Ababa is

*Amson Sibanda, Zewdu Woubalem, Dennis Hogan, and David P. Lindstrom, Population Studies and Training Center, Brown University, USA

nevertheless substantially below what is typically observed in populations with near or below replacement fertility. What makes the decline in fertility in Addis Ababa even more surprising is that it has occurred in the absence of any national family planning initiatives or interventions that could account for such a dramatic fall in fertility. Thus, the fact that an “island” of below replacement fertility can exist in a country as poor as Ethiopia is in itself an intriguing phenomenon, even though other African cities such as Accra, Nairobi and Kinshasa appear to have distinctly lower levels of fertility compared to their national levels (Shapiro and Tambashe 2001; Shapiro 1996).

In this paper we examine the factors behind the recent fertility decline in Addis Ababa. We use Bongaarts’ proximate determinants of fertility framework to identify the relative contribution of changes in each of the different determinants of fertility to the decline in total fertility. We compare the proximate determinants underlying Addis Ababa’s fertility to the proximate determinants in other urban areas of Ethiopia, and in rural areas.

We find that increases in delayed marriage and the proportion of women never married are the major factors accounting for fertility decline in Addis Ababa and in other urban areas. Despite the rise in non-marriage, nonmarital fertility remains low in Ethiopia. Approximately 95 percent of never married women age 20-24 in Addis Ababa were childless in 2000. Growth in contraceptive use is also a factor in fertility decline in Addis Ababa and to a lesser extent in other urban areas, but had a smaller impact than change in marital patterns. Our analysis and results follow closely the work of Kinfu (2000) who performed a thorough analysis of trends in Ethiopian fertility up to 1995. Using a more recent source of data we confirm and update his basic findings.

Data and Methods

We use data from the 2000 Ethiopia Demographic and Health Survey (DHS) and the 1990 National Family and Fertility Survey (NFFS).

Both surveys were conducted by the Central Statistical Authority of Ethiopia and were designed to be nationally representative. However, because of political instability in some regions of the country, certain areas were excluded from the NFFS survey. Despite this coverage problem, these data are generally considered to be of high quality (Lindstrom and Berhanu 1999; Kinfu 2000; Tilson and Larsen 2000; CSA and ORC Macro 2001). In addition to collecting data on children ever born, contraceptive use, breast-feeding practices and other background characteristics of the women and their husbands, these two surveys used similar measurements of the proximate determinants. The 1990 NFFS collected data for 8,757 women age 15-49 and the 2000 DHS collected data for 15,367 women.

We use the Bongaarts model to determine the contribution to fertility of proportions married, contraceptive use, proportions sterile, and postpartum infecundability (Bongaarts 1978; Bongaarts and Potter 1983). We also examine how these proximate determinants changed in importance between 1990 and 2000. After establishing the overwhelming significance of marriage, we proceed to examine three possible sources of fertility change associated with marriage, namely, changes in age at first marriage and first birth, proportions never married, and marital instability.

Results

Trends in Total Fertility

Table 1 presents trends in total fertility rates for Addis Ababa, other urban areas, and rural areas. We present unadjusted estimates and estimates that are adjusted for underreporting of births using Brass’s P/F ratio technique. By any estimate fertility in Addis Ababa is considerably lower than in any other part of Ethiopia. Both sets of estimates (unadjusted and adjusted) show a sharp drop in total fertility in Addis Ababa, and significant declines in other urban areas as well as in rural areas. The unadjusted TFR declined from 3.08 to 1.94 in Addis Ababa and from 4.41 to 3.80 in other urban areas. In rural areas the TFR declined from

7.50 to 6.46. The adjusted TFRs are all larger than the unadjusted estimates. The P/F ratio technique for adjustment works best when fertility is relatively stable over time. When fertility is declining, as is the case of Ethiopia, the adjustment factors are not appropriate, particularly in Addis Ababa where age at marriage has changed. Nevertheless, after adjustment the basic pattern of period and place differences in fertility remains. The adjusted TFR of 2.8 for Addis Ababa (which is a high estimate) is still impressively low by Ethiopian and African standards.

that only women in unions are exposed to the risk of childbirth. This assumption holds reasonably well in Ethiopia. The index of contraception, C_c equals one if no form of contraception is used and zero if all fecund women use modern methods that are 100 percent effective. In populations where reliable information on induced abortions is not available, and where primary sterility is high, as is the case in sub-Saharan African countries, Bongaarts et al. (1984) recommend the use of the index for primary sterility in place of the index for induced

Table 1.
 Unadjusted and Adjusted Total Fertility Rates for Women Aged 15-49
 by Place of Residence, Ethiopia 1990 NFFS and 2000 DHS.

Place of Residence	Unadjusted TFR		Adjusted TFR (P/F ratio technique)	
	1990 NFFS	2000 DHS	1990 NFFS	2000 DHS
Addis Ababa	3.08	1.94	4.69	2.81
Other Urban areas	4.41	3.80	7.17	4.24
Rural areas	7.50	6.46	8.68	7.05

The Role of Proximate Determinants

The proximate determinants of fertility refer to the behavioral and biological mechanisms by which fertility is reduced below its biological maximum. Bongaarts identified four proximate determinants that accounted for the large majority of variation in fertility levels observed across populations (Bongaarts 1978). These four determinants are marriage, contraception, induced abortion, and postpartum infecundability. Bongaarts developed indices based on data collected in conventional demographic surveys to measure the relative impact of each proximate determinant on the level of total fertility in a population (Bongaarts 1978). The index of marriage, C_m measures the effects on fertility of the proportion of women in a sexual union. It is calculated as the weighted average of age-specific proportions married and age-specific marital fertility rates. The index of marriage equals one when all women of reproductive age are in a union and zero when no women are in a union. Implicit in the use of the index is the assumption

abortion. The index of primary sterility, I_p equals one when no women are sterile and zero when all women are sterile. Finally, the index of postpartum infecundability, C_i equals one in the absence of breastfeeding and postpartum abstinence, and zero when infecundability is permanent. When all indices equal one, fertility is at its biological maximum. Based on studies of historical populations with the highest recorded fertility, Bongaarts recommends using 15.3 as the maximum number of births, or what is referred to as the total fecundity rate (Bongaarts 1978; 1982). Multiplying all of the indices together times the total fecundity rate of 15.3 produces the predicted TFR for the population. The predicted TFR will typically differ from the observed TFR due to underreporting of births, underreporting of any of the behaviors measured by the indices, or the omission of proximate determinants that are influential in determining fertility levels in the population under study, such as induced abortion.

Table 2 presents the indices of marriage, contraception, sterility, and postpartum infecundability for Addis Ababa, other urban areas, and rural areas for 1990 and 2000. In 1990 marriage was the most important proximate determinant affecting fertility in Addis Ababa ($C_m=0.54$), followed closely by postpartum infecundability ($C_i=0.59$). In other urban areas and in rural areas postpartum infecundability was the most important proximate determinant: C_i was 0.55 in other urban areas and 0.57 in rural areas. Apart from postpartum infecundability, the only other proximate determinants that were important in reducing fertility was contraception in Addis Ababa and other urban areas, where the index of contraception was 0.70 and 0.82 respectively; and marriage in other urban areas, where the index of marriage was 0.66. All other indices were close to one, reflecting weak fertility-inhibiting effects.

substantial proportions of women living outside of marital unions. Contraceptive use also grew in urban areas during the period. The index of contraception went from 0.70 to 0.55 in Addis Ababa, and from 0.82 to 0.68 in other urban areas. In rural areas contraceptive use continued to be an insignificant factor in determining fertility levels, the index of contraception remained close to one at 0.96.

Table 2 also presents the predicted TFRs that are derived from the indices, and the observed TFRs. In all three areas and for both years the predicted values are within 10 percent of the observed values, with no systematic pattern of differences indicative of underreporting or the omission of any important determinants. The

Table 2.
 Decomposition of Total Fertility by Place of Residence, Ethiopia 1990 NFFS and 2000 DHS.

	Addis Ababa		Other Urban Areas		Rural Areas	
	1990	2000	1990	2000	1990	2000
Index of Marriage (C_m)	0.54	0.35	0.66	0.52	0.81	0.74
Index of Contraception (C_c)	0.70	0.55	0.82	0.68	0.98	0.96
Index of Sterility (I_p)	0.95	0.97	0.98	1.01	1.01	1.01
Index of Postpartum Infecundability (C_i)	0.59	0.66	0.55	0.64	0.57	0.53
Total Fecundity Rate	15.3	15.3	15.3	15.3	15.3	15.3
Predicted TFR	3.24	1.89	4.46	3.50	6.99	5.82
Observed TFR (unadjusted)	3.08	1.90	4.41	3.80	7.50	6.46

In 2000 marriage continues to be the most important factor affecting fertility in Addis Ababa and it becomes the most important factor in other urban areas, surpassing postpartum infecundability. The index of marriage drops to 0.35 in Addis Ababa and to 0.52 in other urban areas, while the index of postpartum infecundability actually declines slightly in importance (i.e., moves closer to one). Even in rural areas the index of marriage drops to 0.74. Between 1990 and 2000 a dramatic change in marriage patterns occurred in urban areas of Ethiopia, and especially in Addis Ababa, which resulted in

closeness of the predicted and observed TFRs increases our confidence in the quality of the two sets of data.

Table 3 decomposes the proportionate change in the predicted TFRs into changes in each of the four proximate determinants. In all three areas (Addis Ababa, other urban areas, and rural areas) a decline in the proportion of women married was the most important factor behind the period decline in fertility. A rise in contraceptive use was important in Addis Ababa and in other urban areas, but had essentially no role in the modest

Table 3.
Proportional Change in TFRs due to Changes in the Proximate Determinants,
Ethiopia 1990 NFFS and 2000 DHS.

Factors responsible for fertility change	Addis Ababa	Rural Areas	
		Other Urban Areas	
Proportion of women married	-0.35	-0.21	-0.09
Contraceptive practice	-0.21	-0.17	-0.02
Primary sterility	0.02	0.03	0.00
Duration of postpartum infecundability	0.12	0.16	-0.07
Proportional change in TFR between 1990-2000	-0.42	-0.22	-0.17

decline in rural fertility. However, the impact of a rise in contraceptive use on fertility was partially cancelled out by a decline in postpartum infecundability due to decreasing durations of breastfeeding and/or postpartum abstinence.

The significant decline in the proportions of women married is due to one or a combination of three changes in marriage patterns: (1) an increase in the mean age at marriage, (2) an increase in the proportion of women who never marry, and (3) an increase in marital dissolution. Any three of these changes in marital patterns will reduce total fertility by reducing women’s exposure to the risk of pregnancy. In the next section we look in turn at each of these three nonmarital states to identify the types of changes in marital patterns that are the source of fertility decline in Addis Ababa and in other urban areas of Ethiopia.

Trends in Ages at First Marriages and First Births

We first look at changes in age at first marriage and first birth. Increases in age at marriage and first birth were an important component of fertility reduction in most Asian nations, and late age at marriage was a factor in the relatively low pre-transition fertility of European populations.

Although there are many ambiguities associated with linking the timing of marriage to the onset of childbearing in most African societies (van de Walle 1993), “marriage is generally considered the best indicator of exposure to the risk of childbearing” (Bledsoe and Cohen 1993:43). Table 4 presents Kaplan-Meier estimates of the median age at first marriage by age at the time of the survey.

Table 4.
Kaplan-Meier Estimates of Women’s Median Age at First Marriage,
Ethiopia 1990 NFFS and 2000 DHS.

Age at Time of Survey	Addis Ababa		Other Urban Areas		Rural Areas	
	1990	2000	1990	2000	1990	2000
45-49	15.0	15.0	14.5	15.0	16.0	15.0
40-44	15.0	16.0	15.0	15.0	15.0	15.0
35-39	16.0	16.0	14.5	16.0	16.0	15.0
30-34	16.0	21.0	15.0	17.0	15.0	15.0
25-29	19.0	24.0	16.0	19.0	15.0	16.0
20-24	— ^a	— ^a	18.0	21.0	16.0	17.0
All women	20.0	23.0	17.0	19.0	16.0	16.0

^a Median age was not calculated because less than 50 percent of women in the age group were ever married by the time of the survey.

Consistent with the decomposition analysis, the median age at first marriage increases dramatically among younger women between 1990 and 2000 in Addis Ababa and in other urban areas. Among women age 25-29 the median jumps from 19 to 24 years in Addis Ababa. In other urban areas the rise is less dramatic (from 16 to 19 years), but is significant nevertheless. By contrast, the median age at first marriage among rural women in their twenties increases by approximately one year.

the median ages of first marriage and first birth in Addis Ababa and other urban areas of Ethiopia are unprecedented.

Trends in Proportions Never Married and Formally Married

A decline in the proportion of women who eventually marry and an increase in marital dissolution can lead to significant declines in fertility in societies with very low levels of contraceptive use (Westoff 1990; Trussell et al.

Table 5.
 Kaplan-Meier Estimates of Women's Median Age at First Birth,
 Ethiopia 1990 NFFS and 2000 DHS.

Age at Time of Survey	Addis Ababa		Other Urban Areas		Rural Areas	
	1990	2000	1990	2000	1990	2000
45-49	20.4	18.0	21.4	18.0	20.3	19.0
40-44	20.4	19.0	20.1	19.0	19.8	18.0
35-39	20.1	19.0	18.6	19.0	19.6	19.0
30-34	19.0	22.0	18.9	19.0	18.1	18.0
25-29	20.0	26.0	18.4	22.0	18.1	19.0
20-24	— ^a	— ^a	20.0	24.0	17.9	20.0
All women	21.3	24.0	19.8	21.0	18.6	19.0

^a Median age was not calculated because less than 50 percent of the women in the age group had a first birth by the time of the survey.

The actual impact of an increase in the median age at marriage on reducing fertility will depend in part on the extent to which the increase is accompanied by a corresponding increase in the median age at first birth. An increase in the prevalence of out of wedlock births will clearly dampen the effect of delayed marriage on total fertility. Table 5 presents Kaplan-Meier estimates of the median age at first birth. In Addis Ababa the median age at first birth increases by three years among women age 30-34 and by six years among women age 25-29. Both medians are 1-3 years greater than the median age at marriage. In other urban areas the largest rise in the median is limited to women under age 30 at the time of the survey, but is dramatic nevertheless (four years). Even in rural areas the median age at first birth rises among the most recent cohorts of women. In the context of sub-Saharan Africa's demographic experience, the large increases in

1979). Table 6 presents the percent of women never married by place of residence and survey year. Among the oldest age cohorts marriage is universal. However, the proportion of women in Addis Ababa who are still unmarried by their late twenties and early thirties has increased dramatically. From 1990 to 2000 the percentage of women age 25-29 who were never married rose from 23 to 40 percent, and the percentage of women age 30-34 who were never married rose from four to 24 percent. Whether these women will eventually marry or remain single is an open question, however, even if the majority marry, their lifetime fertility will be limited by the fact they have spent so much of their most fecund years outside of marriage. Increases in the proportion of women who have never married also occurred in other urban areas as well as in rural areas, but at levels considerably lower than Addis Ababa.

Table 6.
Percent of Women Never Married at Each Age by Place of Residence,
Ethiopia 1990 NFFS and 2000 DHS.

Age at Time of Survey	Addis Ababa		Other Urban Areas		Rural Areas	
	1990	2000	1990	2000	1990	2000
	15-19	95.2	92.0	83.1	84.5	60.4
20-24	57.5	70.8	31.3	39.6	13.0	22.1
25-29	23.3	39.8	6.4	16.0	3.0	6.6
30-34	4.1	23.9	1.1	5.7	0.3	1.2
35-39	1.1	8.0	0.6	1.2	0.0	0.9
40-44	1.0	2.6	0.0	0.1	0.2	0.3
45-49	0.0	1.6	0.0	0.1	0.3	0.0
ALL	41.8	51.5	30.4	36.1	15.2	20.5

As was the case with age at marriage, a rise in the proportion of women never married will play a smaller role in reducing total fertility if women are having births outside of marriage at high rates, as is the case in countries such as Botswana or South Africa. Table 7 presents the proportion of never married women in five-year age groups who were childless. The table reveals two striking patterns. First, childlessness is close to universal among never married women, especially under age 25; and second, the proportion of never married women who are childless increased from 1990 to 2000 in all age groups and in all three areas. In 2000, between 95 and 99 percent of never married women under age 25 in Addis Ababa were childless. By age 25-29, 90 percent of never married women in Addis Ababa were still childless. The prevalence of childlessness among never married women in other urban areas and in rural areas is essentially the same as in Addis Ababa. Equally striking as the level of childlessness is the rise in childlessness over time. From 1990 to 2000 there is a roughly 10 point increase in the percentages of never married women between ages 20 and 29 who are childless. The concomitant rise in age at marriage, proportion never married, and proportion childless among the never married is an exceptional trend. In a decomposition analysis of total fertility in Addis Ababa using data from the 1984 and 1994 population censuses, Woubalem and Lindstrom (2002) found similar evidence of a period decline in non-marital fertility. The exceptionally strong link between nuptiality and fertility in Ethiopia suggests the absence of any place in Ethiopian society for unmarried women with children. The strong social sanctions against out-of-wedlock births are reinforced by adverse economic conditions, which make single motherhood a highly disadvantaged status.

Table 7.
Percent of Never Married Women in each Age Group who are Childless by Place of Residence,
Ethiopia 1990 NFFS and 2000 DHS.

Age at Time of Survey	Addis Ababa		Other Urban Areas		Rural Areas	
	1990	2000	1990	2000	1990	2000
	15-19	98.7	98.8	96.5	99.5	99.1
20-24	84.8	94.5	82.4	92.9	94.0	97.2
25-29	78.1	90.0	75.0	85.7	80.0	93.0

Note: Cell sizes were too small above age 29 to produce reliable estimates.

The final type of non-marital state that we examine is separation, divorce, and widowhood. Although the worst of the economic, political and ecological disasters that struck Ethiopia occurred in the 1970s and 1980s, continued military violence at the start of the 1990s and ongoing economic distress may have contributed to a rise in the proportion of married women who became single as a result of marital dissolution or the death of a spouse. Table 8 presents the proportion of formerly married women by place of residence and survey year. Overall there was little change in the prevalence of formerly married women in all three areas between 1990 and 2000, and in fact among women age 25 and above the percentage formerly married appears to have even declined slightly in Addis Ababa. Because the table is based on marital status at the time of the survey, it is possible that marital dissolution and widowhood may have risen, but that many of these women had remarried by the time of the survey. In a study assessing the impact of early marriage and childlessness on divorce in Ethiopia, Tilson and Larsen (2000) found that a staggering 45 percent of all first marriages end in divorce within 30 years, while about 87 percent of divorced women tend to remarry within ten years. In fact, Tilson and Larsen (2000) observed that 66 percent of divorced women in the 1990 Ethiopia NFFS remarried within two years. While divorce may be fairly common in Ethiopia, women do not remain out of unions for long. Therefore, marital instability or widowhood does not appear to have played a role in the remarkable fertility decline in Addis Ababa and in other urban areas of Ethiopia.

Table 8.
 Percent of Formerly Married Women in Each Age Group by Place of Residence,
 Ethiopia 1990 NFFS and 2000 DHS.

Age at Time of Survey	Addis Ababa		Other Urban Areas		Rural Areas	
	1990	2000	1990	2000	1990	2000
15-19	1.7	4.7	6.3	3.6	4.1	7.6
20-24	10.4	11.8	14.5	16.0	7.4	8.8
25-29	14.0	13.4	15.4	22.7	7.1	8.7
30-34	20.4	14.6	23.6	22.4	8.8	10.5
35-39	29.4	26.4	29.0	21.3	9.4	13.3
40-44	32.7	26.2	31.6	43.8	16.5	18.0
45-49	44.6	33.1	41.4	50.0	19.0	20.9
ALL	15.6	14.1	18.3	18.5	8.8	11.2

Conclusions

Addis Ababa stands out among sub-Saharan African cities for its very low level of fertility. Based on the levels of the proximate determinants of fertility in Addis Ababa recorded by the 2000 DHS we believe the observed TFR of 1.94 is entirely feasible. Even after we adjusted for possible underreporting of births, the high-end estimate of 2.80 that we derived is still low by Ethiopian and sub-Saharan African standards. The single biggest factor responsible for this remarkably low fertility is a dramatic rise in the proportion of unmarried women. This rise is due to an increase in the age at first marriage and rising proportions of women in their twenties and early thirties who remain single. The prevalence of formerly married women who are separated, divorced, or widowed remains essentially unchanged, and therefore is not a factor in the rising number of women living outside of unions. Another remarkable feature of the change in marital patterns in Addis Ababa is that the rise in non-marriage was not accompanied by a rise in non-marital births. Childbearing very much remains within marital unions in Ethiopia. Contraceptive use also rose in urban areas between 1990 and 2000 and contributed to some of the period decline in fertility. Although not covered in our analysis, increased contraceptive use was

surely the most important factor in accounting for the decline in total marital fertility in Addis Ababa from 5.7 to 3.9 children per woman during the same period. Nevertheless, a decline in the proportion of married women accounts for most of the fertility decline in Addis Ababa and other urban areas. The big questions that remain unanswered are why so many women in Addis Ababa delay marriage or do not marry at all, and why non-marital fertility remains so low compared to other sub-Saharan African cities where an increase in delayed marriage and non-marriage has often been accompanied by a rise in out-of-wedlock births. We suspect that severe housing shortages and poor employment opportunities in Addis Ababa and other urban areas of Ethiopia are the driving forces behind the increasing proportions of never married women. For instance, between 1984 and 1999 the unemployment rate rose from 10.5 to 38.1 in Addis Ababa and from 8.8 to 20.3 in other urban areas of the country (CSA 1991, 1999). Traditionally, marriage in Ethiopia marks the establishment of an independent household, particularly in urban areas. The relative costs of housing and the desire for consumer goods are rising faster than income opportunities, which are causing longer delays in marriage (see Kinfu 2000 for a similar argument). The financial cost of increasingly elaborate and expensive weddings is another possible reason for delaying marriage. What is particularly unique in the Ethiopian context is that the prevalence of out-of-wedlock births has not increased, and in fact has declined. We suspect that abortions and increased access to contraception are the immediate mechanisms by which out-of-wedlock births are being averted. The social and economic incentives to avoid non-marital births must remain very powerful in Ethiopia.

As long as the barriers to marriage in Addis Abba remain in place we can expect fertility to stay low. On the other hand, given a total marital fertility rate of 3.9 in 2000 we would expect a lowering of the barriers to marriage to be accompanied by rise in total fertility. We believe the decline in marital fertility and the rise in childlessness among never married women are related to the adverse economic conditions in Ethiopia combined with increased access to contraceptives, and we suspect increased use of induced abortion. Our findings of fertility decline in urban areas are consistent with the earlier observations of fertility decline in the late 1980s made by Lindstrom and Berhanu (1999) and observations made by Kinfu (2000).

References

- Blanc, Ann K. and Naomi Rutenberg. 1990. "Assessment of the quality of data on age at first sexual intercourse, age at first marriage, and age at first birth in the Demographic and Health Surveys." Pp. 41-79 in *An Assessment of DHS-I Data Quality*, DHS Methodological Reports, No. 1, Institute for Resource Development, Columbia, MD.
- Bledsoe, Caroline H. and Barney Cohen. 1993. *Social Dynamics of Adolescent Fertility in Sub-Saharan Africa*. Panel on Population Dynamics of Sub-Saharan Africa, Committee on Population, National Research Council. Washington, D.C.: National Academy Press.
- Bongaarts, John and Robert G. Potter. 1983. *Fertility, Biology, and Behavior. An Analysis of the Proximate Determinants*. New York: Academic Press.
- Bongaarts, John. 1978. "A framework for analyzing the proximate determinants of fertility," *Population and Development Review* 4(1): 105-132.
- Bongaarts, John. 1982. "The fertility-inhibiting effects of the intermediate fertility variables," *Studies in Family Planning* 13(6/7): 179-189.
- Bongaarts, John, Odile Frank, and Ron Lesthaeghe. 1984. "The proximate determinants of fertility in Sub-Saharan Africa," *Population and Development Review* 10(3): 511-537.

Caldwell, John C. and Pat Caldwell. 1993. "The South African fertility decline," *Population and Development Review* 19(2): 225-262.

Central Statistical Authority [Ethiopia] and ORC Macro. 2001. *Ethiopia Demographic and Health Survey 2000*. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Authority and ORC Macro.

Central Statistical Authority [Ethiopia]. 1991. *The 1984 Population and Housing Census of Ethiopia. Analytical Report at National Level*. Addis Ababa: November.

Central Statistical Authority [Ethiopia]. 1999. *Statistical Report on The 1999 National Labor Force Survey*. No. 225. Addis Ababa.

Cohen, Barney. 1993. "Fertility levels, differentials, and Trends." Pp. 8-67. In K.A. Foote, K.H. Hill, and L.G. Martin (eds.), *Demographic Change in Sub-Saharan Africa*. Panel on Population Dynamics of Sub-Saharan Africa, Committee on Population, National Research Council. Washington, D.C.: National Academy Press.

Hogan, Dennis P., Betemariam Berhanu, and Assefa Hailemariam. 1999. "Household organization, women's autonomy, and contraceptive behavior in Southern Ethiopia." *Studies in Family Planning* 30(4):302-314.

Kinfu, Yohannes. 2000. "Below-replacement fertility in tropical Africa? Some evidence from Addis Ababa." *Journal of Population Research* 17(1):63-82.

Lesthaeghe, R.J., G. Kaufmann, and D. Meekers. 1989. "The nuptiality regimes in sub-Saharan Africa. Pp. 238-337 in R.J. Lesthaeghe (ed.) *Reproduction and Social Organization in sub-Saharan Africa*. Berkeley: University of California Press.

Lindstrom, David P. and Betemariam Berhanu. 1999. "The impact of war, famine, and economic decline on marital fertility in Ethiopia." *Demography* 36(2):247-326.

Mammo, Abate and S. Philip Morgan. 1986 "Childless in rural Ethiopia." *Population and Development Review* 12(3):533-546.

Morgan, Philip S. 1996. "Characteristic features of modern American fertility." *Population and Development Review* 22, Issue Supplement: Fertility in the United States: New Patterns, New Theories: 19-63.

Shapiro, David. 1996. "Fertility decline in Kinshasa." *Population Studies* 50:89-103.

Shapiro, David and B. Oleko Tambashe. 2001. "Fertility in urban and rural sub-Saharan Africa: preliminary evidence of a three-stage process." Paper presented at the 1999 Chaire Quetelet Symposium in Demography at the Catholic University of Louvain, Louvain-la-Neuve, Belgium.

Tietelbaum, S.M. 1999. "Sustained below-replacement fertility: realities and responses." In *Below Replacement Fertility*, Population Bulletin of the United Nations Special Issue Nos. 40/41. New York: United Nations. Pp. 161- 182.

Tislon, Dana and Ulla Larsen. 2000. "Divorce in Ethiopia: the impact of early marriage and childlessness." *Journal of Biosocial Science* 32:355-372.

Trussell, James, Jane Menken, and J. Ansley Coale. 1979. "A general model for analyzing the effect of nuptiality on fertility." In *Nuptiality and Fertility*, edited by L.T. Ruzicka. Liege: Ordina Editions. Pp. 7-27.

van de Walle, Etienne. 1993. "Recent trends in marriage." In *Demographic Change in Sub-Saharan Africa*, edited by K.A. Foote, K.H. Hill, and L.G. Martin. Panel on Population Dynamics of Sub-Saharan Africa, Committee on Population, National Research Council. Washington, D.C.: National Academy Press. Pp. 117-152.

van de Walle, Etienne and D. Andrew Foster. 1990. *Fertility Decline in Africa. Assessment and Prospects*. World Bank Technical Paper Number 125, Africa Technical Department Series. Washington, D.C.: The World Bank.

Westoff, Charles J. 1992. *Age at marriage, age at first birth and fertility in Africa*. World Bank Technical Paper Number 169. Washington, D.C.: The World Bank.

Woubalem, Zewdu, and David P. Lindstrom. 2002. "The Demographic Components of Fertility Decline in Addis Ababa, Ethiopia: A Decomposition Analysis." *Partnership in Improving Reproductive Health Background Report* 1(5), Population Studies and Training Center, Brown University.

The Partnership in Improving Reproductive Health Background Reports present findings from work in progress on the dimensions and determinants of fertility and reproductive health in Ethiopia. This work is being conducted by faculty and advanced graduate students at the following institutions:

POPULATION STUDIES AND TRAINING CENTER • BROWN UNIVERSITY • USA
Box 1836 • Providence, RI 02912 • USA
Phone: (401) 863-2668 • Email: Population_Studies@brown.edu

DEPARTMENT OF POPULATION AND FAMILY HEALTH • JIMMA UNIVERSITY
Jimma, Ethiopia

BIRHAN RESEARCH & DEVELOPMENT CONSULTANCY • ADDIS ABABA
P. O. Box 20653 Code 1000 • Addis Ababa, Ethiopia

Funding for this research and for the *Background Reports* is provided by a three-year grant from the David and Lucile Packard Foundation and an award from the Hewlett Foundation. The authors would like to thank the Central Statistical Authority of Ethiopia for providing access to the 1990 National Family and Fertility Survey and the 2000 Ethiopian DHS data sets.