

The Proximate Determinants of the Decline to Below-replacement Fertility in Addis Ababa, Ethiopia

Amson Sibanda, Zewdu Woubalem, Dennis P. Hogan, and David P. Lindstrom

Between 1990 and 2000, the total fertility rate (TFR) in Ethiopia declined moderately from 6.4 to 5.9 children per woman of reproductive age. 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 is that it occurred in the absence of a strong and effective national family planning program. In this study, the components of this fertility decline are identified using the Bongaarts framework of the proximate determinants of fertility. The results of a decomposition analysis indicate that a decrease in the age-specific proportions of women who are married, followed by an increase in contraceptive use are the most important mechanisms by which fertility has declined in Addis Ababa. Poor employment prospects and relatively high housing costs are likely factors that encourage couples to delay marriage and reduce marital fertility. (STUDIES IN FAMILY PLANNING 2003; 34[1]: 1–7)

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 of reproductive age. Early studies of the fertility transition in sub-Saharan Africa documented significant declines in fertility in Botswana, Kenya, South Africa, and Zimbabwe (van de Walle and Foster 1990; Caldwell and Caldwell 1993; Cohen 1993); Ethiopia was not considered among the countries at or near the start of the transition to low fertility, however. 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 progress of this decline. In a national context of high fertility, an unexpected sharp decline in fertility was under way in the capital city of

Addis Ababa. Between 1990 and 2000, the total fertility rate in Addis Ababa dropped by 39 percent, 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 (Kinfa 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 it is even more remarkable given that Ethiopia still has one of the highest levels of fertility in sub-Saharan Africa. Moreover, 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 the contraceptive prevalence rate in Addis Ababa is substantially higher than that in rural areas, it is, nevertheless, considerably lower than 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 occurred in the absence of any national family planning initiatives or interventions that could account for such a dramatic fall in fertility. 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, Kinshasa, and Nairobi appear to have distinctly lower levels of fertility compared with their national levels (Shapiro 1996; Shapiro and Tambashe 2001).

Amson Sibanda is Research Associate, University of Pennsylvania, Population Studies Center, 3718 Locust Walk, Philadelphia, PA 19104. E-mail: sibandaa@pop.upenn.edu. At the time this article was written, he was Research Associate, Department of Sociology and Population Studies and Training Center, Brown University, Providence, RI. Zewdu Woubalem is a doctoral candidate, Dennis P. Hogan is Robert E. Turner Distinguished Professor of Population Studies, and David P. Lindstrom is Associate Professor, Department of Sociology and Population Studies and Training Center, Brown University.

In this study, we examine the factors behind the recent fertility decline in Addis Ababa. We use the Bongaarts framework of the proximate determinants of fertility to identify the relative contribution of changes in each of the different proximate determinants to the decline in total fertility (Bongaarts 1978). We compare the proximate determinants underlying Addis Ababa's fertility to those of other urban areas of Ethiopia and of rural areas. 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

The study is based on data from the 1990 National Family and Fertility Survey (NFFS) and the 2000 Ethiopia Demographic and Health Survey (DHS). Both surveys were conducted by the Central Statistical Authority of Ethiopia and were designed to be nationally representative. Because of political instability in some regions of the country, however, 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, breastfeeding practices, and other background characteristics of the respondents, these two surveys used similar measurements of the proximate determinants. The 1990 NFFS collected data for 8,757 women aged 15–49, and the 2000 DHS collected data for 15,367 women in the same age range.

The Bongaarts model is used here 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 look at three possible sources of fertility change associated with marriage: changes in age at first marriage and first birth, proportions never married, and marital instability.

Results

Table 1 presents trends in unadjusted total fertility rates for Addis Ababa, other urban areas, and rural areas. The results reveal that fertility in Addis Ababa is considerably lower than that in any other part of Ethiopia. A sharp drop in total fertility occurred in Addis Ababa, and sig-

Table 1 Unadjusted total fertility rates for women aged 15–49, by residence, Ethiopia, 1990 National Family and Fertility Survey (NFFS) and 2000 Demographic and Health Survey (DHS)

Residence	1990 NFFS	2000 DHS
Addis Ababa	3.08	1.94
Other urban areas	4.41	3.80
Rural areas	7.50	6.46

nificant declines were seen in other urban areas as well as in rural areas between 1990–2000.¹

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 (1978) identified four proximate determinants that accounted for the majority of variation in fertility levels observed across populations: marriage, contraception, induced abortion, and postpartum infecundability. He developed indexes 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. 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 that only women in unions are exposed to the risk of childbirth. This assumption holds reasonably well in Ethiopia where the proportion of cohabiting women aged 15–49 is very small (1 percent) and where a very low proportion of never-married women give birth out of wedlock (this issue is discussed in detail below). 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 about 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 of primary sterility in place of the index of induced 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_f , equals one in the absence of breastfeeding and postpartum abstinence and zero when infecundability is permanent. When all indexes equal one, fertility is at its biological maximum. Based on studies of historical popu-

lations 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 and 1982). Multiplying all of the indexes together by the total fecundity rate of 15.3 produces the predicted TFR for the population. The predicted TFR will typically differ from the observed TFR because of the underreporting of births, underreporting of any of the behaviors measured by the indexes, 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 indexes 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 important proximate determinants in reducing fertility were 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 indexes were close to one, reflecting weak fertility-inhibiting effects.

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 declines slightly in importance (that is, moves closer to one). Even in rural areas, the index of marriage drops to 0.74.

Table 2 Indexes of proximate determinants of total fertility, by residence, Ethiopia, 1990 National Family and Fertility Survey (NFFS) and 2000 Demographic and Health Survey (DHS), and predicted total fertility rates based on the indexes and observed total fertility rates

Index	Addis Ababa		Other urban areas		Rural areas	
	1990	2000	1990	2000	1990	2000
Marriage	0.54	0.35	0.66	0.52	0.81	0.74
Contraception	0.70	0.55	0.82	0.68	0.98	0.96
Sterility	0.95	0.97	0.98	1.01	1.01	1.01
Postpartum infecundability	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	6.00	5.82
Observed TFR (unadjusted)	3.08	1.94	4.41	3.80	7.50	6.46

Between 1990 and 2000, a change in marriage patterns occurred in urban areas of Ethiopia, especially in Addis Ababa, resulting in 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 in 2000.

When compared with other African cities where rapid declines in fertility have also occurred, the fertility-inhibiting effects of changes in marriage are much stronger in Addis Ababa. For instance, in Nairobi, the value of the index of marriage declined from 0.87 in 1978 to 0.80 in 1989 and 0.75 in 1993, while the index of contraception also decreased from 0.85 in 1978 to 0.70 in 1989 and then to 0.60 in 1993 (APPRC and Population Council 1998).²

Table 2 also presents the predicted TFRs that are derived from the indexes and the observed TFRs. With the exception of rural areas in 1990, in all other 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 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 of residence, 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 essentially had no role in the modest decline in rural fertility. The impact of a rise in contraceptive use on fertility was partially cancelled out, however, by a decline in postpartum infecundability as a result of decreasing durations of breastfeeding and postpartum abstinence.

Table 3 Proportion of change in total fertility rate due to changes in the proximate determinants of fertility, by residence, Ethiopia, 1990 National Family and Fertility Survey (NFFS) and 2000 Demographic and Health Survey (DHS)

Factors affecting fertility change	Addis Ababa	Other urban areas	Rural 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	-0.19	-0.18

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 the dissolution of marriages. Any of these three changes in marital patterns will reduce total fertility by lowering women's exposure to the risk of becoming pregnant.

Trends in Ages at First Marriage and First Birth

Increases in ages at marriage and at first birth were an important component of fertility reduction in most Asian countries, and late age at marriage was a factor in the relatively low pretransition fertility of European populations. Although many ambiguities are 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. 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 aged 25–29 the median jumps from 19 to 24 years in Addis Ababa. In other urban areas, the rise is less extreme (from 16 to 19 years), but it is significant nevertheless. By contrast, the median age at first marriage among rural women in their twenties increases by approximately one year.

The impact of an increase in the median age at marriage on 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. Clearly, an increase in the prevalence of out-of-wedlock births would dampen the effect of delayed marriage on total fertility. Table 5 presents Kaplan-Meier estimates of the median

Table 4 Kaplan-Meier estimates of women's median age at first marriage, by residence, Ethiopia, 1990 National Family and Fertility Survey (NFFS) and 2000 Demographic and Health Survey (DHS)

Age at time of survey	Addis Ababa		Other urban areas		Rural areas	
	1990	2000	1990	2000	1990	2000
20–24	— ^a	— ^a	18.0	21.0	16.0	17.0
25–29	19.0	24.0	16.0	19.0	15.0	16.0
30–34	16.0	21.0	15.0	17.0	15.0	15.0
35–39	16.0	16.0	14.5	16.0	16.0	15.0
40–44	15.0	16.0	15.0	15.0	15.0	15.0
45–49	15.0	15.0	14.5	15.0	16.0	15.0
All women	20.0	23.0	17.0	19.0	16.0	16.0

^aMedian age was not calculated for women aged 20–24 in Addis Ababa because fewer than 50 percent of women in this age group were ever married by the time of the survey.

Table 5 Kaplan-Meier estimates of women's median age at first birth, by residence, Ethiopia, 1990 National Family and Fertility Survey (NFFS) and 2000 Demographic and Health Survey (DHS)

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

^aMedian age was not calculated for women aged 20–24 in Addis Ababa because fewer than 50 percent of women in this age group had given birth by the time of the survey.

age at first birth. In Addis Ababa, the median age at first birth increases by three years among women aged 30–34 and by six years among women aged 25–29. Both medians are one to three years greater than the median age at marriage. In other urban areas, the largest rise in the median (four years) is limited to women younger than 30 at the time of the survey. 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 increases in 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 Formerly Married

A decline in the proportion of women who eventually marry and an increase in the dissolution of marriage can lead to significant declines in fertility in societies with low levels of contraceptive use (Trussell et al. 1979; Westoff 1992). Table 6 presents the proportions of women never married by age group, according to residence and survey year. Among the oldest age cohorts, marriage is universal. The proportion of women in Addis Ababa

Table 6 Percentage of never-married women, by age group, according to residence, Ethiopia, 1990 National Family and Fertility Survey (NFFS) and 2000 Demographic and Health Survey (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	65.4
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 women	41.8	51.5	30.4	36.1	15.2	20.5

who are still unmarried by their late twenties and early thirties has increased substantially, however. From 1990 to 2000, the proportion of women aged 25–29 who were never married rose from 23 to 40 percent, and the proportion of women aged 30–34 who were never married rose from 4 to 24 percent. Whether these women will eventually marry or remain single is an open question. Even if the majority marry, however, their lifetime fertility will be limited because they have spent so much of their most fecund years unmarried. Increases in the proportion of women who never married also occurred in other urban areas as well as in rural areas, but at levels considerably lower than that of Addis Ababa.

A large proportion of these never-married women were living with their parents (not shown). In Addis Ababa, 54 percent of never-married women aged 15–49 were living with their parents, and only 5.8 percent headed their own households in 2000. In other urban areas, 47 percent of never-married women were living with their parents, and only 8 percent headed their own households. In rural areas, less than 1 percent of never-married women headed their own households, and 77 percent were living with their parents.

As was the case with age at marriage, a rise in the proportion of women who have never married plays a smaller role in reducing total fertility if women are giving birth outside of marriage at high rates, as is the case in Botswana and South Africa. Table 7 presents the proportion of never-married women surveyed who were childless by five-year age groups. The table reveals two striking patterns. First, childlessness is nearly universal among never-married women, especially among those younger than 25; second, from 1990 to 2000, the proportion of never-married women who are childless increased in all age groups and in all three areas. In 2000, between 95 and 99 percent of never-married women younger than 25 in Addis Ababa were childless. By the ages of 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 child-

lessness over time. From 1990 to 2000, a roughly 10-point increase in the proportion of never-married women who are childless is found among women between the ages of 20 and 29. 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 nonmarital fertility. The strong link between nuptiality and fertility in Ethiopia suggests the absence of any place in Ethiopian society for unmarried women with children. The social sanctions against out-of-wedlock childbirth are reinforced by adverse economic conditions, which make single motherhood a highly disadvantaged state.

The final type of nonmarital state examined here is that resulting from 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 age group, according to residence and survey year. Overall, little change is seen in the prevalence of formerly married women in all three areas between 1990 and 2000, and in fact, among women aged 25 and older, the proportion of those who were formerly married appears to have declined slightly even in Addis Ababa. Because the table is based on marital status at the time of the survey, it is possible that although marital dissolution and widowhood may have increased, many of these women may have 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 45 percent of all first marriages end in divorce within 30 years and that about 87

Table 7 Percentage of never-married women who are childless, by age group, according to residence, Ethiopia, 1990 National Family and Fertility Survey (NFFS) and 2000 Demographic and Health Survey (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	100.0
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: Sample sizes were too small for women older than 29 to produce reliable estimates for these women.

Table 8 Percentage of formerly married women, by age group, according to residence, Ethiopia, 1990 National Family and Fertility Survey (NFFS) and 2000 Demographic and Health Survey (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 women	15.6	14.1	18.3	18.5	8.8	11.2

percent of divorced women tend to remarry within ten years. Tilson and Larsen observed that 66 percent of divorced women surveyed for the 1990 Ethiopia NFFS remarried within two years. Although divorce may be fairly common in Ethiopia, women do not remain out of union for long. Therefore, marital instability or widowhood does not appear to have played a role in the fertility decline in Addis Ababa or in other urban areas of Ethiopia.

Conclusions

Addis Ababa stands out among sub-Saharan African cities for its very low level of fertility. The levels of the proximate determinants of fertility in Addis Ababa recorded by the 2000 DHS suggest that the observed TFR of 1.94 children per woman is entirely feasible. Even after the estimate is adjusted for possible underreporting of births, the high-end estimate of 2.80 children per woman that we derive is still low by Ethiopian and sub-Saharan African standards. The single most important factor responsible for this low fertility is the rise in the proportion of unmarried women. This increase is due to later age at first marriage and to the greater 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 out of union. Another striking feature of the change in marital patterns in Addis Ababa is that the rise in nonmarriage was not accompanied by a rise in nonmarital births. Childbearing remains almost entirely 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 this 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 in other Ethiopian urban areas.

The big questions that remain unanswered are: Why are so many women in Addis Ababa delaying marriage or not marrying at all, and why does nonmarital fertility remain so low compared with that of other sub-Saharan African cities where an increase in delayed marriage and nonmarriage have 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 percent in Addis Ababa and from 8.8 to 20.3 percent in other urban areas of the country (CSA 1991 and 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 are income opportunities, 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 appears to be unique in the Ethiopian context is that the prevalence of out-of-wedlock births has not increased; in fact, it has declined. This finding is contrary to findings from other African countries including Botswana, Kenya, Liberia, Uganda, and Zimbabwe, where noticeable increases in nonmarital fertility among teenagers have occurred (Bledsoe and Cohen 1993). Although data on the prevalence of induced abortion are not available for Ethiopia, unmarried women likely undergo the procedure. In a study of pregnancy outcomes in Addis Ababa, Kwast et al. (1986) found that induced abortion was a leading cause of maternal mortality, accounting for close to one-half of maternal deaths among single women. Thus, we suspect that abortion and increased access to contraception are the immediate mechanisms by which out-of-wedlock births are being averted among single women in Addis Ababa. The social and economic incentives to avoid nonmarital births also remain powerful in Ethiopia.

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

Notes

- 1 To address potential problems of underreporting of births, we also calculated adjusted fertility estimates using Brass's P/F ratio technique. The adjusted estimates also show a sharp drop in total fertility in Addis Ababa and significant declines in other urban areas as well as in rural areas. The adjusted TFR declined

from 4.69 to 2.81 children per woman in Addis Ababa and from 7.17 to 4.24 children per woman in other urban areas. In rural areas, the TFR declined from 8.68 to 7.05 children per woman. These 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, however. When fertility is declining, as is the case in 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 children per woman for Addis Ababa (a high estimate) is still impressively low by Ethiopian and African standards.

- 2 The 1998 study also presents indexes for Kenyan rural areas and provinces for the years 1978, 1989, and 1993. The value of the index of marriage in the rural areas remained unchanged at 0.86 in 1978 and 1989 and then declined slightly to 0.81 in 1993. The index of contraception declined from 0.96 in 1978, to 0.80 in 1989, and to 0.72 in 1993. These values are much lower than those observed in rural Ethiopia. On the other hand, the fertility-inhibiting effects of the index of postpartum infecundability weakened during this period, increasing from 0.64 in 1978, to 0.66 in 1989, and to 1.00 in 1993. Lastly, as in Ethiopia, the effects of sterility in rural Kenya were also small, staying unchanged at 1.00 during this period.

References

- African Population Policy Research Center (APPRC) and Population Council. 1998. *Fertility Decline in Kenya: Levels, Trends and Differentials*. Nairobi: APPRC.
- 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, DC: National Academy Press.
- Bongaarts, John. 1978. "A framework for analyzing the proximate determinants of fertility." *Population and Development Review* 4(1): 105–132.
- . 1982. "The fertility-inhibiting effects of the intermediate fertility variables." *Studies in Family Planning* 13(6/7): 179–189.
- Bongaarts, John and Robert G. Potter. 1983. *Fertility, Biology, and Behavior. An Analysis of the Proximate Determinants*. New York: Academic Press.
- 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 (CSA) [Ethiopia]. 1991. *The 1984 Population and Housing Census of Ethiopia. Analytical Report at National Level*. Addis Ababa: CSA.
- . 1999. *Statistical Report on The 1999 National Labor Force Survey*. No. 225. Addis Ababa: CSA.
- Central Statistical Authority (CSA) [Ethiopia] and ORC Macro. 2001. *Ethiopia Demographic and Health Survey 2000*. Addis Ababa, Ethiopia and Calverton, MD: CSA and ORC Macro.
- Cohen, Barney. 1993. "Fertility levels, differentials, and trends." In *Demographic Change in Sub-Saharan Africa*. Eds. Karen A. Foote, Kenneth H. Hill, and Linda G. Martin. Panel on Population Dynamics of Sub-Saharan Africa, Committee on Population, National Research Council. Washington, DC: National Academy Press. Pp. 8–67.
- Kinfu, Yohannes. 2000. "Below-replacement fertility in tropical Africa? Some evidence from Addis Ababa." *Journal of Population Research* 17(1): 63–82.
- Kwast, Barbara E., Roger W. Roach, and Widad Kidane-Mariam. 1986. "Maternal mortality in Addis Ababa, Ethiopia." *Studies in Family Planning* 17(6): 288–301.
- 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.
- Shapiro, David. 1996. "Fertility decline in Kinshasa." *Population Studies* 50(1): 89–103.
- Shapiro, David and B. Oleko Tamashe. 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.
- Tilson, Dana and Ulla Larsen. 2000. "Divorce in Ethiopia: The impact of early marriage and childlessness." *Journal of Biosocial Science* 32(3): 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*. Ed. L.T. Ruzicka. Liège: Ordina Editions. Pp. 7–27.
- van de Walle, Etienne. 1993. "Recent trends in marriage." In *Demographic Change in Sub-Saharan Africa*. Eds. Karen A. Foote, Kenneth H. Hill, and Linda G. Martin. Panel on Population Dynamics of Sub-Saharan Africa, Committee on Population, National Research Council. Washington, DC: 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 No. 125, Africa Technical Department Series*. Washington, DC: The World Bank.
- Westoff, Charles F. 1992. "Age at Marriage, Age at First Birth and Fertility in Africa." *World Bank Technical Paper No. 169*. Washington, DC: 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). Providence, RI: Population Studies and Training Center, Brown University.

Acknowledgments

Work on this study was supported by awards from the Packard Foundation and 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. An earlier version of this paper was presented at the 2002 annual meeting of the Population Association of America, Atlanta, 9–11 May.