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Assessment and Prospects

Etienne van de Walle and Andrew D. Foster
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Fertility Decline in Africa
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Etienne van de Walle and Andrew D. Foster

The World Bank
Washington, D.C.
ABSTRACT:

Fertility in Africa remains the highest in the world: the average total fertility rate for the continent is about 6.3 children per woman. With the possible exceptions of Botswana, Kenya and Zimbabwe, little evidence is found of the beginning of a "sustained and irreversible" fertility decline in Sub-Saharan Africa of the sort experienced in other developing areas. In those countries that seem to have witnessed some fertility decline, there remains considerable uncertainty about the causes and permanence of these trends.

Contraceptive use is low in Sub-Saharan Africa, but there is little evidence that shortfalls in contraceptive supply are primarily responsible for the low level of usage. Reported ideal family sizes remain quite high -- between six and nine children per woman -- suggesting that demand for contraception is low. Moreover, the use of contraception outside of marriage and for spacing purposes seems to be understood and accepted. Significant unmet demand for contraception may be found among young unmarried women, but there is little evidence of demand for increased fertility control among older women. This suggests that there is not likely to be a large immediate impact on total fertility from expanded efforts in the provision of family planning.

Very little is known with certainty about the determinants of fertility in Sub-Saharan Africa. It has been argued, on the one hand, that high levels of fertility in Africa are the result of low levels of development and, on the other, that they result from cultural factors specific to Africa. Aggregate data provide some support for both hypotheses: African women are on average less schooled than their Asian or Latin American counterparts, but even those African countries with moderate level of schooling have not experienced substantial declines in fertility. Although there are some differentials in fertility by women's education and area of residence, these differences are moderate and the relationship is not always in the expected direction. Existing studies of African fertility have not been able to properly interpret these relationships because of an absence of detailed economic data.

Analysis of the determinants of fertility in Africa using recently available data is likely to provide new insight into the prospects for fertility decline and the design of population policy. Examination of the determinants of fertility in African countries that appear to have experienced fertility declines will shed light on potential policy options elsewhere in Africa. The possibility that severe economic problems in many countries might be promoting or impeding fertility decline increases the need for evaluation of the microeconomic determinants of fertility and for
a careful examination of social class differences in fertility, attitudes toward contraception and desire for future births. New datasets with the requisite information to study some of the most critical issues have become available; in particular, these datasets will allow analysis of the role of community characteristics, income levels and prices on fertility.

Future analysis should focus on four questions that are potentially answerable using existing data and that may prove useful in evaluating policy and targeting resources.

1. What are the sources and determinants of observed fertility decline in Africa?

2. What are the effects of education on fertility, desired family sizes, and contraceptive use and what are the channels through which these effects operate?

3. What are the likely effects of increases in the availability and costs of schooling, health care and family planning services on contraceptive use and fertility?

4. What are the likely effects of increases in the availability of schooling, health care, and family planning services on measures of child quality, including educational attainment, anthropometric status and child survival?
ACKNOWLEDGMENTS:

This study was conducted as a background paper for research on the Determinants of Fertility in Sub-Saharan Africa, managed by the Africa Technical Department, Population Health and Nutrition Division of the World Bank. We are grateful for comments from many colleagues on earlier drafts of this paper, and in particular from Martha Ainsworth, Jere Behrman, Douglas Ewbank, Dominique Meekers, Jane Menken and Samuel Preston.
FOREWORD

The 1986 World Bank Policy Study on "Population Growth and Policies in Sub-Saharan Africa" underscored the negative consequences of rapid population growth for the region and the need for action to lower fertility and mortality to achieve development objectives. The last decade has seen tremendous movement throughout the region toward developing national population policy and increased commitment to provision of family planning services. In addition, there are the first signs of fertility decline in a few African countries.

This study from the Africa Technical Department represents the first phase of a two-phase program on "Fertility Determinants in Sub-Saharan Africa" with the goal of identifying effective policies to reduce fertility and slow rapid population growth in the region. The study evaluates fertility trends in Sub-Saharan Africa, based on the most recent results of the Demographic and Health Surveys (DHS), and reviews the literature on the economic and cultural explanations for continued high fertility. Family planning services are still not widespread in the region and there are signs of unmet need for contraception among some groups of the population. The authors find, however, that the most important reason for low contraceptive use in Africa is high desired family size -- over 6 children per woman, on average. This suggests that policies to reduce rapid population growth must focus on both improved access to family planning and to other multisectoral policies that may lower the demand for children.

The authors also note that the limited research to date has found that many socioeconomic factors -- such as women's schooling and urbanization -- have an ambiguous effect on fertility in Sub-Saharan Africa, unlike in other parts of the world. The second part of the program on Fertility Determinants will consist of a program of research on avenues for policy intervention to lower desired family size and raise the demand for contraception.

We hope that this study will clarify the demographic situation in Sub-Saharan Africa for policy analysts and decision makers and suggest promising areas for future analysis on reducing fertility and raising contraceptive use.

Hans Wyss
Director
Technical Department, Africa Region

May 2, 1990
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I. INTRODUCTION

This report focuses on the prospects for fertility decline in sub-Saharan Africa as assessed for the period since 1985. In 1985, the World Bank commissioned various reports on fertility, which provided an up to date review of the evidence at that time. (Much of this material will appear in Acsadi et al., forthcoming. In this report, we want to build on previous World Bank supported research, look at fresh survey evidence on the course of fertility, provide an updated review of the literature, and examine new arguments that have been presented since 1985; we also want to discuss the need for new methodological advances, and for the testing of existing hypotheses that have been offered by various authors.

Research up to 1985 reflected to a large extent the knowledge gained from the analysis of the various World Fertility Surveys (WFS) conducted in the region between 1977 (Kenya) and 1984 (Nigeria). Although more results from analyses of WFS data have come out since then and interesting comparative analyses have continued to appear in the literature, the focus has now changed to a new set of surveys, the Demographic and Health Surveys (DHS) which are now in progress in much of Africa. They will provide some additional insights into the interactions between health and fertility, but above all, they will update our knowledge of levels and trends in various countries and may answer some urgent questions about the onset of the decline in fertility heralded by earlier reports on contraceptive prevalence in such countries as Zimbabwe or Botswana, or about the continued rise of fertility in other countries of sub-Saharan Africa; they will help answer the question whether the fertility transition has started in some countries or parts of countries. We shall discuss this material in Section I of this report. It should be clear that our analysis is preliminary, and entirely based on the First Country Reports which are only coming out now. The evidence leads to the conclusion that the first indications of a fertility transition—the secular decline of fertility brought about by the adoption of voluntary family limitation—may be appearing in a few countries of sub-Saharan Africa.

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Without denying the enormous achievements of the WFS and the DHS in furthering our understanding of fertility in sub-Saharan Africa, it is fair to say that the recent interest of researchers has changed substantially from an emphasis on the proximate determinants of fertility, to the study of the more 'ultimate' determinants that account for the survival of high fertility and of the socioeconomic and ideational changes that will eventually lead to sustained fertility decline. In addition, the atmosphere of the debate has changed during the 1980s. Increasingly, the prospect of demographic transition must be evaluated in terms other than economic progress and mortality decline. Evidence of changes in the African family and the position of women within the family, the slowing down of social and economic progress and the introduction of structural adjustment programs to deal with economic stagnation, and the rapid spread of the AIDS epidemic in Africa have made it necessary to consider the relationship between each of these factors and fertility decline.

The recent literature has raised questions on the continuation of high fertility for which the WFS and DHS data are less pertinent. Some of these questions concentrate on the cultural originality of sub-Saharan Africa, which, it has been argued, presents special obstacles to the fertility transition. The extent of sub-Saharan Africa's exceptional position is reviewed in Section II of this report. In Section III, further insight is gained through a discussion of recent micro-based analyses of the determinants of fertility in sub-Saharan Africa and elsewhere. The ongoing debate on the relative importance of deficiencies in the supply of family planning services and cultural barriers to fertility decline in Africa is discussed in Section IV.

Whereas the notion of family limitation has been of little importance on the continent thus far, child spacing has always been culturally valued. It is therefore important to establish the extent to which contraception can be introduced as a substitute for traditional techniques of child spacing, including practices that aim at delaying the first birth. Section V considers two areas where demand for contraception exists in Africa: the spacing needs of married women and the desire to control fertility outside of marriage. Nuptiality, which was not emphasized by the WFS and generally has received little systematic treatment in the literature, is considered in Section VI. A last section is devoted to summarizing research questions that we believe to be of central importance, along with new analytical approaches that are likely to prove useful.
II. RECENT TRENDS IN AFRICAN FERTILITY

Fertility in Africa remains the highest in the world. (For a recent review, see Page, 1988.) The World Bank (1986) estimated that the average total fertility for the 45 continental countries (including North Africa) was 6.3 children per woman. Recent surveys report average desired family sizes of six to nine children per woman. In their 1985 discussion of fertility in Sub-Saharan Africa, Cochrane and Farid summarized the overall picture as it emerged from WFS. In comparison with other world regions, the proximate factors accounting for exceptionally high fertility in sub-Saharan Africa were: (1) early and universal marriage and (2) very little use of efficient contraception. Despite the high levels of fertility, however, there were particular features of the African reproductive regimes which had long acted to restrain fertility in parts of the continent. Those included subfecundity of pathological origin, and, more importantly, long breastfeeding and postpartum abstinence that led to exceptionally long birth intervals. (Any discussion of fertility and contraception in Africa must give special weight to the issue of birth spacing.)

Cochrane and Farid emphasized the most striking apparent trend of the previous decades, which was toward higher rather than lower fertility. The conclusion that fertility was rising was inferred from the fact that the number of children or parity per woman aged 45-49 was generally lower (with the exception of Ghana) than the total fertility rate computed on the basis of the preceding five years. (Table 1 gives this evidence, complemented by new results from more recent DHS.) This Parity/Total Fertility ratio (or P/F ratio in short) is a convenient, but not necessarily foolproof analytical tool for examining fertility changes. In principle, the cumulated number of children over the women's lifetime reflects long-term levels, and fertility over the last five years is more influenced by recent change. It is quite possible, however, that part of the apparent rise of fertility was due to the survey methodology and the patterns of reporting bias; the pattern has reversed itself in the DHS, perhaps because the phrasing of the questions was different in this new set of surveys. If genuine, however, it could be interpreted to mean that the forces of modernization had operated in a perverse fashion: subfecundity had been reduced in some areas, and elsewhere postpartum abstinence, a factor which had traditionally reduced fertility below its natural maximum, had lost some of its force. (There was little sign of a reduction in the duration or incidence of breastfeeding, which remains an important barrier to declining birth intervals.) The apparent fertility increase should not be exaggerated, however; it amounted to about half a child in most countries, and substantially exceeded this amount only in Cameroon, a country where pathological sterility had been widespread in the past.
Table 1:
Cumulative Fertility for Women 45-49 (P), Current Fertility (F), and P/F Ratios

<table>
<thead>
<tr>
<th>Country</th>
<th>Cumulative fertility: all women aged 45-49 (P)</th>
<th>Current fertility rate (in 0-5 years prior to each survey) (F)</th>
<th>P/F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>World Fertility Surveys</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benin 1981-2</td>
<td>6.27</td>
<td>7.08</td>
<td>.89</td>
</tr>
<tr>
<td>Cameroon 1978</td>
<td>5.18</td>
<td>6.40</td>
<td>.81</td>
</tr>
<tr>
<td>Ghana 1979-80</td>
<td>6.71</td>
<td>6.47</td>
<td>1.04</td>
</tr>
<tr>
<td>Ivory Coast 1980-1</td>
<td>6.84</td>
<td>7.36</td>
<td>.92</td>
</tr>
<tr>
<td>Kenya 1977-8</td>
<td>7.88</td>
<td>8.25</td>
<td>.96</td>
</tr>
<tr>
<td>Lesotho 1977</td>
<td>5.29</td>
<td>5.76</td>
<td>.92</td>
</tr>
<tr>
<td>Mauritania 1981</td>
<td>6.00</td>
<td>6.25</td>
<td>.96</td>
</tr>
<tr>
<td>Nigeria 1981-2</td>
<td>5.84</td>
<td>6.34</td>
<td>.92</td>
</tr>
<tr>
<td>Senegal 1978</td>
<td>7.16</td>
<td>7.15</td>
<td>1.00</td>
</tr>
<tr>
<td>Sudan (N.) 1979</td>
<td>5.98</td>
<td>6.02</td>
<td>.99</td>
</tr>
<tr>
<td><strong>Demographic and Health Surveys</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Botswana 1987</td>
<td>5.8</td>
<td>5.0</td>
<td>1.16</td>
</tr>
<tr>
<td>Burundi 1987</td>
<td>6.9</td>
<td>6.8</td>
<td>1.01</td>
</tr>
<tr>
<td>Ghana 1986</td>
<td>7.25</td>
<td>6.43</td>
<td>1.13</td>
</tr>
<tr>
<td>Kenya 1988</td>
<td>7.5</td>
<td>6.7</td>
<td>1.12</td>
</tr>
<tr>
<td>Liberia 1986</td>
<td>6.4</td>
<td>6.3</td>
<td>1.02</td>
</tr>
<tr>
<td>Mali 1987</td>
<td>7.06</td>
<td>6.73</td>
<td>1.05</td>
</tr>
<tr>
<td>Ondo State 1986</td>
<td>6.9</td>
<td>6.0</td>
<td>1.15</td>
</tr>
<tr>
<td>Senegal 1986</td>
<td>7.0</td>
<td>6.4</td>
<td>1.09</td>
</tr>
<tr>
<td>Togo 1988</td>
<td>7.28</td>
<td>6.21</td>
<td>1.17</td>
</tr>
<tr>
<td>Uganda 1988-9</td>
<td>7.77</td>
<td>7.30</td>
<td>1.06</td>
</tr>
<tr>
<td>Zimbabwe 1988</td>
<td>6.87</td>
<td>5.70</td>
<td>1.21</td>
</tr>
</tbody>
</table>

On the basis of a declining trend in total fertility rates computed from retrospective reports over three five-year periods preceding the survey, Cochrane and Farid conjectured that fertility was in the initial stages of decline in Ghana, Kenya, Senegal and Sudan (See Table 2). The possibilities of error in retrospective reporting are such that this could not be a strong inference. In fact, there remained strong doubts as to the reality of any fertility decline, thus far, in sub-Saharan Africa.

With the initial survey results coming out of the DHS, the emphasis has now begun to change. The lower part of Table 1 shows that the P/F ratios appear to have reversed themselves everywhere, a finding which at face value could be interpreted as a sign of generalized fertility decline. The fact that a P/F ratio greater than one is as characteristic of DHS surveys as a P/F ratio below one was of the WFS suggests the possibility, however, of bias inherent in the survey methodology.

Be it as it may, several of the First Country Reports claim to have identified the first symptoms of fertility decline in parts of the countries which conducted surveys in 1986, 1987 or 1988. In Ondo State (Nigeria), the 1986 survey "found evidence of recent declines in fertility" (Ondo State, 1989: XV). In comparison with the 1978 WFS, the Senegal 1986 DHS survey suggested "a marked decline... essentially attributable to the young generations below 30 years..." (Senegal, 1998: 32). The Mali 1988 survey report identified a "very significant fertility decline" in Bamako, the capital (Mali, 1989: 31). The most spectacular declines were measured in the 1988 Botswana Family Health II survey (in comparison with the First Family Health Survey of 1984) and in the Kenya DHS of 1988. The Report for Botswana concluded: "There are indications that fertility began to decline some 10-15 years before the survey, around the same time the Family Planning Programme was introduced in 1973" (Botswana, 1989: 24). Data from the DHS survey of Kenya "provide the first evidence of a major decline in fertility" (Kenya, 1989: xix). The Zimbabwe DHS was not available at the date of this writing, but initial results reveal important declines of fertility. Only the reports for the 1986 Liberia and the 1987 Burundi DHS concluded without qualification that no fertility decline has taken place.

2 As women older than 49 years are not interviewed, reported fertility histories are increasingly truncated as one goes back in time. The computation in Cochrane and Farid assumes that the fertility of older women in the past was equal to that of more recent cohorts, and we have reproduced their computation for the new surveys included in Table 2.
Table 2:
Estimated Total Fertility Rates for Five-Year Periods Prior to the Survey, (Calculated from the Birth Histories Data)

<table>
<thead>
<tr>
<th>YEARS BEFORE THE SURVEY</th>
<th>Country</th>
<th>0-4</th>
<th>5-9</th>
<th>10-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>World Fertility Survey</td>
<td>Ghana 1979-80</td>
<td>6.47</td>
<td>6.97</td>
<td>7.21</td>
</tr>
<tr>
<td></td>
<td>Kenya 1977-78</td>
<td>8.25</td>
<td>8.84</td>
<td>9.15</td>
</tr>
<tr>
<td></td>
<td>Senegal 1978</td>
<td>7.15</td>
<td>7.50</td>
<td>7.72</td>
</tr>
<tr>
<td>Demographic and Health Survey</td>
<td>Ghana 1988</td>
<td>6.40</td>
<td>6.93</td>
<td>7.15</td>
</tr>
<tr>
<td></td>
<td>Kenya 1989</td>
<td>6.71</td>
<td>7.84</td>
<td>8.50</td>
</tr>
<tr>
<td></td>
<td>Senegal 1986</td>
<td>6.62</td>
<td>7.94</td>
<td>8.11</td>
</tr>
</tbody>
</table>

Sources: See Table 1

The case of Ghana is especially interesting. According to the Report of the Ghana DHS of 1988, "overall, the data suggests that, even if a short-term fertility decline occurred in Ghana during the mid to late seventies, the decline has not continued into the eighties" (Ghana, 1989: 23). This is interesting, as Cochrane and Farid believed that Ghana provided the best evidence of decline for any sub-Saharan African country, and data from the Ghana Fertility Survey of 1980 had been widely used to support a claim of "crisis-led fertility decline". Table 3 gives age specific fertility rates for Ghana computed from fertility histories for the 5-year period preceding the WFS of 1980 and the DHS of 1988. There is no evidence of continued decline of fertility on this basis, despite the favorable prognosis of the 1980 WFS. Ghana provides a warning about being overeager to interpret the evidence of one single survey as showing the onset of fertility decline.
Table 3: Comparison of age specific fertility rates in the WFS or CPS and the DHS, Botswana, Kenya, Ghana and Senegal

<table>
<thead>
<tr>
<th>Age</th>
<th>Botswana CPS 80</th>
<th>DHS 88</th>
<th>Ratio DHS/CPS</th>
<th>Kenya WFS 77-8</th>
<th>DHS 89</th>
<th>Ratio DHS/WFS</th>
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<tr>
<td>15-19</td>
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<td>.125</td>
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<td>.177</td>
<td>.152</td>
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<td>20-24</td>
<td>.288</td>
<td>.212</td>
<td>0.74</td>
<td>.369</td>
<td>.314</td>
<td>0.86</td>
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<td>25-29</td>
<td>.265</td>
<td>.202</td>
<td>0.76</td>
<td>.356</td>
<td>.303</td>
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<td>30-34</td>
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<tr>
<th>Age</th>
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<th>DHS 88</th>
<th>Ratio DHS/WFS</th>
<th>Senegal WFS 78</th>
<th>DHS 86</th>
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<td>.107</td>
<td>0.99</td>
</tr>
<tr>
<td>45-49</td>
<td>.061</td>
<td>.060</td>
<td>0.98</td>
<td>.034</td>
<td>.040</td>
<td>1.18</td>
</tr>
<tr>
<td>TFR</td>
<td>6.39</td>
<td>6.43</td>
<td>0.99</td>
<td>7.14</td>
<td>6.62</td>
<td>0.93</td>
</tr>
</tbody>
</table>

Sources: see Table 1

Although the optimism of the majority of First Country Reports is infectious, we must be aware that the analysis of trends based on the retrospective interviewing with changing survey methodologies of populations that are largely illiterate, is fraught with difficulties. The questions were sometimes asked in a very different way in the WFS and the DHS. In Senegal, for example, the procedure used to collect information on a woman's maternities was much more thorough in the WFS than in the DHS: the timing of women's pregnancies was established in the WFS by one interviewer filling in a special diagram, the AGEVEN graph, while another interviewer
completed the detailed individual questionnaire at a later stage; the DHS procedure was much less time-consuming.

Moreover, even if there have been real declines in fertility, these declines may not represent the initial stages of a decline in completed family targets. Changes in fertility, particularly at young ages, may arise from changes in various proximate determinants (age at marriage, spousal separations, durations of breastfeeding, etc.) which do not imply a fundamental change in the motivations to have large families. This possibility is of particular relevance in the light of the severe economic conditions faced by many African countries in recent years. Hardship could account for forced delay of marriage, spousal separation, or temporary incentives to delay the next pregnancy and fertility would go back to higher levels when bad times are over. Table 3 presents the evolution of age-specific fertility rates in Senegal according to the two surveys. The apparent fertility decline was concentrated in the first three age groups. If this change represents a deliberate attempt to limit fertility, one would expect to see that changes in contraceptive use or desired family size are also concentrated at young ages; this is not the case, however. For every age group, contraceptive ever-use rises between the two surveys and the desired number of children falls:

<table>
<thead>
<tr>
<th></th>
<th>WFS</th>
<th></th>
<th>DHS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15-29</td>
<td>30-49</td>
<td>15-29</td>
</tr>
<tr>
<td>Ever-used contraception</td>
<td>0.9%</td>
<td>1.1%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Desired number of children</td>
<td>8.5</td>
<td>9.1</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Here too, differences in the phrasing of the questions in the two surveys could account at least in part for the change in responses. The use of modern contraception remained very low in the DHS, and was hardly sufficient to account for the reported fertility decline. On

---


4 In the WFS, the question on fertility preferences was: "If you could choose exactly the number of children you will have during your whole life, how many children would you like to have?" In the DHS, the question asked to women who had children already was: "If you could start again from the time when you had no children, and could choose exactly the number of children you desire, how many would you like to have?"
the basis of this evidence, it would be very hard to conclude that the fertility transition has started in Senegal.

This brief discussion of the data from Senegal illustrates an important point: if one wishes to identify the beginning of a sustained decline in completed family size, distinct from mere short-term fluctuations in fertility or reporting errors, then one should examine a variety of indicators for evidence consistent with this story. In particular one should look for:

1) a conclusive drop in the level of fertility using comparable surveys or from internal evidence of retrospective birth histories in one survey;

2) a concentration of declines among high parity and/or older women who are most likely to have reached or exceeded their desired family sizes;

3) a conclusive drop in fertility intentions;

4) a significant rise in the use of efficient contraceptives, particularly among age groups experiencing fertility decline; and

5) evidence that declines are concentrated in, but not limited to, selected groups of the population.

Botswana (Table 3) provides an example of a country for which some but not all of these criteria are met. The level of total fertility between the 1984 and the 1988 Family Health Surveys appears to have declined from 6.46 in 1984, to 5.0 in 1988, or by 33 percent; however, the decline in the number of children ever born appears to have occurred at all ages by a comparable amount. At the oldest ages, there is even a reported decline in CEB for a single cohort of women (Table 4); this can only be the result of misreporting. Moreover, the shape of the age-specific fertility curves does not move in a pattern consistent with patterns that have accompanied sustained fertility decline in other contexts: a similar decline has occurred at all ages (Table 3). Other criteria are met, however; 95 percent of women in Botswana knew of at least one modern method of contraception, and 54 percent had ever used one—a considerable proportion, and a significant increase over 1984. Thirty percent of all women reported using a method of contraception, either traditional or modern, at the time of the survey; this constitutes

---

5 The Family Health Survey of 1984 collected summary data on the number of children ever born, while that of 1988 employed a birth history approach. According to Kenya (1989: 25), "previous methodological research in Kenya ... has shown that birth histories result in lower estimates of cumulative fertility than summary data, though the cause is unclear."
a large enough proportion to account for the observed decline of fertility. It should be noted, however, that the level and age pattern of contraceptive use was roughly similar to that of Mexico in the WFS of 1976, at a time when total fertility was much higher, 6.3 as against 5.0 in Botswana. The ideal number of children was 4.7, but the question on this topic was phrased differently in the 1984 and the 1988 surveys, and "in general, the difference was too small to conclude there has been a significant change in family size norms" (Botswana, 1989:65). To summarize this evidence, a fertility decline has probably occurred in Botswana between 1984 and 1988, but its extent is difficult to measure; some of the increase in contraceptive use could have been for spacing rather than for family limitation.

Table 4:

<table>
<thead>
<tr>
<th>Age</th>
<th>1984 CPS</th>
<th>1988 DHS</th>
<th>Ratio 1989/1984</th>
<th>Difference by cohort in 5 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>0.3</td>
<td>0.3</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>20-24</td>
<td>1.4</td>
<td>1.2</td>
<td>0.86</td>
<td>0.9</td>
</tr>
<tr>
<td>25-29</td>
<td>2.9</td>
<td>2.5</td>
<td>0.86</td>
<td>1.1</td>
</tr>
<tr>
<td>30-34</td>
<td>4.2</td>
<td>3.7</td>
<td>0.88</td>
<td>0.8</td>
</tr>
<tr>
<td>35-39</td>
<td>5.4</td>
<td>5.1</td>
<td>0.94</td>
<td>0.9</td>
</tr>
<tr>
<td>40-44</td>
<td>6.3</td>
<td>5.4</td>
<td>0.86</td>
<td>0.0</td>
</tr>
<tr>
<td>45-49</td>
<td>6.8</td>
<td>5.8</td>
<td>0.85</td>
<td>-0.5</td>
</tr>
</tbody>
</table>


Kenya not only has one of the oldest family planning programs in Africa, but it also has been subjected to more surveys on fertility than any other country in Africa. The 1977-8 Kenya Fertility Survey and the 1989 Demographic and Health Survey used comparable fertility histories. The comparison of age specific fertility rates is given in Table 3. The decline of total fertility from 7.9 in 1977-8 to 6.71 in 1989 amounts to more than one child, or 18 percent, but it is almost evenly distributed over all age groups; there is only a suggestion of a larger decline among the two last age groups. 14.7 percent of all women were currently using contraception, although there was little clear increase with age, except in the case of female sterilization, which has become an important component of contraceptive use in Kenya. The mean ideal number of children for all women had reached an "Asian" level, 4.4. In sum, although future studies may still
indicate that the fertility transition in Kenya is not decisive, there are indications that a change has finally taken place. It may be that Kenya is finally collecting the rewards from a long and disappointing history of involvement with family planning programs.

At this writing, the First Country report for the 1988 DHS of Zimbabwe is not yet available. Data presented in the preliminary report suggest a total fertility rate of 5.7, compared to 6.5 measured by the 1984 Reproductive Health Survey (but 5.6 in the 1982 census, possibly a less reliable source), and the report does not come to a firm conclusion: "Because different methodologies were used to derive TFRs from the Census, ZRHS and ZDHS, reaching conclusions about fertility trends will require additional analysis" (Zimbabwe, 1989: 7). Nonetheless, the level of contraceptive use is perhaps the most suggestive thus far of a sustained fertility decline in sub-Saharan Africa (see Table 5).

It should be emphasized that evidence for a sustained decline in completed family size is still weak everywhere in sub-Saharan Africa. Most disturbing is the absence of clear age specific indication of family limitation in the African countries under review. A parallel decline of fertility at all ages suggests either misreporting, or a change in spacing which may be unrelated to fertility limitation.
Table 5:

Percent of currently married women who are currently using modern methods

<table>
<thead>
<tr>
<th>AGE</th>
<th>Botswana</th>
<th>Burundi</th>
<th>Ghana</th>
<th>Kenya</th>
<th>Liberia</th>
<th>Mali</th>
<th>Ondo St.</th>
<th>Senegal</th>
<th>Zimbabwe</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>14.3</td>
<td>0.6</td>
<td>2.3</td>
<td>6.7</td>
<td>2.0</td>
<td>1.3</td>
<td>1.7</td>
<td>0.4</td>
<td>28.4</td>
</tr>
<tr>
<td>20-24</td>
<td>31.2</td>
<td>0.7</td>
<td>3.4</td>
<td>11.8</td>
<td>4.9</td>
<td>1.4</td>
<td>2.1</td>
<td>0.9</td>
<td>41.6</td>
</tr>
<tr>
<td>25-29</td>
<td>38.7</td>
<td>1.4</td>
<td>4.3</td>
<td>18.8</td>
<td>6.7</td>
<td>1.6</td>
<td>3.0</td>
<td>2.3</td>
<td>43.9</td>
</tr>
<tr>
<td>30-34</td>
<td>38.4</td>
<td>1.5</td>
<td>6.9</td>
<td>22.2</td>
<td>8.3</td>
<td>1.5</td>
<td>4.3</td>
<td>4.9</td>
<td>43.2</td>
</tr>
<tr>
<td>35-39</td>
<td>35.1</td>
<td>1.8</td>
<td>5.9</td>
<td>22.9</td>
<td>5.1</td>
<td>1.4</td>
<td>5.3</td>
<td>3.8</td>
<td>30.7</td>
</tr>
<tr>
<td>40-44</td>
<td>29.0</td>
<td>1.0</td>
<td>9.0</td>
<td>21.2</td>
<td>5.7</td>
<td>0.8</td>
<td>4.0</td>
<td>1.2</td>
<td>26.1</td>
</tr>
<tr>
<td>45-49</td>
<td>11.9</td>
<td>1.6</td>
<td>4.2</td>
<td>17.5</td>
<td>7.1</td>
<td>0.3</td>
<td>3.4</td>
<td>2.4</td>
<td>17.3</td>
</tr>
<tr>
<td>Total</td>
<td>28.9</td>
<td>1.2</td>
<td>5.2</td>
<td>17.9</td>
<td>5.6</td>
<td>1.3</td>
<td>3.7</td>
<td>2.4</td>
<td>36.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARITY</th>
<th>Botswana</th>
<th>Burundi</th>
<th>Ghana</th>
<th>Kenya</th>
<th>Liberia</th>
<th>Mali</th>
<th>Ondo St.</th>
<th>Senegal</th>
<th>Zimbabwe</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>13.6</td>
<td>0.0</td>
<td>1.9</td>
<td>0.8</td>
<td>2.5</td>
<td>2.5</td>
<td>1.7</td>
<td>0.2</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>30.4</td>
<td>0.8</td>
<td>3.5</td>
<td>8.6</td>
<td>3.6</td>
<td>1.1</td>
<td>2.6</td>
<td>1.2</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>37.2</td>
<td>0.9</td>
<td>3.0</td>
<td>16.0</td>
<td>4.8</td>
<td>0.8</td>
<td>2.1</td>
<td>3.1</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>41.2</td>
<td>1.6</td>
<td>5.1</td>
<td>18.6</td>
<td>5.8</td>
<td>0.8</td>
<td>2.5</td>
<td>2.6</td>
<td>-</td>
</tr>
<tr>
<td>4+</td>
<td>32.1</td>
<td>1.6</td>
<td>7.5</td>
<td>21.7</td>
<td>8.7</td>
<td>1.5</td>
<td>5.0</td>
<td>3.6</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>28.9</td>
<td>1.2</td>
<td>5.2</td>
<td>17.9</td>
<td>5.5</td>
<td>1.3</td>
<td>3.7</td>
<td>2.4</td>
<td>36.1</td>
</tr>
</tbody>
</table>

Note: * For Botswana, all women.

Table 6 presents the recently collected age-specific fertility rates for African countries, in absolute values and expressed as a percentage of the average of the six countries for which the DHS results have been published, and which do not make a defensible claim to have started a sustained fertility decline. The large fluctuations in fertility at 15-19 can be largely explained by differences in age at marriage; there are too few women in the 45-49 age group to allow definite conclusions. At other ages, however, the ratio to the average is relatively constant; despite some irregularities, only Kenya and Zimbabwe show the clear decline with age that would be the result of family limitation.

It is possible that the declines of fertility that are observed among younger women here and there, and particularly in Senegal, Botswana and Kenya, are the result of a desire for spacing births, and of a greater willingness of women to use various contraceptive techniques to delay the next birth, but experience with fertility declines in other parts of the world suggest that this is rather unlikely. In all countries of sub-Saharan Africa, 6

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6 The six countries are: Burundi, Ghana, Liberia, Mali, Ondo State (Nigeria) and Senegal
there is a large and consistent increase with age in the proportion of women who want no more births (Table 7), but the motivation is clearly not sufficient (or the distinction between spacing and stopping too confusing) to stimulate stopping behavior.

The increase in contraceptive knowledge and use in every DHS country appears to be a significant trend of the 1980s. To have an age specific effect on fertility, contraceptive use for limiting family size should increase with parity, and with age until the late thirties (Table 5). Only in Botswana, Kenya and Zimbabwe is the use of modern methods of contraception sufficient to account for a perceptible decline in fertility.

In conclusion, despite the upbeat attitude of DHS First Country Reports, it seems difficult to conclude at this point that sub-Saharan Africa as a whole has entered the initial stages of a sustained fertility decline. There may be signs of change here and there including a generalized increase in the knowledge that contraception exists and a reduction in the desired number of children. There may be population groups here and there that have made significant efforts to limit completed family sizes. Beyond that, with the possible exceptions of Botswana, Kenya and Zimbabwe, there is little evidence that the kind of sustained and irreversible decline in fertility that has characterized the fertility transition in other regions has begun in sub-Saharan Africa. It is noteworthy that these countries have been relatively less affected by the economic crisis of the recent decades, and have a more educated female population, than the other countries that had a DHS survey.
Table 6: Age specific fertility rates, and ratio to average for 6 countries*, DHS

<table>
<thead>
<tr>
<th>Age specific fertility rates</th>
<th>Botswana</th>
<th>Burundi</th>
<th>Ghana</th>
<th>Kenya</th>
<th>Liberia</th>
<th>Mali</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>0.125</td>
<td>0.052</td>
<td>0.124</td>
<td>0.152</td>
<td>0.184</td>
<td>0.201</td>
</tr>
<tr>
<td>20-24</td>
<td>0.212</td>
<td>0.271</td>
<td>0.258</td>
<td>0.314</td>
<td>0.285</td>
<td>0.291</td>
</tr>
<tr>
<td>25-29</td>
<td>0.202</td>
<td>0.324</td>
<td>0.278</td>
<td>0.303</td>
<td>0.272</td>
<td>0.288</td>
</tr>
<tr>
<td>30-34</td>
<td>0.191</td>
<td>0.292</td>
<td>0.248</td>
<td>0.255</td>
<td>0.223</td>
<td>0.260</td>
</tr>
<tr>
<td>35-39</td>
<td>0.148</td>
<td>0.238</td>
<td>0.195</td>
<td>0.183</td>
<td>0.181</td>
<td>0.193</td>
</tr>
<tr>
<td>40-44</td>
<td>0.083</td>
<td>0.131</td>
<td>0.117</td>
<td>0.099</td>
<td>0.114</td>
<td>0.112</td>
</tr>
<tr>
<td>45-49</td>
<td>0.038</td>
<td>0.082</td>
<td>0.060</td>
<td>0.035</td>
<td>0.063</td>
<td>0.040</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ratio to average</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>0.960</td>
<td>0.399</td>
<td>0.953</td>
<td>1.168</td>
<td>1.414</td>
<td>1.544</td>
</tr>
<tr>
<td>20-24</td>
<td>0.784</td>
<td>1.002</td>
<td>0.954</td>
<td>1.162</td>
<td>1.054</td>
<td>1.076</td>
</tr>
<tr>
<td>25-29</td>
<td>0.696</td>
<td>1.117</td>
<td>0.958</td>
<td>1.044</td>
<td>0.937</td>
<td>0.993</td>
</tr>
<tr>
<td>30-34</td>
<td>0.727</td>
<td>1.111</td>
<td>0.944</td>
<td>0.970</td>
<td>0.848</td>
<td>0.989</td>
</tr>
<tr>
<td>35-39</td>
<td>0.740</td>
<td>1.190</td>
<td>0.975</td>
<td>0.915</td>
<td>0.905</td>
<td>0.965</td>
</tr>
<tr>
<td>40-44</td>
<td>0.721</td>
<td>1.137</td>
<td>1.016</td>
<td>0.860</td>
<td>0.990</td>
<td>0.973</td>
</tr>
<tr>
<td>45-49</td>
<td>0.702</td>
<td>1.514</td>
<td>1.108</td>
<td>0.646</td>
<td>1.163</td>
<td>0.738</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ondo St. Senegal Togo Uganda Zimbabwe Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age specific fertility rates</td>
</tr>
<tr>
<td>15-19</td>
</tr>
<tr>
<td>20-24</td>
</tr>
<tr>
<td>25-29</td>
</tr>
<tr>
<td>30-34</td>
</tr>
<tr>
<td>35-39</td>
</tr>
<tr>
<td>40-44</td>
</tr>
<tr>
<td>45-49</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ratio to average</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>15-19</td>
<td>0.469</td>
<td>1.222</td>
<td>0.968</td>
<td>1.460</td>
<td>0.837</td>
<td>1.0</td>
</tr>
<tr>
<td>20-24</td>
<td>0.880</td>
<td>1.032</td>
<td>1.017</td>
<td>1.221</td>
<td>0.943</td>
<td>1.0</td>
</tr>
<tr>
<td>25-29</td>
<td>1.037</td>
<td>0.958</td>
<td>0.948</td>
<td>1.103</td>
<td>0.886</td>
<td>1.0</td>
</tr>
<tr>
<td>30-34</td>
<td>1.115</td>
<td>0.993</td>
<td>0.940</td>
<td>1.027</td>
<td>0.867</td>
<td>1.0</td>
</tr>
<tr>
<td>35-39</td>
<td>0.970</td>
<td>0.995</td>
<td>1.035</td>
<td>1.100</td>
<td>0.840</td>
<td>1.0</td>
</tr>
<tr>
<td>40-44</td>
<td>0.955</td>
<td>0.929</td>
<td>0.973</td>
<td>0.868</td>
<td>0.764</td>
<td>1.0</td>
</tr>
<tr>
<td>45-49</td>
<td>0.738</td>
<td>0.738</td>
<td>1.348</td>
<td>0.738</td>
<td>0.628</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Note: * Countries are Burundi, Ghana, Liberia, Mali, Nigeria (Ondo State), and Senegal. Sources: See Table 1.
Table 7:
Attitudes toward stopping and spacing,
in percentage of currently married women, DHS

<table>
<thead>
<tr>
<th>Botswana</th>
<th>Burundi</th>
<th>Kenya</th>
<th>Liberia</th>
<th>Mali</th>
<th>Ondo</th>
<th>St.</th>
<th>Senegal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Want no more children</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-19    &amp; 10.8   &amp; 1.1  &amp; 9.3    &amp; 1.0  &amp; 1.1  &amp; 0.0 &amp; 1.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-24    &amp; 10.4   &amp; 2.4  &amp; 18.3   &amp; 6.9  &amp; 3.6  &amp; 0.9 &amp; 1.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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| **Want to wait at least two years** | |
| 15-19    & 39.8   & 69.1 & 53.8   & 38.2 & 42.2 & 61.7| -       |
| 20-24    & 49.2   & 76.1 & 55.2   & 44.3 & 47.9 & 59.2| -       |
| 25-29    & 38.1   & 69.9 & 35.9   & 40.2 & 42.6 & 59.3| -       |
| 30-34    & 34.1   & 52.0 & 17.8   & 32.7 & 34.9 & 47.0| -       |
| 35-39    & 17.8   & 38.4 & 11.8   & 24.4 & 22.4 & 34.7| -       |
| 40-44    & 9.2    & 22.5 & 2.0    & 16.5 & 5.9  & 14.7| -       |
| 45-49    & 1.4    & 10.2 & 0.8    & 11.6 & 4.0  & 7.3 | -       |

Source: See Table 1.

Part of the uncertainty on the trend of fertility may be lifted by subsequent analysis of the material that has been recently collected, if careful attention is paid to the role of proximate determinants other than voluntary fertility control (nuptiality, spousal separation, the components of the birth interval...) in explaining apparent trends.
III. IS AFRICA ON SCHEDULE?

Sub-Saharan Africa is one of the last major regions of the world where a secular decline of fertility has not yet taken place. Hence the question: Is sub-Saharan Africa on schedule? Has the level of development in individual countries exceeded the stage where one would expect fertility to decline? Did Asian countries start their fertility decline at lower levels of socioeconomic development than Africa has reached? Have African family planning programs encountered societal resistance and suffered setbacks which Asian or Latin American precedents did not predict?

In responding to these questions it is important that we avoid the implicit assumption that fertility decline holds a particular place in a well-ordered schedule of social and economic changes that constitute the process of development. This notion of a well-ordered schedule does not conform with reality: just as development economists have come to recognize that the process of development is multi-faceted, and that no single factor predisposes an economy to rapid economic growth, demographers have increasingly concluded that the relationship between aggregate economic indicators and the onset of the decline of marital fertility does not lend itself to easy generalizations. The classical "threshold hypothesis" that stated there was a critical level of economic and social development at which fertility should start to decline, has been largely discarded in demographic theory today (Cleland, 1985; Cleland and Wilson, 1987). As the leadership of WFS has acknowledged:

WFS has failed to identify any single aspect of development that is the crucial lever of demographic change... Its onset appears to be determined more by ill-understood cultural factors than by any objectively ascertainable development indicators (Gille, 1985: 279).

We are left with a complicated picture in which ideational changes, facilitated by the spread of education and by the activities of family planning programs, have played a major role in the observed reductions of fertility in countries of Asia and Latin America. Given this complexity, one should not be surprised to find that government programs designed to reduce fertility can be successful even at low levels of development; nor should one expect to find that the relationship between period fertility and various measures of economic development is consistent across global regions, and within regions, across linguistic and cultural groups.

Nonetheless, if we move beyond the idea that there is a well-defined schedule of fertility decline, we can gain new insights by examining the observed relationships and trying to understand possible sources of variability. For example, Caldwell

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7 See Freedman, 1987, p. 64 for an assessment of the evidence.
and Caldwell (1988) have used a comparison of different measures of development and fertility to argue against the World Bank's (1986) proposition that the failure of family planning programs in Africa can be attributed to an insufficient level of development. Using data from four countries in Africa (Ghana, Kenya, Côte d'Ivoire, Nigeria) and Asia (India, Indonesia, Thailand and China) the Caldwell's concluded that development alone cannot explain the "under-achievement" of African countries and suggested that cultural factors must be invoked, specifically religion.

A more complete picture can be obtained by taking a wider sample of countries. Since the level of female education is known to be an important correlate of fertility decline in aggregate data (Cutright 1984: 101-109) we focus initially on the relation between the change in period total fertility from 1965 to 1985 (DTFR) and the 1965 gross primary enrollment ratio for females, an index of the extent of female primary education, in low and middle income countries with pretransition levels of fertility (TFR>4) in 1965. The gross primary enrollment ratio for females is constructed by taking the ratio of the number of females involved in primary education to the number of females in the appropriate age group. This ratio can exceed 100 percent if individuals outside of the primary age group attend primary school, as is frequently the case in societies undergoing rapid change in the level of education.

The data are compiled from various issues of the World Development Report (1974-1988). While these numbers are easily accessible and may represent a best guess of the underlying patterns, it is important to recognize that the information on which the estimates are based is quite limited and of variable quality. Nonetheless, we believe that the results provide an important perspective on fertility decline in Africa.

Figure 1 (along with Table 8) shows the relationship between DTFR and the extent of female primary education in 1965 (PRI65). The variables exhibit a strong negative relation, although two African countries are distinctive outliers for their low levels of fertility change relative to educational status in 1965: Lesotho and the Congo. Neither country has experienced a decline in fertility (DTFR = 0 and +0.5, respectively) despite levels of female primary education exceeding 90 percent. Although relatively little is known about fertility patterns in the Congo, the 1978 WFS carried out in Lesotho does provide an opportunity to examine fertility patterns in that country. One would not want to generalize on this basis, however; Lesotho is unique in a number

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8 The analysis was also carried out using indices of male and combined primary education without any appreciable change in the results. Although females are generally less schooled than their male counterparts, with few exceptions, at the national level male primary education is highly correlated with female primary education and visa-versa.
of respects, not the least of which is the fact that women are more educated than men in that country. 9

In any case, on the basis of Figure 1, it is evident that although a number of Asian and Latin American countries were educating the vast majority of their female children by 1965, few of the African countries were doing so. Thus there is a sense in which the World Bank's (1986) assessment was valid: at least with respect to the level of female primary education as measured in 1965 (and thus among those in childbearing years in 1985), Africa, as a whole, is at a lower level of development. Even if levels of primary education were more comparable today (as is indeed the case) the African countries would be at a disadvantage.

When we take a closer look, however, we find substantial support for the Caldwell's argument. Although sub-Saharan countries with low levels of female primary education in 1965 do not differ substantially from other countries with low educational attainment, it is evident that at higher levels of education the fertility change for sub-Saharan countries lies distinctly above that of their counterparts in Asia, Latin America and North Africa. 10

A more formal examination of the relationship between education and fertility may be carried out by estimating a simple linear model. In Table 9 the change in the total fertility rate between 1965 and 1985 (DTFR=TFR85-TFR65) is assumed to be a function of period total fertility in 1965 (TFR65) and the level in 1960 and change in level (1960/5-1980/5) of three measures of economic development: GNP per capita (GNP60,DGNP), the percent urban (URB60,DURB) and the index of female primary education (PRI65,DPRI). 11 Interaction terms are incorporated in order to

9 In the WFS sample, 40% of husbands but only 5% of wives reported having no schooling (Cleland and Rodriguez, 1988: Table 1). This and other unique features of the economic and social structure in Lesotho may be attributed to the high levels of male labor migration to South Africa. For more details, see Timaeus and Graham (forthcoming).

10 One possible exception is provided by Zimbabwe which, according to the figures presented in Table 9, has experienced a fertility decline of 1.70 over the relevant time period. Given the poor quality of the data, however, one would not wish to make too much of the experience of any one country. Moreover, fertility in 1985 was still quite high (TFR=6.3), relative to that of other countries with high levels of female primary education in 1965.

11 Figures for female primary education refer to the period 1965 to 1985, because sex-specific data on educational attainment in 1960 are less complete than those for 1965. GNP per capita figures for 1960 are estimated on the basis of the reported average annual growth rates between 1960 and 1975 and GNP per capita in 1975.
test the hypothesis that the sub-Saharan countries are different and are constructed by multiplying an index which takes the value one for countries in sub-Saharan Africa (AFRICA) and the corresponding economic variables. If, for example, the interaction variable XGNP60=AFRICA*GNP60 were found to be significantly different from zero then we could conclude that the relationship between fertility change and GNP per capita measured in 1960 is different in sub-Saharan Africa than in the other regions considered.

Since the dependent variable, DTFR, refers to the change in total fertility (TFR85-TFR65), it will be negative for countries experiencing a fertility decline. Thus a negative coefficient on PRIM60 implies that higher levels of female primary education lead to more rapid fertility decline (i.e. to lower fertility in 1985, given the level of fertility in 1965).

Model 1 shows the effects of regressing the change in total fertility on each of the variables (and ignoring the possible simultaneity effects that might arise, for example, if the change in urbanization from 1960 to 1980 is not exogenous with respect to fertility change in that period). It is evident that although many of the estimated coefficients are not significantly different from zero, the joint hypothesis that the AFRICA dummy and each of the interaction terms is zero is firmly rejected (p<0.01)---fertility trends in Africa differ significantly from those in the other regions considered.

Model 2 illustrates the point that there is no significant loss in explanatory power when the urbanization and per capita income variables are excluded from the analysis (p>0.1). It is also evident that changes in primary education (DPRI, XDPRI) are not significantly associated with fertility decline---countries which have experienced substantial increases in female primary education in the last two decades have yet to receive a dividend in the form of a more rapid decline in fertility. One possible interpretation of this result is that increases in female primary education will only begin to have an effect on fertility when the corresponding females reach their childbearing years.

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12 An analysis which used urbanization and per capita income as instruments for the corresponding change variables (and excluded these variables from the regression) did not differ appreciably from the one presented here.
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Variable Names:

- **DTFR** Change in fertility 1965 to 1985 (1985 TFR - 1965 TFR)
- **TFR65** Period TFR in year 1965
- **PRI65** Ratio of number of females in primary school to number in appropriate age group in year 1965
- **GNP80** GNP per capita in year 1980
- **URB80** Percentage urban in year 1980
Figure 1
Fertility Change and Female Primary Education
Table 9:
Regressions of Fertility Change on SES Indices

<table>
<thead>
<tr>
<th>Model</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(0.988)</td>
<td>(0.878)</td>
<td>(0.870)</td>
<td>(0.269)</td>
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<tr>
<td>TFR65</td>
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<td>0.071</td>
<td>0.049</td>
<td>(0.113)</td>
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<td>PRI65</td>
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<td>-0.020***</td>
<td>-0.021***</td>
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<td>GNP60</td>
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<td>0.000</td>
<td>(0.000)</td>
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<tr>
<td>URB60</td>
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<td>0.006</td>
<td>(0.008)</td>
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<td>-0.005</td>
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<td>(0.000)</td>
<td>0.000</td>
<td>(0.000)</td>
</tr>
<tr>
<td>DURB</td>
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<td>(0.000)</td>
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<td>AFRICA</td>
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<td>3.579 (1.406)**</td>
<td>0.544 (0.333)</td>
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<tr>
<td>XFR65</td>
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<td>-0.459 (0.201)**</td>
<td>0.010 (0.006)*</td>
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<td>XDGNP</td>
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<tr>
<td>XDURB</td>
<td>0.010 (0.017)</td>
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</table>

SS Res. 13.241
SS Total 78.687
R2 0.832
Obs. 61.000
D.F. 46.000

F-tests for joint significance of AFRICA dummy and interactions:
4.37***

F-tests for model comparisons:
1 vs 2
2 vs 3
3 vs 4
4 vs CONST

1.291
0.740
3.114*
61.217***

Notes:
Standard errors in parentheses.
Significance levels: *p<0.1 **p<0.05 ***p<0.01
Variable Names:
Dvrr Change in variable vrr from 1960/1965 to 1980/1985
TFRnn Period TFR in year 19nn
PRInn Ratio of number of females in primary school to number in appropriate age group in year 19nn
GNPnn GNP per capita in 19nn
URBnn Percentage urban in year 19nn
AFRICA 1 if in Sub-Saharan Africa, 0 otherwise
Xvrrv Interation term of AFRICA with vrrv
Models 3 and 4 indicate that the difference between trends in fertility in Africa and those in other regions arises from two sources. First, as was evident in Figure 1, the relationship between female education and fertility change is significantly weaker in Africa than in other regions. Although little can be said with certainty about the reason for this difference, the observed patterns do suggest that in evaluating the possible explanations for continued high fertility in Africa we might gain from an attempt to identify how each mechanism might diminish the relationship between education and fertility.

Second, although fertility in 1965 is not significantly related to fertility decline in most regions, sub-Saharan Africa countries with especially high fertility in 1965 experienced greater declines in the subsequent period than those with intermediate levels of fertility. This pattern probably arises from variation in secondary sterility, post-partum abstinence and breastfeeding: countries in which these factors provided an important constraint on fertility in 1965 were more likely to have experienced fertility increases in the subsequent two decades.

IV. EVIDENCE FROM MICRO-BASED STUDIES

Micro-based studies of fertility in sub-Saharan Africa from the WFS and LSMS have also emphasized the relationship between education and fertility, and provide some insight into the relationships observed at the aggregate level. Of particular interest are studies by Cleland and Rodriguez (1988), Lesthaeghe (1984) and Ainsworth (1989).

Cleland and Rodriguez (1988) undertake a comparative analysis of the relationship between education (both male and female) and marital fertility in a cross-section of WFS countries using individual level data. Although they found substantial variation in the patterns observed in different regions of the world, they found little variation among countries within any given region. Thus although there was a clear negative relationship between education and fertility in Latin America, the relationship in Asia and Africa was less clear with the highest marital fertility often found among women with a few years of schooling.

Using indices of natural and controlled fertility Cleland and Rodriguez show that the non-linear pattern arises from a combination of two opposing effects. The effect of education on an index of fertility control is monotonic tending to lower fertility among educated women, although "In Africa this takes the form of a threshold: not until the husband has completed primary school is fertility control practiced to an appreciable extent" (1988:427). The relationship between education and an index of natural fertility in Asia and Africa is also monotonic but acts in
the opposite direction, a pattern that is attributed to declines in traditional birth-spacing restraints (1988:437).

Although Asia and sub-Saharan Africa showed some similarities, important differences were also in evidence. Sub-Saharan Africa exhibited higher levels of fertility at all levels of educational attainment. For example, the average index of total fertility among women with at least a secondary education was 5.6 in Africa but 4.6 in Asia. (The corresponding figures for the Caribbean, Latin America and North Africa/West Asia were 3.8, 3.5 and 4.1, respectively). Moreover there was an even greater difference once controls for other factors including husband's education and occupation and wife's employment status were introduced (6.3 in Africa versus 5.0 in Asia). Note also that this difference was due to differences in the level of fertility control--model estimates indicate that natural fertility is on average lower in Africa than Asia (1988:433).

Results concerning the determinants of fertility other than education have been more ambiguous. It has been noted, for example, that in contrast to the experience of other regions, urban residence and occupational status are not important correlates of fertility in Africa (Cochrane and Farid, 1988). This result is consistent with Cleland and Rodriguez's finding that "The effect of wife's education on fertility behavior is least affected by socio-economic controls in Africa" (1988:436).

Nonetheless there is evidence that the relationship between education and fertility differs substantially according to urbanization. For example, Cleland and Rodriguez present results consistent with a complex story in which the level of urbanization, in combination with government family planning effort, determines the relationship between education and fertility. In predominantly rural countries, increased education tends to raise fertility and government programs have little effect; in urban countries, however, increased education tends to lower fertility, with government programs reducing the education differential to some extent. While the authors dismiss the importance of urbanization in favor of less well-defined cultural factors, the evidence is intriguing.

Other studies have shown that levels of parental education interact in important ways with other individual and community level variables. Using data from Thailand, for example, Behrman and Sussangkarn (1989) find that there is an interaction between women's and men's schooling in relations that determine the number of children and the children's schooling. In a cross-national study Entwisle and Mason (1985) find that educational effects are positive in the absence of a family planning program and negative in the presence of one. Rosenzweig and Schultz (1982) report substitution between women's schooling and community characteristics with respect to fertility and mortality in
Colombia, while Strauss (1989) finds complementarities in the context of child growth in the Côte d'Ivoire.

An analysis of the contextual effects of education on fertility in Africa provides a more detailed picture. In analysis of WFS data from African countries, Lesthaeghe (1984) shows that the effects of an individual's educational level on marital fertility are dependent on the average level of schooling in a given area. For example, in Kenya, the fertility increasing effect of primary education diminishes with the average level of schooling, so that in the urban areas (where the average level of education is highest) the effect becomes negative. It is suggested that education at the individual level tends to disrupt traditional practices which lengthen birth intervals, but that subsequently, higher average levels of education produce social conditions conducive to the adoption of contraception.

Other explanations are possible. For example, the availability of childcare within the household may be an important determinant of the relationship between labor force participation and fertility in Africa (Delancey, 1988:215). But while the wage received by a given woman is a function of her own level of education, the cost of childcare depends on the level of education in the area as a whole (or more specifically on the presence in the area of individuals with a low opportunity cost of time who are willing to care for her children). Thus the relationship between education and fertility at the individual level will interact with the contextual level of education in a fashion that is consistent with the results reported by Lesthaeghe (1984).

Although data from the WFS have provided a number of important insights into African fertility patterns a key shortcoming of those data is the absence of information on income. It is therefore interesting to note that Ainsworth's (1989) analysis of the LSMS data on fertility in Côte d'Ivoire, which does include information on income, yields a somewhat different perspective. Although there is some evidence that increased education initially leads to higher fertility in a bivariate analysis, the relationship between education and fertility becomes negative or not significantly different from zero at all levels of education after controls for income and urbanization are introduced. While this finding suggests that the effects of education are underestimated when income is not controlled for, it is important to recognize that income is determined in part by levels of education.

Although the availability of data on income distinguishes Ainsworth's analysis from that of Lesthaeghe (1984) and Cleland and Rodriguez (1988), there are a number of other important differences including the use of data on children ever born rather than period-based measures of marital fertility and the fact that the data come from different countries and time periods. While it is important
to sort out the reasons for the observed differences, it is also important to recognize that the relationship between education, income and fertility is unlikely to remain fixed in the face of substantial social and economic change.

In summary the existing literature considering the micro-determinants of fertility in Africa provides a complicated picture. Educational levels seem to have some effect on fertility, but the relationship is complex, involving non-linearities and contextual effects. Other factors including urbanization play little role in themselves, but do seem to have an effect on the relationship between education and fertility. As was the case in the analysis of the aggregate data, regional factors seem to make a difference: Africa is distinguished by a relatively weak relationship between education and fertility.

Perhaps the most important conclusion that arises from analysis of the available literature on the micro-determinants of African fertility is its relative scarcity. In part because of an absence of appropriate data, existing analyses have been able to provide little insight into the mechanisms underlying fertility change and the relationship between education and fertility in Africa.

V. MECHANISMS UNDERLYING LEVELS AND TRENDS IN AFRICAN FERTILITY

In an attempt to understand the high levels of fertility in sub-Saharan Africa, demographers-sociologists have constructed two strands of arguments. The first considers the role of cultural factors which interact in important ways with the socioeconomic factors considered in the conventional transition literature. The second suggests that contraceptive distribution has been defective in Africa and that there has been a lack of political will and administrative capacity to implement family planning programs and satisfy existing demand. It is generally acknowledged that the African resistance to contraception is most relevant in the area of family limitation, and that it does not extend to birth spacing and the control of childbearing in extra-marital relations. The latter two topics are addressed in the next sections.

13 Particularly influential here have been two papers: John C. Caldwell and Pat Caldwell, "The cultural context of high fertility in sub-Saharan Africa," Population and Development Review 13, no. 3 (September 1987), and Odile Frank and Geoffrey McNicoll, "Fertility and population policy in Kenya," Population and Development Review 13, no. 2 (June 1987).
Cultural factors and the supply and demand of contraception

Caldwell and Caldwell (1987) have summarized the particular difficulties encountered by family planning programs in sub-Saharan Africa by reviewing ways in which cultural factors affect both the supply and demand of contraception. The following discussion draws heavily upon their list of factors, although we have supplemented it with other related arguments and attempted in each case to provide counter-arguments.

African religion and the horror of sterility. Caldwell and Caldwell (1987; 1988) characterize ancestor worship and the horror of infertility as fundamental characteristics of African reproductive systems. They claim that even where the imported monotheistic religions, Christianity and Islam, have been adopted by a substantial portion of the population, sub-Saharan Africans retain a fundamental belief in the power of ancestral forces which encourage high fertility and disapprove of anything that limits fecundity. Barrenness is considered a punishment of the gods or a characteristic of witches whom society casts out. Infant death, pregnancy wastage, sterilization, IUDs and contraception in general are identified with barrenness. Only women who continue to bear children are in good moral and social standing.

Thus, the Caldwells claim to have identified the ultimate cultural source of the failure of family planning programs. There are, however, serious questions about their theory. First, there is little direct evidence that ancestor cults are still uniformly important in the sub-Saharan region which has maintained high fertility. African women are prompt to invoke the will of God, as when they say that their desired number of children is "as many as God will send"; but the ancestors appear rarely, if at all, in the available tape recordings of fertility surveys where African women have discussed their fertility motivations (Adeokun, 1981; Kamuzora, unpublished; F. van de Walle, unpublished).

The Caldwells would have us believe that barrenness is the ultimate catastrophe for a woman. In a continent where subfecundity is a major health hazard, it would be surprising if some accommodation had not been found with barrenness. In fact, the World Fertility Surveys in Africa have enumerated many women without children, either because they were sterile, or because their children had died. Evidence from these surveys suggests that childless women are more likely to have divorced, to have remained single once divorced, and to have become wives of polygynist. They do not appear more likely, however, to reside in urban areas as might be the case if they were forced into prostitution as a result of infecundity. The basic conclusion that emerges is that childless women may experience a comparative disadvantage, but not
African cultures, when confronted with an inevitable conflict between a norm (in this instance, the so-called horror of infecundity) and ineluctable everyday realities (the statistical risk of being physiologically sterile), have been expert at finding accommodations; for example, fosterage and marriage between women provide culturally sanctioned alternatives to motherhood. It is interesting to mention in this context that the most famous autobiography in the anthropological literature of Africa, that of Baba of Karo, concerns a childless woman of the Hausa (Smith, 1954). Although childlessness was clearly important in shaping Baba’s life, it did not appear to have made a social outcast of her; a witch, perhaps, but then a good witch and a respected member of the community.

According to the Caldwells, some techniques of birth control are generally unacceptable in tropical Africa, because they elicit the traditional horror of sterility. This would be the case, for example, for sterilization or abortion. They believe that family planning programs will have to rely on hormonal methods, the IUD and more marginally on barrier methods; this would be in sharp contrast with Asian programs, the mainstay of which were sterilization and abortion.

These views must be qualified in view of the demand for abortion in some African cities, to a large extent (but not entirely) among unmarried women (Coeytaux, 1988). The Caldwells (1988b) themselves have discussed the growing frequency of abortion over time. In their survey of Ibadan, three fourths of abortion users were single women and one fourth married women; the latter were using abortion mostly for birth spacing. Abortion is probably vastly underreported in retrospective surveys, as in other parts of the world (Bleek, 1987a). Results from the DHS suggest that sterilization is making inroads in many African countries (see Table 10); it seems to be the method of choice in parts of Kenya. The WFS have attested to the existence of a large number of traditional methods of contraception and abortion, often magical or of unproven efficacy, suggesting at least that there is no fundamental objection to the principle of birth control; these methods are usually used for spacing or outside of marriage.

14. These results are not presented in this paper, but are available from the authors on request.

15 Marriage between women is a custom whereby a married woman pays the bride price for another woman who brings forth children in her name.
In sum, the Caldwells' hypothesis on the primacy of religious influences on African fertility is intriguing, but lacks empirical verification.

**Economic advantages gained from children.** Caldwell (1977) suggested that high fertility is economically rational in traditional African economies where land is held by the lineage and increasing human numbers provide the best form of investment available to control the land and its products. In contrast, in the land tenure systems of Asia which are dominated by the individual ownership of land by heads of households, the status of a man is determined by the amount of land owned, not by the size of his family; investment often takes the form of labor-saving implements. Other writers have concurred that subsistence agriculture is conducive to large families in sub-Saharan Africa. As Boserup (1985: 386) puts it, "Where women and children perform nearly all the agricultural work, the father of a large family is likely to become a rich man, while the father of a small family will remain poor." Boserup believes that low population density in Africa has encouraged the survival of extensive land-using systems of tenure. Thus, the reproductive cultures of sub-Saharan Africa have been to a large extent shaped by their productive systems, by the hoe instead of the plough as is in Asia.\(^{16}\)

How is economic change altering these conditions? Because of poor transportation and the weakness of markets for the products of the land, migration is more profitable than production for sale; few are exposed to the modern working conditions that might otherwise provide incentives for fertility reduction. For Boserup, Africa is lagging behind economically; its higher mortality, its lower economic development and urbanization explain why fertility has not come down. The explanation, however, fails to account for the sustained high fertility in the cities of Africa.

Economic conditions may also affect the economic costs and benefits of children by changing the levels of schooling, nutrition and health care that these children are provided. This perspective arises in the quantity-quality model discussed by Becker (1981). Increases in the returns to education, for example, may cause parents to provide their children with more education. This change increases the costs of each child as a result of school fees and the decreased availability of children for work and thus (unless parents can borrow against the future income of their children) will induce parents to choose smaller families.

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\(^{16}\) The argument is not new, see Boserup's (1970) own work, which influenced Goody’s (1976) formulation. For a recent review, see Lesthaeghe, 1986.
There have been attempts to test empirically the continued economic rationality of high fertility in the African context. The literature is reviewed by Delancey (1988), and the evidence is inconclusive. Depending on the structure of the family and the type of production, the number of children may exert either a positive or zero effect on household income; evidence on the relation between the number of children and income per head is also inconclusive. Depending on the availability of land, productivity and saving may be affected positively or negatively by family size.

Table 10:
Percent using female sterilization
DHS

<table>
<thead>
<tr>
<th></th>
<th>Of all women</th>
<th>Of women using modern family planning methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botswana</td>
<td>2.2</td>
<td>6.9</td>
</tr>
<tr>
<td>Burundi</td>
<td>0.1</td>
<td>10.0</td>
</tr>
<tr>
<td>Ghana</td>
<td>0.9</td>
<td>19.1</td>
</tr>
<tr>
<td>Kenya</td>
<td>3.6</td>
<td>40.8</td>
</tr>
<tr>
<td>Liberia</td>
<td>1.0</td>
<td>14.3</td>
</tr>
<tr>
<td>Mali</td>
<td>0.1</td>
<td>8.3</td>
</tr>
<tr>
<td>Ondo State</td>
<td>0.1</td>
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<tr>
<td>Senegal</td>
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</tr>
<tr>
<td>Zimbabwe</td>
<td>2.3</td>
<td>6.4</td>
</tr>
</tbody>
</table>

Source: See Table 1

Delancey's discussion of the relationship between fertility and labor force participation of women is particularly interesting. Since a basic tenet of the new household economics is that children are intensive in the use of the mother's time, it is generally expected that women's labor force participation will be negatively related to fertility (especially if controls for income are introduced). Household data from developed countries generally exhibit this pattern; data from developing countries have provided mixed results, and this is also the case for Africa. According to Delancey (1988:214)

Micro level research on the relationship between labor force participation of women and fertility in sub-Saharan Africa provides a variety of findings, most of them supporting a positive relationship and emphasizing the compatibility of jobs and child care.
Unfortunately, much of the existing literature measuring the economic costs and contributions of children suffers from methodological difficulties because many of the variables which are used to predict the economic returns to high fertility are jointly determined with fertility. For example, if there is unmeasured variation in the costs of childcare then women with inexpensive childcare may be both more likely to participate in the labor force and have higher fertility. Similarly, if there is unmeasured variation in the costs of education for different families, then families with low costs of education may have more children and provide each child with more education. Techniques which have been developed to control for the endogeneity of such factors as labor force participation, levels of schooling and nutritional status in other regions (see, for example, Rosenzweig and Schultz 1982; Blau, 1984; Blau et al., 1988; Behrman and Sussangkarn, 1989) have not, to our knowledge, been incorporated into the analysis of data from sub-Saharan Africa.

Wealth flows and kinship solidarity. John Caldwell has hypothesized that fertility begins to decline when the balance of advantages that accrue to the parental generation from their children disappears. This change occurs historically because of changes in the modes of production, an increased emphasis on the quality in children (including investment in schooling) and subtle cultural changes brought about by the introduction of new cultural perspectives on the nuclear family. According to the Caldwells (1988:25) intergenerational wealth flows in Africa have continued in favor of parents, to a large extent because of the strength of the lineage kinship system.

That children often provide some security for their parents later in life is not in doubt; however, the proposition that parents of large families are better off than those with few children has not been adequately tested. Filial piety remains a strong norm, but there are many ways to circumvent it. Increasing geographic mobility and economic opportunities outside of agriculture have increased the bargaining power of children, and often parents must be satisfied with occasional gifts. In surveys, parents often complain that children cannot be relied on as in the past, and acknowledge that one is lucky if one child out of many succeeds well enough in life to pay up some of the accumulated debt. Investment in education seems less certainly to bring rewards in employment and wealth than in the recent past; many a child ends up unemployed despite its schooling and continues to depend on its parents. Today's parents would be foolish to base their fertility decisions on promises that they themselves are less and less able to keep towards their own parents.

Kinship solidarity operates not only between children and parents, but also in a more general fashion within an extended family network. The costs of children can be reduced by sharing the cost of their upbringing with kin. Fostering relieves parents
from the burden of excessive fertility. It also may provide a mechanism for maintaining kinship solidarity: households linked by a fostering relationship may be more likely to support each other during periods of economic adversity.

Some of the costs of raising a child may also be borne by its siblings. Delancey (1988) stresses the "surprising" positive relationship between fertility and education at the family level, and the possible role of "siblings' chains of support" where educated individuals pay for the school expenditures of their younger brothers and sisters.

And yet, the cost of kinship solidarity may be resented by the individuals who have to assume it, and some attempts may be made to avoid bearing its full burden. For example, children not raised by their parents may be the victim of neglect as evidenced by the elevated level of mortality among foster children (Bledsoe and Brandon, 1987). Siblings' chains of support do not seem to have hindered fertility decline in Asia where they are also quite common.

Fertility decision-making as the male's prerogative. According to Caldwell and Caldwell (1987: 421)

The African family structure typically places reproductive decision-making in the hands of the husband and the economic burden mainly on the shoulders of the wife. Nothing could be more conducive to maintaining high fertility... [The wife's] isolation in an economic, and often social, unit with her children makes her increasingly dependent on those children and often loath to limit their number.

The argument, also advanced by Boserup (1985: 388), is the centerpiece of an article by Frank and McNicoll (1987) on Kenya,

17 In the context of rural India, Rosenzweig and Stark (1989) argue that marriage serves an important role as a means of constructing implicit risk-sharing arrangements between households. The presence of the bride in the household of the groom, it is argued, reduces the incentive on the part of either household to renege on an otherwise unenforceable agreement. A similar argument could easily be constructed in the context of fostering arrangements.

18 If children who are fostered out are less healthy than those that stay at home, a similar pattern might emerge even if foster children are not neglected. A careful analysis of the determinants of fostering (according to age, sex, and health and education status of the child before leaving home) would allow us to distinguish this possibility. To our knowledge no such study exists, however.
with obvious wider applications to all of sub-Saharan Africa. For them:

The major feature of traditional African societies that is characteristically different from others (and is fairly well typified in Kenya) is the cleavage of the basic nuclear family unit -- the man/woman or husband/wife pair -- and consequent rearrangement of the social and economic functions of family members. (Frank and McNicoll, 1987: 213)

By marriage (through the "contractual quid-pro-quo" of bridewealth payments exchanged between the lineages) the Kenyan woman receives rights of access to land and child labor, and she is almost exclusively responsible for the production of subsistence and the rearing of children. But she must defer to her husband while working on his land and raising his children. The main burden is hers, although she also gains old-age security from her children including the right of access to land after her husband has died. Thus, the costs of raising the children are balanced to some extent by the economic security which women derive from them in their old age. But the economic cost of raising children is almost invisible to the husband, the decision-maker, who receives the advantages of status and prestige from paternity. Through payment of the bridewealth, the husband has received control over the reproductive powers of his wife, and he has the power to oppose her use of contraception. Women, in this system, have a powerful stake in having large families, both as a way to attach their husbands and ensuring the existence of a support in their old age.

In many parts of Africa, the budgets of husband and wife are separate and "spouses do not necessarily follow joint household practices as postulated by the New Home Economics model" (Fapohunda and Todaro, 1988: 572). The husband may be able to leave the cost of children almost exclusively to his wife or sexual partner, and get a "free ride" on the benefits of paternity. Fertility decision-makers, so goes the argument, are not bearing the costs of fertility.

Despite the plausibility of this story, empirical evidence is only partly supportive. For example, while Fapohunda and Todaro (1988: 585-586) report that there are important differences in the ideal family sizes of husbands and wives in Lagos, Nigeria, it is the husbands who are more likely to want small families. Moreover, the model of the egalitarian family with joint budget and paternal responsibility should not be counted out. Fapohunda and Todaro find that in a highly educated neighborhood of Lagos where the majority of individuals can be classified as demographic innovators, there was no significant difference between the reported preferences of the two spouses (p. 584). Similarly, Oppong (1987) reports that among the elites of Ghana where family planning is making inroads, fathers express concern about bringing up their children and go well beyond the recognized obligation of
paying for their education. These concerns are particularly important in times of economic adversity, when young males may not have the resources to support their children and wives. In this circumstance, rather than abandoning paternal responsibility while retaining the power of decision making, these males may abdicate in favor of what Frank and McNicoll (1987: 234) call the "Caribbean style of family" and Wolf Bleek (1987a: 144) describes as a "matrifocal tendency". Women would increasingly take over the decision-making power and may eventually choose family limitation as a means of improving their status.

Frank and McNicoll see a deteriorating position of women in post-independence Kenya with the evolution of agrarian policy towards individual ownership on the European model and a tendency among policy makers to overlook traditional rights of access to land. They note that bridewealth has shown remarkable resilience so far, which indicates that paternal rights and power of control are still in force. And yet, they believe that the most probable outcome is an increase in autonomy for women, which could then lead to a decline in fertility as the balance of costs and advantages as they perceive them is altered.

In various parts of Africa, the deterioration of the traditional family has been noted, and the prevalence of female-headed families is increasing (Locoh, 1988: 54). Although the pattern of separate residence is not exclusive of marriage, the control of men on mother-centered units is looser. Where men are scarce as a result of labor migration, as in much of southern Africa, new family forms are appearing (Timaeus and Graham, 1989). And finally, the survival of the institution of the bridewealth is by no means universal; much more information on its evolution through time would be necessary before its persistence can be taken as evidence of continued marital control over the wife's reproductive powers.

Is supply of contraception creating its own demand?

In the previous section, we reviewed the specific arguments used to explain why fertility has not declined in Africa and why family planning programs have encountered few successes so far. Those who have argued the supply side of the argument have often maintained that, for whatever reason, the effort of governments in providing easy access to contraceptive supplies has lagged.

The argument takes two forms. In a first form, summarily known as "the KAP-Gap" argument, it is assumed that there is a significant proportion of women in any country who want no more children, and that better access to contraceptive methods could help them attain their fertility goals, and in the process reduce overall fertility. (For a statement of the argument in connection with sub-Saharan Africa, see for example Coeytaux, 1988a). Using
information from recent DHS surveys (including one African country, Liberia), Charles Westoff (1988) has shown that non-use of contraception by women who want to avoid childbearing is restricted to those who are not currently exposed to high risks of pregnancy. The KAP-Gap, argues Westoff, does not exist.

In economic terms the KAP-Gap may be described using Easterlin's economic framework for fertility analysis as a situation in which the (biologically determined) supply of children exceeds the demand for children but the (social, psychic and/or economic) costs of fertility control are prohibitive (Easterlin, 1975). Attempts to incorporate this perspective into analyses of contraceptive use in developing countries have yielded mixed results, possibly as a result of the difficulty associated with measuring costs of control. Nonetheless, there is some evidence that measures of contraceptive availability have some effect on contraceptive use (Easterlin and Crimmins, 1985). Since, to our knowledge, this approach has not been used to analyze data from sub-Saharan Africa, it is not known if regulation costs are a substantial barrier to contraceptive use in that region; however, the fact that reported demand for children remains quite high suggests that regulation costs, although high, are likely to be of limited importance in the aggregate.

A second form of the argument is that contraceptive supply will by itself generate demand; as long as controlling fertility is held to be impossible, women will accept their lot, but they will soon adopt innovative behavior when its rationale is demonstrated to them. This is a reversal of the old argument that where there is a will, there is a way, and that where motivation exist, people will use contraceptive methods such as coitus interruptus which are available in every society. The argument is used in a recent United Nations (1989b: 112-3) report:

It should be pointed out that the availability of family planning continues to be inadequate in Africa, even though the demand is still small. But experience has shown that the mere presence of [family planning] centres is a powerful stimulus to requests for services. In those localities that have centres, the use of contraception has grown rapidly, which proves that a latent demand does exist in Africa and would make itself felt if it had a chance.

Some insight into this argument can be gained from a study which has examined fertility change in the catchment area of a rural hospital that serves about 300,000 people in Chogoria, Kenya (Goldberg et al., 1989). In this study the authors interpret a marked fertility decline to be the result of family planning activities. They believe that improved availability of contraceptives cannot, in itself, account for the drop of fertility, but that the desired fertility has fallen, and hence that "demand for family planning services and smaller families can be stimulated
in rural Kenya (p. 23)." The increase in demand and the success of the program were due to its convenience and accessibility, to the confidentiality of the services and to the follow-up of discontinues. Although the argument on this point is not explicit, it would appear that the demand was created by supply; Goldberg et al. do not describe the particular features of the program, beyond its supply aspects, which were successful in changing demand. For example, they do not describe any special effort at indoctrination as part of the program, which might have convinced women that a smaller number of children would be preferable.

The Chogoria phenomenon has created a stir among demographers because it provides a documented example of fertility decline in a part of the world where family planning programs have had little success so far. Frank and McNicoll (1987: 221) explain the decline as a result of changing socioeconomic conditions in an exceptionally prosperous area. Even if the success of Chogoria were explained by especially intensive programmatic efforts, the cost and organizational demands of the project might severely limit its interest for other sites, and put it out of reach for entire countries. Frank and McNicoll (1987: 227) make 'Chogorias' synonymous with "small, often private-sector projects with impressive results that can be found in almost any country."

Whatever the merits of the claim that demand for contraception, be it for spacing or stopping, can be 'created' in the African context, it is widely recognized that small successes of the Chogoria type are needed, and that they can give many lessons that can then be extrapolated to larger programs. As Freedman (1987: 64) puts it,

...in places such as sub-Saharan Africa it may be desirable to: (1) Start with partial, experimental test programs at key selected focal points rather than with a fanfare-initiated, uniform, national program. (2) Pick places, target groups and situations where a "success" is most likely to occur...
VI. TWO AREAS OF CONTRACEPTIVE DEMAND

There are two areas where the existence of demand for contraception is proven, the spacing needs of the married population and the avoidance of extra-marital fertility. In neither case is the limitation of the women's family size the goal; but the skills acquired in avoiding conception in these context, may be carried over in the future.

Spacing needs

Frank (1987) has argued against the view that supply of contraception creates its own demand:

Non-practice of contraception is due less to lack of availability than to an apparent lack of motivation, since women who do not want additional children are outnumbered by the women who say they intend to continue childbearing, among all women who practice contraception (pp.187-8).

Indeed, a confounding factor in evaluating the effect of family programs on fertility is the very large number of women who report using contraception for spacing and not for family limitation. Even where moderately high levels of contraceptive prevalence have been reported, as in Botswana and Zimbabwe, the purpose is often not to regulate the size of the family. (See also Wray et al., 1987). According to the United Nations (1989a: 11) in Zimbabwe, for instance, nearly 90 per cent of new acceptors registered by the family planning programme stated that they wanted to have more children (Chombo and others, 1986). By contrast, the initial growth of contraceptive use in some other developing countries, especially in Asia, was due mainly to the adoption of contraception after couples had as many children as desired.

The reproductive regimes of sub-Saharan Africa have always been characterized by an adherence to the norm of long birth spacing. In surveys, women have often no clear idea of an ideal size of family, but they are very explicit about what constitutes an ideal interval between births. Lengthy periods of postpartum abstinence still characterize large parts of the continent, although the influence of Islam in the Sahel region and of education and modernization everywhere, have tended to whittle down the strength of the intercourse taboo, and account for rising fertility in some areas. In Kenya, for example, which now has one of the highest fertility and growth rates in the world, there is some evidence that postpartum abstinence used to be longer. (See Lesthaeghe, 1986 for a review of the evolution of fertility change in various parts of Africa.) Educated and urban couples are especially likely to curtail the period of abstinence and
breastfeeding (see Oni, 1985, for a recent example), and they are also most likely to turn to contraception as a substitute spacing mechanism (Caldwell and Caldwell, 1987).

The benefits of spacing are generally accepted by African political and medical authorities. Statements by heads of states, collected by the United Nations ahead of the 1984 World Population Conference in Mexico City (United Nations, 1985), were almost unanimous in recognizing the potential role of family planning programs for the health and welfare of women and children.

The finding of the WFS that there is a strong effect of the length of birth intervals on the survival prospects of children, has been widely advertised as an argument for birth control (Cornelius et al., 1989). That finding is now subjected to intense scrutiny, as is the concept of maternal depletion. One problem is that prematurity, a major contributor of perinatal mortality, shortens the birth interval without being amenable to benefit from the effects of family planning.

If contraception essentially substitutes for traditional forms of birth spacing, increasing contraceptive prevalence will have only a limited impact on overall fertility. There are indications from various parts of Africa that this substitution is indeed taking place (Bertrand et al., 1986 for Zaire). But the use of modern contraception in this way may keep fertility from rising (if, as is the case, in sub-Saharan Africa the intercourse taboo is being shortened or abandoned). Moreover, if the psychic, social and economic costs of using contraceptives lessen with increased use, we might expect individuals who have used contraception for spacing purposes to be more likely to consider family limitation at a later stage. They also may do so more successfully: women who have been accustomed to the various techniques of birth control with their advantages and drawbacks in the low-pressure circumstance of spacing will make a more informed choice when they have reached the number of children they want; they will not be easily discouraged by the real or assumed side effects of contraception.

Premarital demand for contraception

It has been recognized that teenage childbearing represents a special health hazard. The literature on the subject is, however, peculiarly ambiguous, because it often fails to distinguish the risk that is inherent to the age of the mother and that which pertains to social disapproval and a lack of paternal support for children born out of wedlock.

In sub-Saharan Africa, the definition of illegitimacy is especially difficult (Adegbola, 1987). Identifying marriage may be difficult, and moreover, the notion of legitimacy is not comparable to that in western law. Under certain conditions of
acknowledgement by the father, a child may be a legitimate offspring while its parents are not married; or it may have legitimate status in the lineage of its mother. It is often stated that "in sub-Saharan Africa, a child is always welcome." On the other hand, prenatal care may be delayed because of the shame which accompanies an extramarital birth and parental support may often be lacking when the father denies his responsibility. The question of the excess mortality of children born out of wedlock is an empirical issue that can only addressed with the appropriate data. Unfortunately, data from the WFS cannot answer the question, because of the large number of imputations of dates which render the identification of true pre-marital births almost impossible.\(^{19}\)

Cherlin and Riley (1986) have reviewed the growing literature on the consequences of adolescent fertility for the World Bank. The resort to abortion by what seems to be an increasing number of young women in urban areas of sub-Saharan Africa deserves special mention, because it suggests that there exist serious motivations to avoid extra-marital births and therefore, a potential market for contraception. These motivations had been described extensively for the Akan of Ghana by Wolf Bleek (1976) in what remains one of the best anthropological description of the context of birth control in an sub-Saharan African society.

It is repeatedly emphasized by informants that nothing like illegitimacy exists among the Akan. This may be true in the judicial sense of the word, and also in the sense that there is no stigma attached to the child itself, but it would be going too far to claim that an unmarried woman who is pregnant does not experience feelings of shame ... and disappointment. This shame exists particularly when there is no man to claim fatherhood of the child. In this case the shame even extends to the child when he grows up. To have no father is a pitiful state to be in... Other crucial factors are the economic problems which a girl expects to face when she brings forth a baby without a father or with a father who may abscond at any time, and the fact that she has to stop her schooling (Bleek, 1976: 244).

It is not surprising, then, that "a married man who will reject the use of any type of contraception in his marriage... eagerly practices birth control in his affair with a girl friend (id.: 243)." Young women commonly practiced contraception to avoid a birth, or resorted to abortion when they were pregnant.

There have been many other studies in urban areas that have confirmed that schoolgirls and teenagers in general run a high risk of getting pregnant before marriage, that they often do not

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\(^{19}\) For an attempt to study the excess mortality of pre-maritally born infants, see Gueye and van de Walle, 1988.
welcome their first child (although they intend to raise a family eventually) because it will diminish their academic and economic prospects, and that there is a great demand for contraception and abortion in this group. For example, surveys by Nichols and his colleagues in Ibadan and Monrovia (1986; 1987) confirmed the prevalence of premarital sexual relations, the large number of pregnancies incurred and the resort to abortion and contraception. Studies in other areas, including Kenya, Tanzania, the Gambia and Zimbabwe, reveal a high incidence of pre-marital sexual activity and a low prevalence of contraceptive use (Kulin, 1988: 730). Abortions remain generally illegal and dangerous in the region, and family planning could find a great deal of justification as a means of preventing unwanted teenage pregnancies. Unfortunately, the public’s attitude towards sexual education and unrestricted access to contraceptives remains hostile, because it is seen as further encouragement to sexual promiscuity. To avoid controversy, family planning services often refuse to serve minors without parental authorization. There is probably significant excess demand in this area. It seems reasonable to assume that increased access to contraceptives at younger ages would allow individuals to gain contraceptive knowledge and experience which might later translate into birth spacing and family limitation.

VII.  MARRIAGE

The study of nuptiality changes and their impact on fertility has been relatively neglected for sub-Saharan Africa. This neglect is in part the result of the inadequate information provided by surveys such as the WFS and the DHS which have concentrated on the "married population" at risk of conception. But in Asia, a considerable part of the fertility decline of the last decades was attributable to nuptiality effects. In analyzing changes in fertility, it is important to distinguish the role of nuptiality from that of family limitation. The existence of various forms of unions complicates the measure of trends in age at marriage, and the prevalence of teenage fertility, in and out of unions, raises questions about the link between trends in nuptiality and fertility. If age at marriage goes up in a population but age at first regular intercourse remains the same or goes down, the effect on overall fertility could be negligible.

The most thorough recent analysis of African nuptiality was made by Lesthaeghe et al. (1989) The authors used not only the WFS and other survey data, but also the various censuses which have been taken in Africa since the 1950s. In the process, they established nuptiality maps of Africa, indicating the distribution of age at marriage and the prevalence of polygyny. The exercise confirms that age at marriage is uncommonly low for females compared to other world regions and that the age difference between spouses is uncommonly large, a feature that accompanies the survival of polygyny in most of the region. (On these points, see
also United Nations, 1988).

The more contentious point concerns time trends in nuptiality. Retrospective data from the WFS on the age at which women got married do not provide reliable information on trends because of the uncertainty that pertains to the dating of events and the assessment of ages. The best evidence comes from the comparison of the proportions single by age in several censuses or surveys over time, provided definitions and the quality of reporting (of ages for example) have not changed. Such a comparison suggests that before 1975 the age of marriage was increasing slowly (perhaps by half a year per decade) in all countries where the comparison could be made (Lesthaeghe et al., 1989: 325). It is not clear whether the trend has continued in the last decade, nor to what extent its effect on fertility is compensated by an increase in the number of pre-marital births.

The major increase of education, particularly female education, appears to be related to a decrease of the proportions married at young ages in Africa; at the individual level, the length of schooling is strongly related to age at marriage. But schoolgirls are also at greater risk of pre-marital relations. Later marriage is correlated with higher premarital fertility (Lesthaeghe et al., 1989, p. 330).

In any case, the onset of the childbearing ages is a particularly important topic in Africa today. The potential effect of changes in age at marriage offers a prospect for fertility decline in Africa today, not least because it creates a demand for contraceptive methods to avoid births outside of wedlock. This, as discussed in the previous section, is a possible route for the introduction of birth control. The recent halt in the expansion of education may portend an interruption of the trend towards later marriage; "the current economic crisis is not propitious for the enhancement of female education and a continuation of the female nuptiality transition" (Lesthaeghe et al., 1989: 329), although it also increases the time needed by young males to obtain an adequate economic foundation for marriage and childbearing. The progress of AIDS will probably have important social consequences in the area of nuptiality and extra-marital relations. Also, the trend towards female-headed families and the decline of traditional kinship solidarities may accelerate the control of women over their sexuality.

For all these reasons, the study of nuptiality must be closely integrated with that of fertility, and controlling for the effect of the former on the latter must should be an important task during any analysis.
VIII. CONCLUSION

Summary

In the course of an analysis of the above discussion it has become clear that a great deal remains to be learned about the determinants of fertility in Africa. Nonetheless, a consideration of the literature has illuminated a number of important issues which are summarized below.

First, fertility levels in Africa remain high, although there is some recent evidence of a decline in Kenya, Botswana and Zimbabwe. There remains considerable uncertainty about the extent to which these declines represent changes in the timing or spacing of births and about the extent to which declines are limited to certain ethnic groups.

Second, high fertility is evident in virtually all subgroups of the population in Africa with the exception of urban elites who form a small proportion of the total population. Although there are some differentials in fertility by education and residence these differences are moderate and the relationship is not always in the expected direction. Moreover, even those in low-fertility categories in Africa tend to have higher fertility than their counterparts in Latin America and Asia.

Third, the most important factor that distinguishes African fertility from the point of view of the proximate determinants is low contraceptive use. The notion that the breakdown in traditional spacing behavior explains the sustained high fertility levels is of limited value. Even though post-partum abstinence seems to have declined, such a decline accounts for only a small portion of current fertility and breastfeeding remains an important barrier to shortened birth intervals.

Fourth, there is little evidence that shortfalls in contraceptive supply are primarily responsible for the low level of usage. Reported ideal family sizes remain quite high, suggesting that demand for contraception is low. Moreover, contraception outside of marriage and for spacing purposes seems to be understood and accepted. Significant unmet demand may be found among young unmarried women, but there is little evidence of a desire for increased fertility control among older married women. This is not to say that family planning programs might not have a payoff in terms of increased use-effectiveness among women who have present spacing needs and in the future may choose to limit their fertility. But there is not likely to be a large immediate impact on total fertility from such expanded efforts.

Fifth, a number of different hypotheses regarding the underlying causes of high desired family sizes have been proposed
but remain unresolved. It has been argued, on the one hand, that high levels of fertility in Africa are primarily a result of low levels of development in that region and, on the other, that they result from cultural factors specific to Africa. Aggregate data provide some support for both hypotheses: African women are on average less schooled than their Asian or Latin American counterparts, but in contrast with the experience of Latin Asian and Asian countries, even those African countries with moderate levels of schooling have not experienced substantial declines in fertility.

Micro-level data also show clear differences in the relationship between education and fertility in different regions of the world but there remains some question as to how these differences should be interpreted. While this pattern may result from specific aspects of African culture, a number of alternative explanations involving such factors such as an interaction between the level of urbanization and family planning expenditures, the confounding effects of income and urbanization and the interaction of individual and aggregate level effects of education have been advanced. Existing studies of African fertility have not been able to distinguish these explanations because of an absence of detailed economic data.

Sixth, a detailed analysis of the determinants of fertility in Africa using existing data is likely to provide new insight into the prospects for fertility decline in that region as well as to prove useful in the design of policy. Three factors combine to make an evaluation at this point in time of particular interest: the presence, for the first time, of substantial declines in fertility in a number of African countries; the fact that many African economies have faced real declines in per capita income in recent years; the availability of new methodologies; and the availability of new data sets.

As indicated above, data on contraceptive use and fertility indicate that fertility decline has begun in Botswana, Kenya and Zimbabwe. There have also been claims that data from Senegal suggest the start of a decline among young women. Since previous surveys have indicated that fertility decline in sub-Saharan Africa has been limited to a small and select sample of women (i.e. the urban educated elite), little insight has been gained into the conditions and characteristics that are likely to lead to a more general decline in fertility. By examining the determinants of fertility in those African countries which have experienced declines in fertility we will be able to examine possible roles for government policy in inducing and shaping fertility decline in those countries where fertility remains high.

The severe economic problems in many African countries have raised the possibility that fertility declines (temporary or permanent) might result from economic pressures on families;
alternatively, economic pressures may prove to be a barrier to sustained fertility decline. These possibilities increase the need for evaluation of the micro-economic determinants of fertility and for a careful examination of social class differences in fertility, attitudes towards contraception and desire for future births. Since fertility declines in Asia generally took place during periods of rapid economic growth, lessons drawn from the Asian experience may not be applicable in the African context.

Finally, a number of new data sets with the requisite information to study some of the most critical issues have become available. Of particular importance are data sets that allow one to examine the role of community characteristics, income levels and prices on fertility. While no single data set contains all of the information that might be desired, it seems likely that substantial insight can be gained by analyzing a variety of different data sets.

Central questions

An analysis of the existing literature on the determinants of fertility in Africa has indicated that very little is known with certainty about the determinants of fertility in sub-Saharan Africa. Even in those cases where consistent patterns emerge, the interpretation of these patterns is difficult. Unfortunately, much of the uncertainty cannot easily be resolved using existing data and a number of questions which are potentially answerable have little direct bearing on policy issues. As a result we believe that future analysis should focus on the following four questions which are potentially answerable using existing data and may prove useful in the evaluation of policy.

First, to what extent do the observed declines in fertility represent the initial stages of a widespread and permanent decline in completed family size as opposed to changes in the timing or spacing of births among particular ethnic or socio-economic groups? A deterioration in economic conditions can lead, for example, to delayed marriage and thus to a temporary decline in period total fertility, without any change in completed family size. In the absence of a sustained decline in desired family sizes, increases in spacing behavior will only have a moderate effect on completed family size. By identifying the sources of observed fertility decline in Africa we will be in a better position to interpret these declines as well as to effectively target resources.

Second, what are the effects of education on fertility, desired family sizes, contraceptive use and what are the channels through which these effects operate? Economic and demographic theories of fertility decline have suggested a number of mechanisms through which education might affect fertility including the cost of maternal time, aspirations for children's education, the costs
of contraception, the costs of increased child quality, the costs of childcare, the timing of marriage, autonomy in decision making and the diffusion of ideas about family size limitation. The relative importance of these different mechanisms needs to be examined in the African context. This can perhaps best done through micro-based studies incorporating detailed economic and demographic data.

Third, what are the likely effects of increases in the availability and costs of schooling, health care and family planning services on contraceptive usage and fertility? Although these effects are critical from an operational perspective, little is known with certainty about their relative importance. It can be argued, for example, that increases in school fees will lead to lower fertility by increasing the costs of educating one's children; however, if school fees were to lead to substantial declines in the proportion educated (particularly of females) fertility might actually increase.

Fourth, what are the likely effects of increases in the availability of schooling, health care and family planning services on measures of child quality including educational attainment, anthropometric status and child survival? For example, even if increases in school fees are effective from the perspective of lowering fertility, these increases may frustrate government attempts to raise levels of education. From an operational perspective it is essential to determine how different policies which affect fertility will contribute to or interact with other objectives.

Methodological issues

From a methodological perspective, the most important issue to consider is the possibility that heterogeneity in unobserved characteristics contributes in important ways to observed fertility patterns. In many cases, unless appropriate techniques are adopted, unjustified inferences may be drawn as a result of these characteristics. Examples include maternal ability, motivations and habits (Behrman and Sussangkarn, 1989; Wolfe and Behrman, 1986; Behrman and Wolfe, 1987); women's fecundity which, if not controlled for, may bias estimates of contraceptive effectiveness (e.g., Rosenzweig and Schultz, 1987); differences in child and early environmental endowments which may bias estimates of the impact of breastfeeding and early health interventions (e.g., Rosenzweig and Wolpin, 1988); and community characteristics which may bias the estimated impact of government programs (e.g., Rosenzweig and Wolpin, 1986).

A key aspect of this literature is the need to properly specify the context in which individual choices are made. It is unclear that existing models from Asia can be applied directly to the analysis of African data. For example, traditional spacing
behavior may have an effect on contraceptive choice and therefore on the relation between contraceptive use and fertility. In order to ensure that accurate estimates of the effects of education, contraceptive use and nuptiality on fertility are obtained, it is therefore necessary to undertake such an analysis subsequent to a detailed demographic characterization of available data.

New data

Information on promising data sets and the type of variables available in each data set is presented in Table 13. The DHS data contain information on fertility levels, differentials and intentions along with information on current and first contraceptive use, health, anthropometry, family planning service availability (in some cases), and a number of socio-economic indicators. These data will provide an important opportunity to evaluate recent changes in fertility trends and determinants in Africa; it will also provide an opportunity to expand comparative studies within Africa. Given the variability in economic and social conditions that is found in contemporary Africa, this type of comparative analysis is likely to prove quite fruitful.

The LSMS surveys conducted under World Bank's auspices,20 will allow more detailed consideration of a number of issues because of the richness of the data. In particular, the availability of information on wages and income will allow a more careful examination of the relation between labor force participation (of parents and the children) and fertility behavior. Also more instruments will be available for identification of structural models which attempt to control for simultaneity and unobservables. Recently collected information on family planning service availability, contraceptive use, and cognitive and innate ability should be particularly useful in this regard.

Third, data from WFS, IRS and CPS can provide useful background for the analysis of fertility trends in recent years. These data sets all provide information on fertility levels, differentials and trends and socio-economic indicators; in some cases information on contraceptive use, anthropometry and/or income is also available.

20 For an example of analysis based on such a survey, see Ainsworth, 1989.
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Survey types considered are the Demographic and Health Surveys (DHS), Living Standard Measurement Surveys (LSMS), Contraceptive Prevalence Surveys (CPS), World Fertility Surveys (WFS), and finally the Integrated Rural Survey (IRS) from Kenya. Surveys from the 1970s are included in this table only when more recent data are also available. WFS are also available for Benin, Cameroon, Lesotho, Sudan and Nigeria.
Conclusion

In conclusion, we would like to emphasize the point that an analysis of African fertility at this time is likely to provide substantial insight into the design of effective policy in that region. Moreover, given the severe economic constraints facing many sub-Saharan nations today it is imperative that such an analysis take place: as a result of possible lags between increased knowledge of contraception and its use, between increases in education and decreases in desired family sizes and between declining fertility and slowed population growth, inappropriate policy choices based on untested assumptions about the determinants of African fertility could well have an adverse effect on economic growth well into the next century.
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