The fertility transition in sub-Saharan Africa: Early transition rise and (slow) decline

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ABSTRACT

Fertility in most of Sub-Saharan Africa has remained very high since fertility estimation started in the 1960s. This article documents the current stage in the fertility transition at the country level for all Sub-Saharan countries making use of all the available National data on children ever born and total fertility. It is possible to document for almost every country that fertility increased in the early stages of the transition to reach a maximum level, and that fertility has started to decline from that maximum level. These qualitative features hide large quantitative differences both in the maximum level reached and in the present stage of the transition. There are many countries were fertility is still high and the pace of decline is slow. In some countries where fertility had started to decline there might be stalls in the transition although the available data is often contradictory regarding recent trends.

I. INTRODUCTION

Sub-Saharan Africa is the region of the world with the highest fertility. The United Nations estimated in the 2006 revision of *World Population Prospects* (henceforth *WPP2006*), an average total fertility of 5.48 for the region in 2000-2005 (United Nations, 2007). This is an extremely high level of fertility. According to the same estimates, only four countries or areas from outside the region had a total fertility in 2000-2005 in excess of 5: Afghanistan, Occupied Palestinian Territory, Timor Leste and Yemen.

While the present level of fertility is very high, fertility in sub-Saharan Africa has started to decline. According to *WPP2006* a maximum level of 6.8 was reached in 1960-1965. Fertility is, therefore, at present 81 percent of the maximum level. Table 1 shows the corresponding statistics for the all the world's regions that include developing countries based on *WPP2006*. The global picture is that all the regions except Sub-Saharan Africa and Melanesia are already at an advanced stage of the fertility transition from high to low levels defined as fertility below 60 percent of the maximum level. Only in these two regions total fertility is still above 4. Within sub-Saharan Africa, large contrasts emerge between Southern Africa, already at an advanced stage of the transition, and the rest. In Middle Africa and Western Africa the transition has barely started, with levels above 80 percent of the maximum[1].

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[1] Some words of caution are necessary on this exercise. First, looking at the maximum of regional aggregates is different from looking at maximum fertility in each of the countries. Second, *WPP* estimates correspond to periods of five-years, therefore smoothing peak fertility estimates. Third, for many

Since the original formulation of demographic transition theory in the first half of the twentieth century, based on the experience in Europe and North America, there has been the hypothesis that fertility would start to decline in every region of the world following declines in infant and child mortality and improvements in education, female empowerment and standard of living (Jones et al., 1997; Bulatao and Casterline, 2001; Caldwell, 2006). The evidence in table 1 shows that indeed fertility has declined by a very large margin all around the world with the exception of parts of Sub-Saharan Africa. The more developed countries are not shown in the table because they experienced the transition generally before 1950, the initial period of the *WPP2006* estimates. The natural question emerging from table 1 is whether sub-Saharan Africa is a region just like the rest where the transition is happening late, or if the transition of fertility in sub-Saharan Africa is inherently different from the rest. The answer to this question is not still clear given that we are still in the middle of the process. The purpose of this work is to characterize the current stage in the transition at the country level in Sub-Saharan Africa by making use of all the National data available on both cohort and period fertility. The analysis shows that it is possible to document an almost universal process by which fertility increased in the early stage of the transition to reach a maximum level, and that in all countries (with the possible exception of Guinea Bissau) a process of decline has started. The decline of fertility from the maximum is not a uniform process, and plateaus and reversals are observed for some countries. While some of these fertility stalls seem to be real since they correlate with reversals in other proximate determinants of fertility, in other cases they can be an artifact of the data given the existence of important measurement problems. We approach this issue by providing alternative measures of fertility change, including measures based on the F/P ratio from one survey or census (United Nations, 1983; Tabutin and Schoemaker, 2001) and the comparison of total fertility estimated from different surveys or censuses.

The estimation of fertility for sub-Saharan Africa has never been easy. Early studies attempted to obtain at least one estimate for each country or National sub-division (Brass et al., 1968; Clairin, 1971; Adegbola, 1977; United Nations, 1977). The picture obtained was of large heterogeneity in fertility levels. By the 1980s, data on trends was becoming increasingly available and, again, the impression was of heterogeneous trends (Page, 1988; Lesthaeghe, 1989; Van de Walle and Foster, 1990; Foote et al., 1993; Locoh and Hertrich, 1994; Cleland et al., 1994; Lesthaeghe and Jolly, 1995). While some countries like Zimbabwe first, and then Botswana, Côte d'Ivoire, Ghana, Kenya or Senegal showed fertility declines, others had increasing fertility like Cameroon or the Central African Republic, first, and then Benin, Kenya or Mauritania. It is only in the late 1990s, and in the context of an acceleration of fertility decline throughout the developing world, that an image of generalized decline within sub-Saharan Africa started to spread (Bulatao and Casterline, 2001; Tabutin, 1997; Cohen 1998; Shapiro and Tambashe, 2002; Garenne and Joseph, 2002; Tabutin and Schoemaker, 2004; Makinwa-Adebusoye, 2007). Within the context of the demographic transition, the question is whether fertility will continue to decline until reaching levels close to replacement, like in South Africa, Mauritius or the Seychelles, or if the transition will stop at higher levels like 3 or 4 children per woman due to stable high demand for children (Caldwell et al., 1992; United Nations, 2007a). There are differing views on this respect. On one hand, we observe an increasing prevalence of modern contraception in most of sub-Saharan Africa together with the existence of high levels of unmet need for contraception in sub-Saharan Africa (United Nations, 2004, 2008; Sedgh et al., 2007). On the other, work focusing on the specificities of the sub-Saharan African fertility transition emphasizes that, contrary to the case in most of the world, fertility decline is not always based on stopping behaviour but rather on lengthening birth intervals for the purpose of maintaining reproductive health (Caldwell et al., 1992; Bledsoe, 2002; Johnson-Hanks, 2007). At this moment in the debate, recent work has focused on emergence of stalls in the fertility transition in a number of countries

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countries the evidence is very scanty or/and contradictory, and the quinquennial *WPP* estimates provide smoothed estimates that have not been devised for the precise timing of maxima.

both in Africa and elsewhere (Bongaarts, 2006; Bongaarts, 2008; Garenne, 2007; Shapiro and Gebreselassie, 2007). If confirmed, stalls could be confirmation of the African specificity, or, alternatively, if connected with similar plateaus in contraceptive prevalence they could be associated with a decline in funding for family planning activities (Ross et al., 2004). However, there are still methodological questions on the identification of stalls. The process of identification based on a very slow decline or an increase in total fertility in successive *Demographic and Health Surveys* (DHS) can lead to spurious findings. It is, therefore, important to confirm fertility stalls based on alternative methodologies.

II. DATA AND METHODS

Information on sub-Saharan African fertility has traditionally been scarce. Evidence started to accumulate only in the 1960s thanks to the inclusion of questions on fertility in most of the censuses and a number of Demographic sample surveys in the 1950s and 1960s. Questions on births in the last 12 months before the census were used to estimate period total fertility, while questions on children ever born by age of the women, provided estimates of cohort total fertility (Tabutin, 1984). One of the early findings in the literature was that very often the observed period fertility was implausibly low due to the misreporting of births. The use of indirect estimation techniques and, especially, the P/F Brass method, allowed for the adjustment of period fertility estimates (Brass, 1968; United Nations, 1983). In the 1970s and 1980s the *World Fertility Survey* (WFS) provided information on fertility trends for 13 sub-Saharan African countries (United Nations, 1987; Cochrane and Farid, 1989). From the perspective of measuring fertility, the important new element in the *WFS* was the inclusion of retrospective birth histories allowing for the estimation of fertility trends from one survey. The *WFS* opened the ground for other international survey programs of which the most notable have been the *Demographic and Health Surveys* (DHS) and UNICEF *Multiple Indicator Cluster Surveys* (MICS). Many countries also developed their own National survey programs that are generally of a similar format to *DHS* or *MICS*. In addition, some countries in the region, particularly island countries or areas like Mauritius, Réunion or Seychelles have good vital statistics based on a birth registration system (United Nations, 1977).

As a result of these developments there is a wealth of sources of National information of fertility trends in the sub-Saharan region:

a. Observed and adjusted age-specific fertility rates and total fertility from questions on births in the last 12 months in censuses and surveys.
b. Age-specific fertility rates and total fertility calculated from maternity histories for a period of years before the survey (generally 3 or 5) for *WFS*, *DHS*, some *MICS* and other National surveys.
c. Retrospective, generally incomplete, age-specific fertility rates up to 20 years before the survey derived from surveys with birth histories.
d. Information of children ever born by age of mother from censuses or surveys providing estimates of cohort fertility trends. While *WFS* and *DHS* only interview women up to age 50, many censuses and some surveys have information on children ever born for women beyond the age of 50. This is very useful since it is possible to infer fertility trends in the past.
e. Additional indirect estimates based on information on the age-structure of the population. These were often the only sources for censuses that did not include questions on fertility. Matching population figures by age and sex with fertility estimates also provides a check for adjustment of observed total fertility.

The fertility database used for the present analysis includes information on all the direct sources (a) to (e) for all the 51 countries or areas in sub-Saharan Africa[2]. In this respect, the present work is an exception. Most evaluations of fertility trends use information only from sources (a), (b) and (e) (Brass et al., 1968;

[2] This information is a subset of the Fertility and Family Planning database of the United Nations Population Division.

Foote et al., 1993; Tabutin, 1997; Cohen, 1998; Adebusoye, 2007). The most complete studies look at (b), (c) and (d) but only for *WFS* and *DHS* surveys (Kirk and Pillet, 1998). Most of the recent work, and in particular the discussion on fertility stalling, is limited to the use of (b) (Bongaarts, 2005, 2008; Shapiro and Gebreselassie, 2007) or at most (b) and (c) (Garenne, 2007) for *DHS* surveys only. This limits the analysis to at most 32 countries. Garenne (2008) focuses on (d) for the analysis of rising cohort fertility, but does not provide information at the country level. On the other hand, the present analysis is based solely on information at the country level. For analysis at the subnational level see Tabutin and Schoumaker (2001), and for analysis of rural/urban differentials see Garenne and Joseph (2002) and Garenne (2007). The analysis of urban/rural differentials is particularly helpful because generally the urban fertility transition started earlier and progressed farther (Garenne and Joseph, 2002; Shapiro and Tambeshe, 2002). We are also not using, except for the introduction, the *World Population Prospects* estimates produced by the United Nations Population Division every two years for every country in the world since one of our purposes is precisely to confirm using National sources two of the qualitative features of the estimates: the presence of a period of increasing fertility in the initial stages of the transition and the generalization of fertility decline to almost every country in the sub-Saharan region.

Each of the sources of information has their limitations, and their combination provides an opportunity to evaluate the coherence of the data and the degree of uncertainty. Data from censuses and surveys based on births in the last 12 months generally suffers from an underestimation of the number of births. The typical solution is the application of indirect methods of estimation. By far, the most widely used method is the Brass P/F adjustment method or some of its variants. The method is based in the comparison for women who are currently of childbearing age of the reported children ever born, P, and the observed total fertility, F. Under the assumption of constant fertility, births are adjusted so that the adjusted period fertility rates produce the same reported parity as observed for the age-group of women taken as a reference (United Nations, 1983). While, in principle, the method is expected to work fine only under the assumption of constant fertility in previous years, Moultrie and Dorrington (2008) show that the method works relatively fine under conditions of changing fertility. Under a typical transition with an early increase in fertility followed by a decline, a sequence of P/F adjusted fertility estimates would match the evolution of total fertility only with a small time lag. Changes in the timing of births might also affect the estimates leading to biases in the level. The P/F ratio is also useful for the estimation of fertility trends from one data source that includes information on period fertility and on children ever born. This applies to most of the sources in our database. The idea is to use the ratio for the women 45-49 who have basically completed their childbearing. If P is bigger than F it is an indication of declining fertility in the, approximately, previous 17-19 years (United Nations, 1983; Cleland et al., 1994; Cohen, 1998). A measure of the proportion by which fertility has fallen is given by $A = 1-(F/P)$ (Tabutin and Schoemaker, 2001). We will use this indicator as a tool to measure the extent of fertility increase before reaching the maximum and as an alternative indicator of current fertility trends. This indicator has an important property when computed from maternity histories: it is relatively little affected by incorrect birth timing. This can be an important property since errors in the reporting of birth dates can lead to substantial biases in fertility trends that are typical of many sub-Saharan countries (Arnold, 1990; United Nations, 1987b; Pullum 2006). In particular, *DHS* surveys have typically a built-in rationale for birth displacement: births in the previous five years (until 1993) or three years (from 1993 onwards) require answering long sets of children-specific questions. The use of three year estimates (before 1993) or five-year estimates can partly attenuate the effects (Kirk and Pillet, 1998), but birth underreporting remains an issue.

In figure 1 all the sources of information for one country, Ethiopia, are displayed. We can see the typical effects of birth displacement by looking at the DHS estimates: Both the 2000 and 2005 surveys have maternity histories implying fast fertility decline. However, the levels implied by births in the previous three years (around 5) are completely off from those indicated by births 10-14 years before the survey (above 7). The differences are not so important when looking at trends in children ever born, particularly if we consider that women of 40-44 years have not yet completed childbearing. Garenne

(2008) proposes the use of a standardized adjustment to make the comparison easier between the two age-groups. In this case, the adjusted estimate for women 40-44 in the DHS 2000 of 6.3 will not be far from the adjusted estimate of 6.6 based on CEB to women 45-49 in the DHS 2005. We can see how the combination of data on children ever born from different sources can help in reconciling differences between them (Feeney, 1988, 1995). The figure also shows the extent by which adjusted period total fertility can differ from observed total fertility. For instance, the P/F adjusted estimates from the 1994 Census and the 1998 MGHS survey are very much in agreement with the retrospective estimates from the DHS 2005, whereas the official adjusted estimate from the 1994 survey is closer to the DHS 2000. The unadjusted figure is out of the plausible range at 4.3 indicating important birth omissions. These omissions are probably not only limited to the births in the last 12 months. They also affect the children ever born. This can be seen by comparing the CEB data from the 1994 Census with the total fertility estimate from the 1981 Demographic Survey and the CEB from the NFFS 1990, the MGHS 1998 and the DHS 2000. The graph is good at illustrating the potentials and deficiencies of the data: while accurate estimation of fertility trends remains difficult, it can be said with a reasonable degree of certainty that fertility increased in the early stages of the fertility transition, reached a maximum sometime between 1980 and 1995 with levels between 7.5 and 8, and started to decline in the late 1990s. It is difficult to say with confidence the present level. It probably lies between 6 and 7, being likely that the DHS 2005 estimate of 5.7 provides an underestimate of present fertility.

Since our purpose is the identification of a maximum fertility level and the measurement of the present stage in the transition, a number of rules are followed to identify the fertility maximum: First, the maximum is determined from cohort fertility or period fertility estimates for a reference period 5 years or less before the source date without making use of more distant retrospective information[3]. The reason is the existence of spurious maxima in fertility from retrospective histories given the prevalence of birth displacement. While this argument also holds for the estimates in the five years preceding the survey, we have seen that in general that will lead to a downward bias so that any maxima found will provide a conservative level. Second, for each available source of information on total fertility, only the most plausible level from the set of available adjusted and observed levels will be used for the identification. Third, the maximum should be compatible with the rest of available sources, in particular, any maxima based on children ever born is only considered when it is compatible with the estimates of total fertility after allowance for uncertainty (both internal, from the difference between observed and adjusted total fertility, and external, from the discrepancy between sources). At this stage all the retrospective information from surveys was taken into consideration for the confirmation of maxima.

A word of caution must be said about both the level of the maximum and the timing. In some cases the maximum can be an overestimate of maximum levels. The reason is straightforward: any census or survey overestimating fertility is more likely to give a maximum. The second limitation is about timing. In countries were data is scarce, sources dates can be relatively far apart, and the maximum could well have been reached in a period between data points. This problem can be particularly relevant for countries where the transition started earlier. In addition, when the timing of the maximum is based on data on children ever born, there is imprecision about the precise maximum of period fertility. For this exercise, the maximum has been dated as the midyear when women in the age-group were 30 years old, a figure close to the mean age at childbearing in the region (United Nations, 2000b). Differences of five or even ten years should not be interpreted as meaningful.

[3] The exception is Somalia, where the only two recent sources are the MICS 2006, providing retrospective information but no information on children ever born, and the Reproductive Health Survey 2002-2003 that seems unreliable. Use has been done of the MICS 2006 retrospective information to identify the maximum, at the cost of possibly overestimating the level of maximum fertility.

III. THE PRESENT SITUATION

The latest estimates of total fertility are displayed in map 1[4]. The map shows, first of all, large contrasts between most of Southern Africa and some of the island countries, where total fertility is below 4, and the rest. There are three other clusters with intermediate fertility, between 4 and 5: some coastal countries in Western Africa, some coastal countries in Middle Africa, and some countries in Eastern Africa (Djibouti, Kenya and Sudan). There are two stripes of high fertility levels, the first one West to East from Guinea Bissau to Somalia, the second one going North to South from Chad to Zambia. Fertility also tends to be higher in the interior than in the coast. Fertility is estimated above 7 only for two countries: Guinea Bissau, 7.4, and Niger, 7.1. Between 6.5 and 7 lie Chad, Mali and Uganda.

While the analysis of fertility determinants is beyond the scope of this paper, map 2 displays the latest estimate of contraceptive prevalence. The map shows a similar pattern to that of total fertility: Again contraceptive prevalence is highest in Southern Africa and in some island countries, there are intermediate levels in some coastal countries in Western and Middle Africa, and the lowest values are found on the West-East stripe close to the tropic of Cancer. There are also some differences: the North to South line is absent, and some countries with intermediate levels of fertility have very low contraceptive prevalence, like Angola, Sierra Leone or Sudan. Figure 2 shows the scatter plot of total fertility and contraceptive prevalence. While there is an expected negative association, the relation is far from perfect with outliers in every direction. Botswana, Namibia and South Africa are countries where fertility is lower than expected given the level of contraceptive prevalence. Zimbabwe and Malawi show the reverse for moderately high contraceptive prevalence.

For countries with low contraceptive prevalence there are important differences among countries with relatively similar levels of prevalence. These findings are in line with those of Jolly and Gribble (1993) that found that other proximate determinants like the postpartum nonsusceptible period and marriage patterns were very important in accounting for fertility differentials in sub-Saharan Africa. Changes in some of these factors can indeed be responsible for the early transition rises in fertility. It is also possible that some of the outliers are due to errors in measurement, particularly of total fertility. In this sense, fertility might be underestimated in some countries like Djibouti, Sierra Leone or Sudan.

IV. MAXIMUM FERTILITY

While simple formulations of the demographic transition depict the fertility transition as a simple path towards lower fertility, there is enough evidence to show that many countries, both developed and developing, have experienced an increase in fertility in the early stages of the process (Dyson and Murphy, 1985; Saito, 2006). These increases were rather anticipated “owing to a breakdown of traditional factors that once served to regulate fertility, including polygamy and breast-feeding, and to improvements in health and related conditions” (United Nations, 1977, p. 60). Further observation of sub-Saharan African trends has shown that these early-transition increases were present in many countries (Lesthaeghe and Jolly, 1995; Garenne, 2008). In the case of sub-Saharan Africa, one factor has been found to be particularly relevant: the reduction of infecundity connected to the prevalence of gonorrhea and other diseases (Larsen, 2000; Garenne, 2008).

While this phenomenon has been identified before, previous studies did not cover every country in sub-Saharan Africa. This is therefore the first study to analyze whether the early transition rises were

[4] Note that the date of the estimate is not the same for every country, ranging between a mid-year of 1995 for Togo and 2006 for the Seychelles. Gabon, Sudan and Togo are the only countries with a reference year earlier than 2000.

present in every country of sub-Saharan Africa. The results seem to confirm that this is the case. For every country in sub-Saharan Africa it is possible to find increasing levels of fertility before reaching the maximum. There are three exceptions to the pattern that correspond to countries where the available data does not go back in time enough to document the increase: Djibouti and Eritrea, where there is no data available before 1990 and the maximum corresponds to the CEB for women 45-49 in the earliest survey, and Mayotte, where the maximum observed fertility is the earliest value of 8.1 observed in 1978. In the case of Djibouti and Eritrea, the relatively low levels of observed maximum fertility (6.2 and 6.4) indicate that the earliest data available might be already below an earlier maximum. In the case of Mayotte, 8.1 is one of the highest levels of fertility ever observed and it is extremely likely that lower levels were prevalent before. For the rest of countries and areas it is possible to document a period of increasing fertility before the maximum level. For countries with richer data, increasing fertility is supported by many alternative estimates of period and cohort fertility.

The maximum fertility level is displayed in map 3. The first characteristic is that maximum levels were very high. Besides the exceptional case of St. Helena (4.7), only two countries had a maximum below 6: Gabon and Lesotho with 5.9. These two cases provide the core of two regions where maximum fertility was lower, Southern Africa, and the Gulf of Guinea area that also includes Cameroon, Central African Republic, Congo and Equatorial Guinea. The second region is precisely the place where the prevalence of permanent sterility was highest. On the opposite end, maximum fertility was highest in two other regions that still have the highest fertility levels: Mali, Niger and Senegal in Western Africa, with levels between 7.5 and 8, and Kenya, Rwanda and Somalia with levels above 8 (followed closely by some neighbours like Ethiopia and Uganda, between 7.5 and 8). Overall there is an association between maps 1 and 3, with the countries that had higher maximum fertility still having higher fertility. Part of the reason is that in many of the countries where fertility reached highest maxima, the maxima were reached later. Map 4 displays the year when maximum fertility was reached. We see that the countries where the maximum was reached later belong generally to the two stripes of current high fertility in Africa. At the other end, South Africa and the island countries or areas were the places where the maximum was reached at an earlier date, followed by other countries in Southern and Eastern Africa, and then by Ghana and Togo.

Providing a simple estimate of fertility increase before reaching the maximum is not an easy task, since countries reached the maximum at different moments in time and data availability tends to diminish the farther back in time. One simple solution is to provide an estimate as close as possible to a F/P ratio by comparing the maximum to an estimate of fertility 10 to 20 years before the maximum. The exceptions are the countries where the maximum corresponds to the earliest data (Djibouti, Eritrea and Mayotte). No attempt has been done to reduce all of the estimates to a common length because the estimates refer precisely to a period when maximum fertility was reached, and therefore, there were no monotonic changes in fertility by definition. That limits the comparability of the estimates but still gives an indication of the local magnitude of the increase. The results are displayed on map 5. The countries with the highest increases include Mali and Zimbabwe. The infertility areas centered on Gabon also experienced relatively high increases. The same applies to Eastern Africa. In contrast, early transition increases were modest in the countries in the South coast of Western Africa, Central African Republic, Madagascar and South Africa.

V. Present Stage in the transition and recent trends

The estimation of maximum fertility allows a measurement of the present stage in the transition based on the comparison of the latest fertility estimate and the maximum fertility level. Map 6 displays this simple indicator. Again, it is Southern Africa and some of the island countries that are most advanced in their fertility transition, with seven countries having reduced their fertility by more than half. In contrast, Chad and Guinea Bissau are still very close to their maximum levels and these are the countries where we might suspect that the fertility decline has not started or has barely started. There are many more countries were the fertility decline is still at an early stage, with current levels above 80 percent of the maximum. A continuum of countries from Madagascar and Mozambique in the South East to Guinea in the North West shows this characteristic. In summary, the fertility transition in sub-Saharan Africa is characterized by an early rise to extremely high levels in comparative perspective, and an incipient decline in most countries except for Southern Africa and some island countries where the transition is more advanced.

The prospects for the future depend on how fast the fertility decline is, and this is the question that the recent literature on fertility stalls has been addressing. The idea would be that the decline is slower in the last decade in some of the countries in the region, or fertility has even increased. This question is more difficult to address than the existence of a maximum, since we are talking not only about measuring the slope of the trends, but changes in the slope of the trend. The case of Ethiopia in figure 1 was a good illustration of the problems of inferring about changes in the slope in the presence of inconsistencies in the data. Most of the work on fertility stalls has based the inference in the trends observed in DHS estimates for the period three years before the survey for two different surveys. In figures 3 to 6 the cases of Ghana and Kenya, that were highlighted by Bongaarts (2006) as cases of stalling fertility are displayed. In the case of Ghana, we see a similar situation to that found in Ethiopia: there are clear indications that there was a maximum around 1970 with fertility levels over 7 children per woman. From that moment, all the sources point towards a decline in fertility. It is interesting to note the possibility of an initial decline in fertility between 1930 and 1950. Is fertility currently stalling? The only indicator in that respect is the comparison of the DHS 2003 and DHS 1998. Note how the comparison of retrospective trends from these surveys tend to suggest that the 1998 survey was underestimating fertility, whereas the DHS 1988 and 1993 provide estimates that are roughly coincident with the DHS 2003. The 2000 census provides a direct estimate that is too low and an adjusted estimate that seems too high. The case of Kenya again shows consistently that a maximum was reached at levels of more than 8 children per woman in the 1970s and that a decline has occurred. When focusing in the period since 1990, we find a similar pattern to that of Ethiopia and Ghana: the DHS 2003 provides substantially higher estimates than the DHS 1998 for every moment in time. The 1999 census provides an estimate that is very similar to those produced by DHS 2003. See also the clear deficiencies of the retrospective estimates 15 to 19 years before the survey from both DHS 1998 and DHS 2003. Again, a fertility stall does not emerge as the main conclusion to extract from the inspection of inconsistent data. It might well be that the speed of decline has slowed down, although the conclusions on that respect are very much dependent on the value of fertility in the 1980s, that is subject to much uncertainty given the discrepancies of the data.

Given the limitations for the analysis of trends derived from inconsistencies in the data, it is worthwhile exploring an alternative method that does not rely on the comparison of different sources: the F/P ratio for the age group 45-49 from the latest available source[5]. This index provides an alternative look at recent trends over the previous two decades. To the extent that the estimates of total fertility are more affected by underreporting than completed parity, if something the indexes will be overestimating decline. Map 7 shows the patterns throughout Africa. There are only four countries where fertility has increased over the period: Comoros, Guinea Bissau, Madagascar and Somalia. What is more worrisome is that in most of the countries, and precisely in those places with the highest levels of fertility, the declines have been very slow, in many cases less than 10 percent, in others between 10 and 20 percent. Such slow pace of fertility decline, if continued, means that very high fertility is going to continue in sub-Saharan Africa in the medium term.

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[5] For civil registration countries, F corresponds to the latest estimate of total fertility and P to an estimate of total fertility 16 to 19 years before the latest date. In some cases, the F/P ratio does not correspond to the latest fertility estimate since there is no information on children ever born for that estimate. In that case, the latest estimate of F/P is being used.

VI. Conclusions

The analysis of fertility in Africa has always been subject to data deficiencies. The proliferation of estimates of fertility in the last decades through censuses, national and international survey programs provides convincing evidence of some qualitative characteristics that apply to the fertility transition in almost every country: Fertility has risen in the early stages of the transition to reach a very high maximum level according to international standards, and, with the possible exception of Guinea Bissau, fertility has started to decline. On the whole, the pace of decline has been slow, particularly in many of the countries that had the highest maximum levels of fertility.

While those qualitative conclusions are relatively robust, the estimation of fertility in sub-Saharan Africa remains difficult in most countries. In particular, there are many inconsistencies between different sources, including surveys from the same international program. In this respect, any analysis of fertility stalls should be based on something more than the comparison of the last two point estimates for a country.

Another conclusion that emerges from the study is that there are many sources of information on fertility for sub-Saharan Africa, and that limiting the analysis to only one source, like for instance DHS surveys, leads to an unnecessarily partial view. In particular, information on cohort fertility provides valuable information, especially for the earlier periods. National censuses and surveys are available for every country of the region. The problem is therefore not so much the lack of data, as in the first studies on fertility in sub-Saharan Africa, but rather the existence of inconsistencies in the data. These inconsistencies are not absent from the most ambitious programs like the WFS and DHS.

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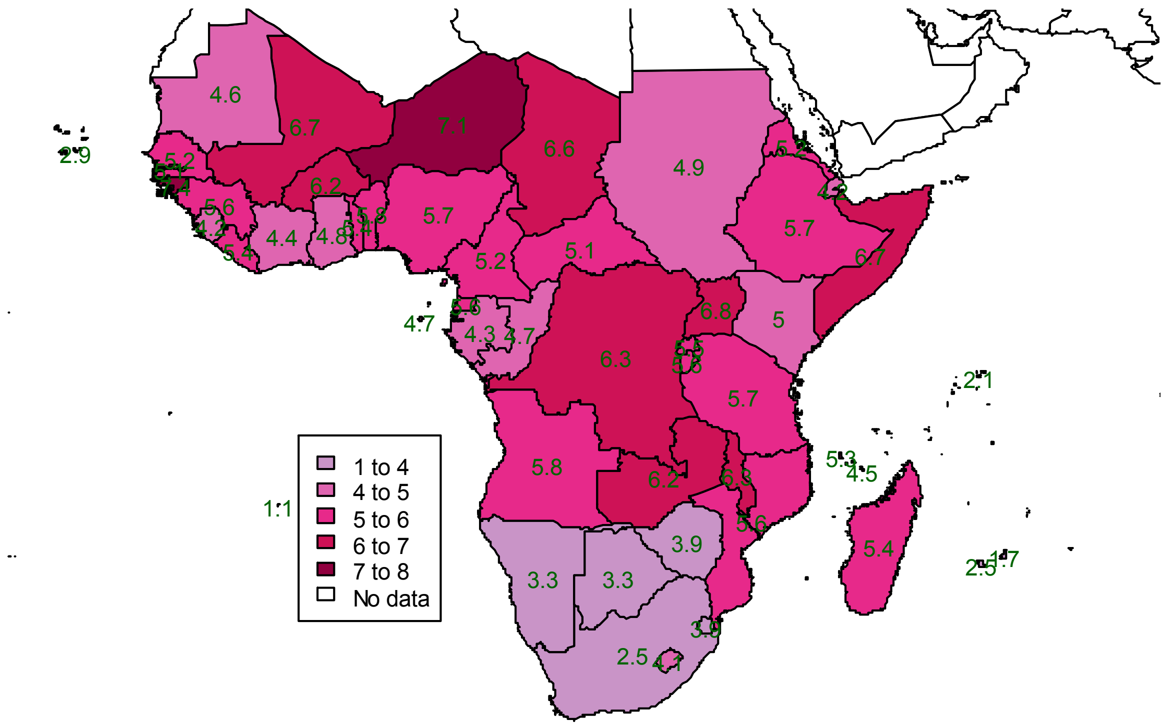
Table 1: Maximum and present fertility levels for selected world's regions.

	Maximum Fertility			
	Period	Level	2000-2005	Percentage of maximum
Sub-Saharan Africa	1960-1965	6.80	5.48	81
AFRICA	1960-1965	6.87	4.98	72
Eastern Africa	1965-1970	7.03	5.60	80
Middle Africa	1980-1985	6.63	6.21	94
Northern Africa	1960-1965	7.06	3.16	45
Southern Africa	1955-1960	6.46	2.90	45
Western Africa	1975-1980	7.03	5.77	82
LATIN AMERICA AND THE CARIBBEAN	1960-1965	5.97	2.53	42
Caribbean	1960-1965	5.49	2.56	47
Central America	1955-1960	6.82	2.67	39
South America	1960-1965	5.77	2.47	43
ASIA	1950-1955	5.87	2.47	42
Eastern Asia	1950-1955	5.67	1.66	29
South-Central Asia	1955-1960	6.06	3.19	53
South-Eastern Asia	1960-1965	6.19	2.51	41
Western Asia	1950-1955	6.49	3.22	50
OCEANIA				
Melanesia	1955-1960	6.33	4.10	65
Micronesia	1960-1965	6.51	3.01	46
Polynesia	1960-1965	6.97	3.28	47

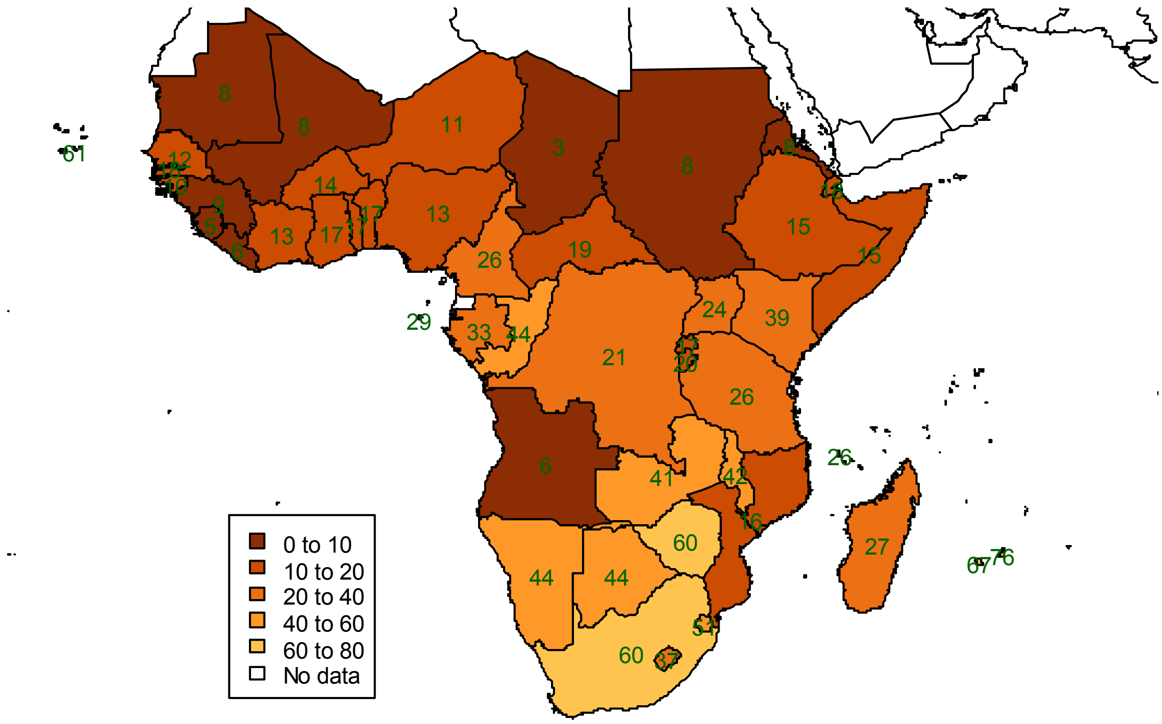
Source: World Population Prospects 2006 (United Nations, 2007)

Map 1. Latest Total Fertility



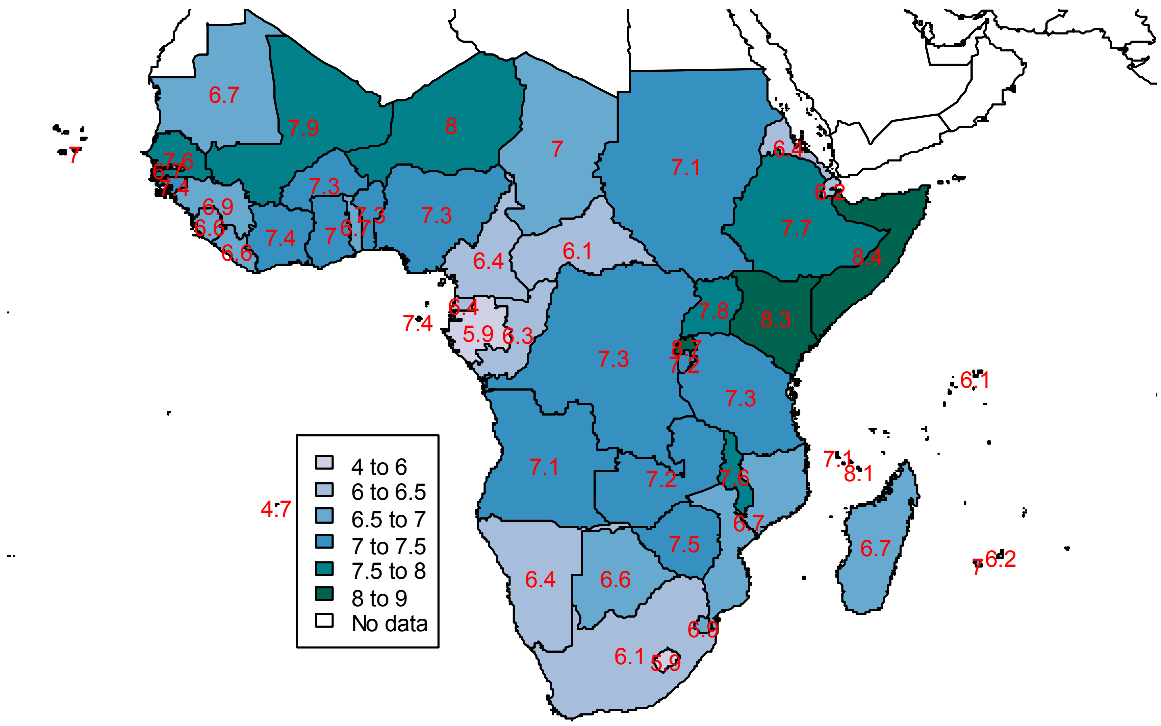
Based on latest National fertility data. UNPD database

Map 2. Contraceptive Prevalence



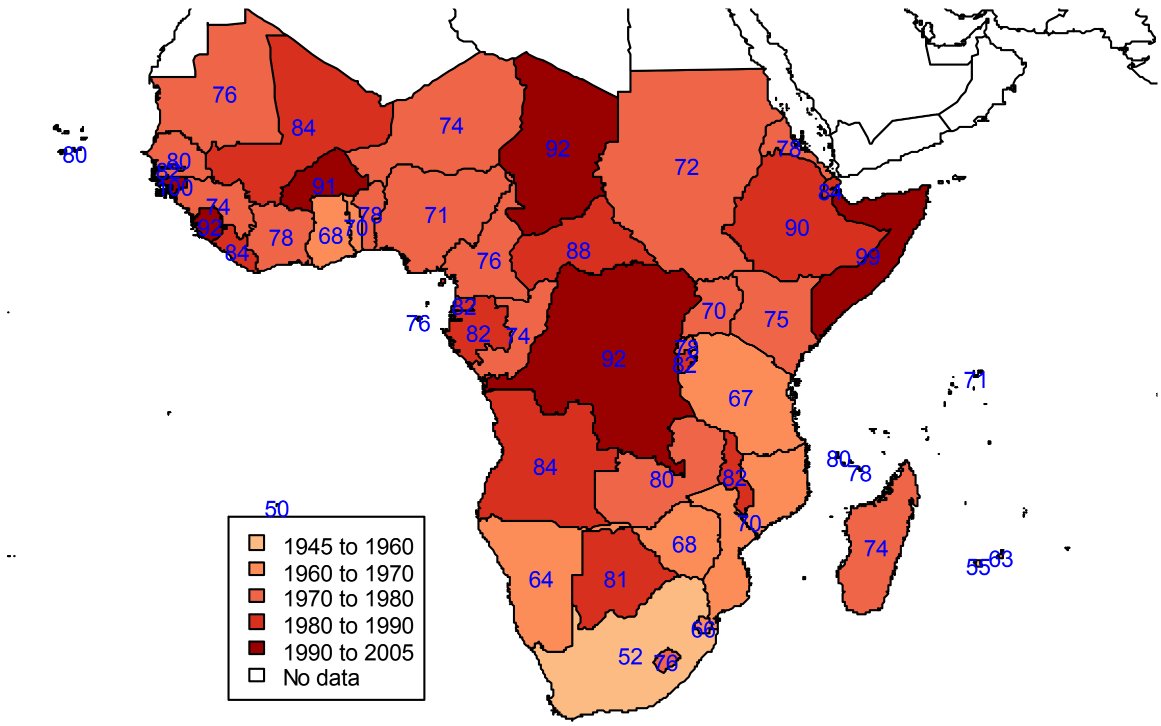
Any method. Married women 15-49. Based on latest survey data. UNPD database

Map 3. Maximum fertility



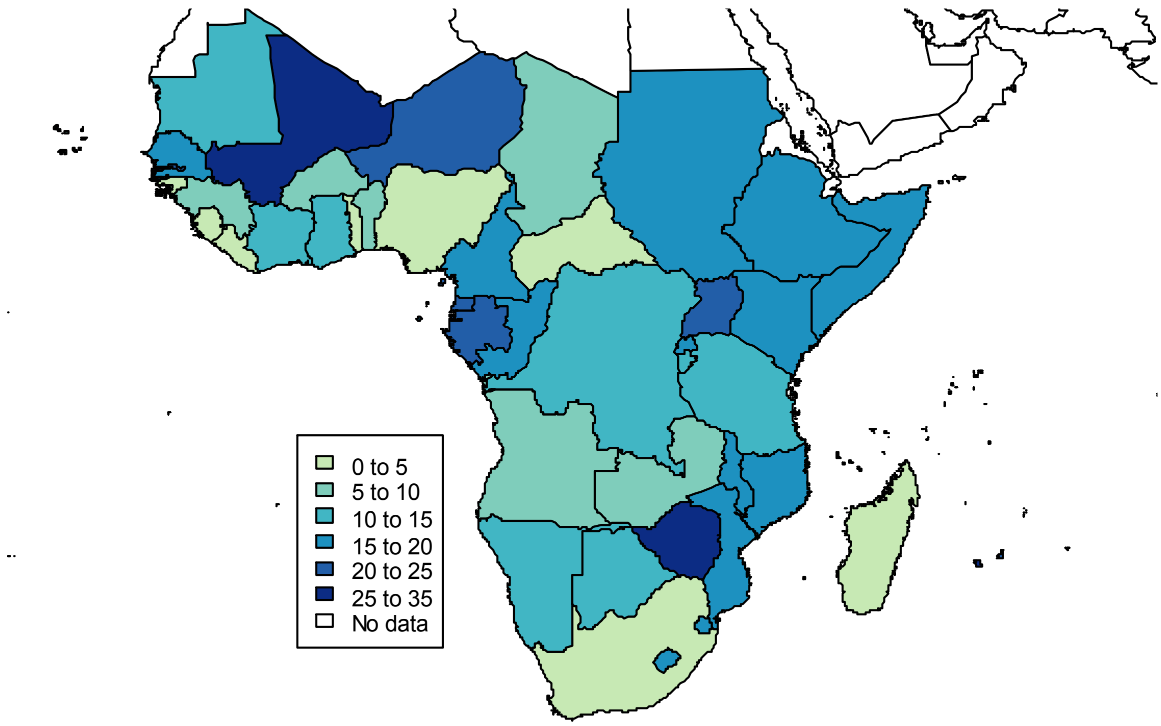
Based on National children ever born and fertility data. UNPD database

Map 4. Year of maximum fertility



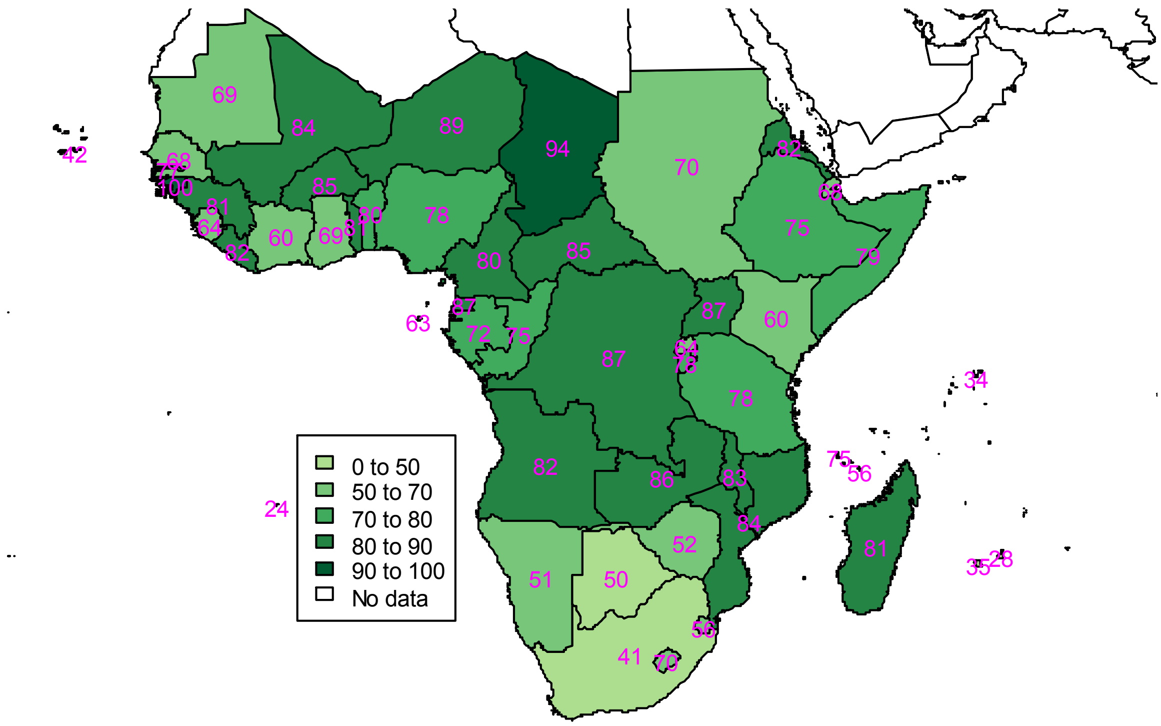
Based on National children ever born and fertility data. UNPD database

Map 5. Increase prior to the maximum



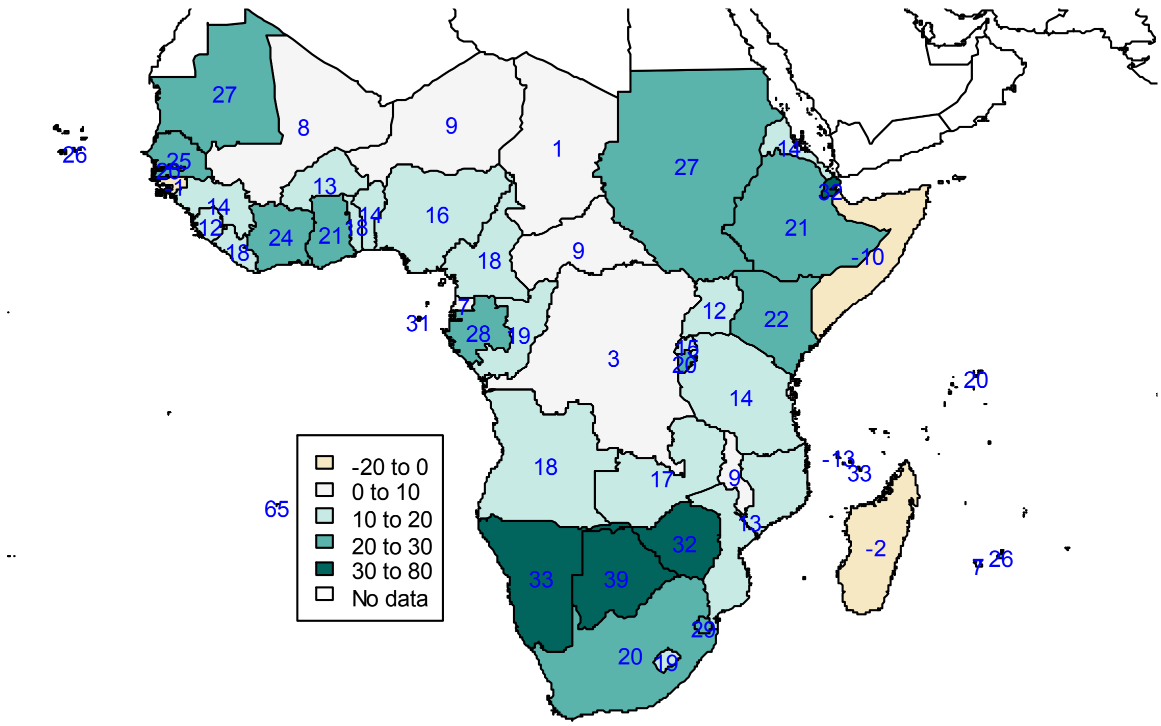
In percentage. 10 to 20 years before maximum. UNPD database

Map 6. Current TF as percentage of maximum



Based on National data on CEB and fertility. UNPD database

Map 7. Current decline in fertility from F/P data



Based on National data on CEB and fertility. UNPD database

Figure 1. Cohort and period fertility in Ethiopia

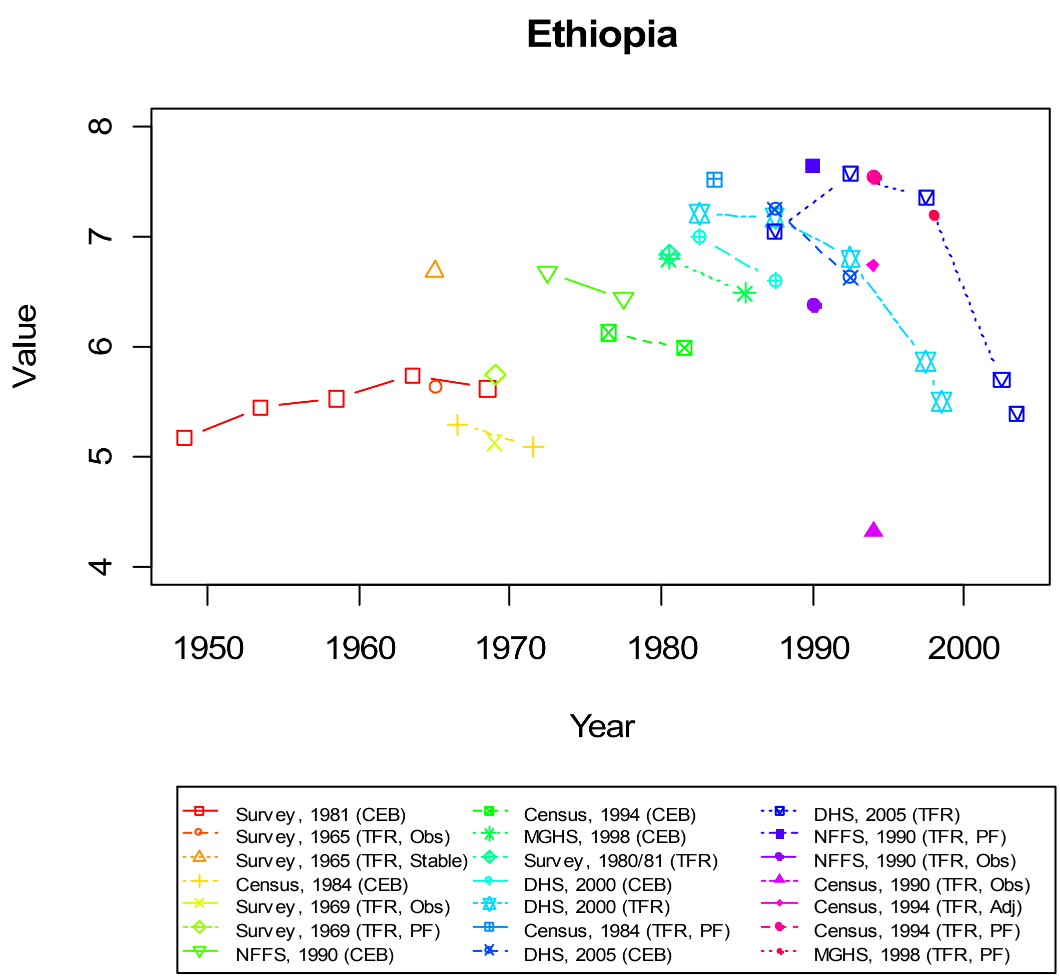


Figure 2. Latest CP and Total Fertility

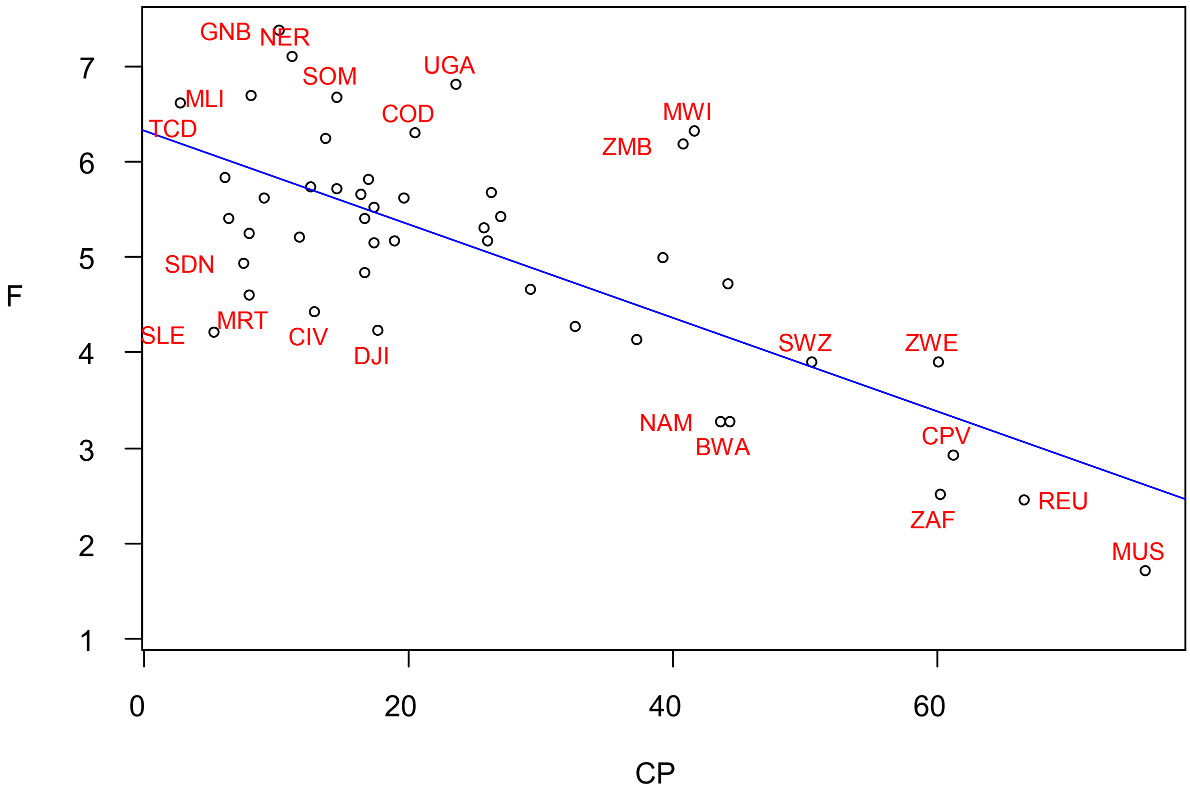


Figure 3. Cohort and period fertility in Ghana

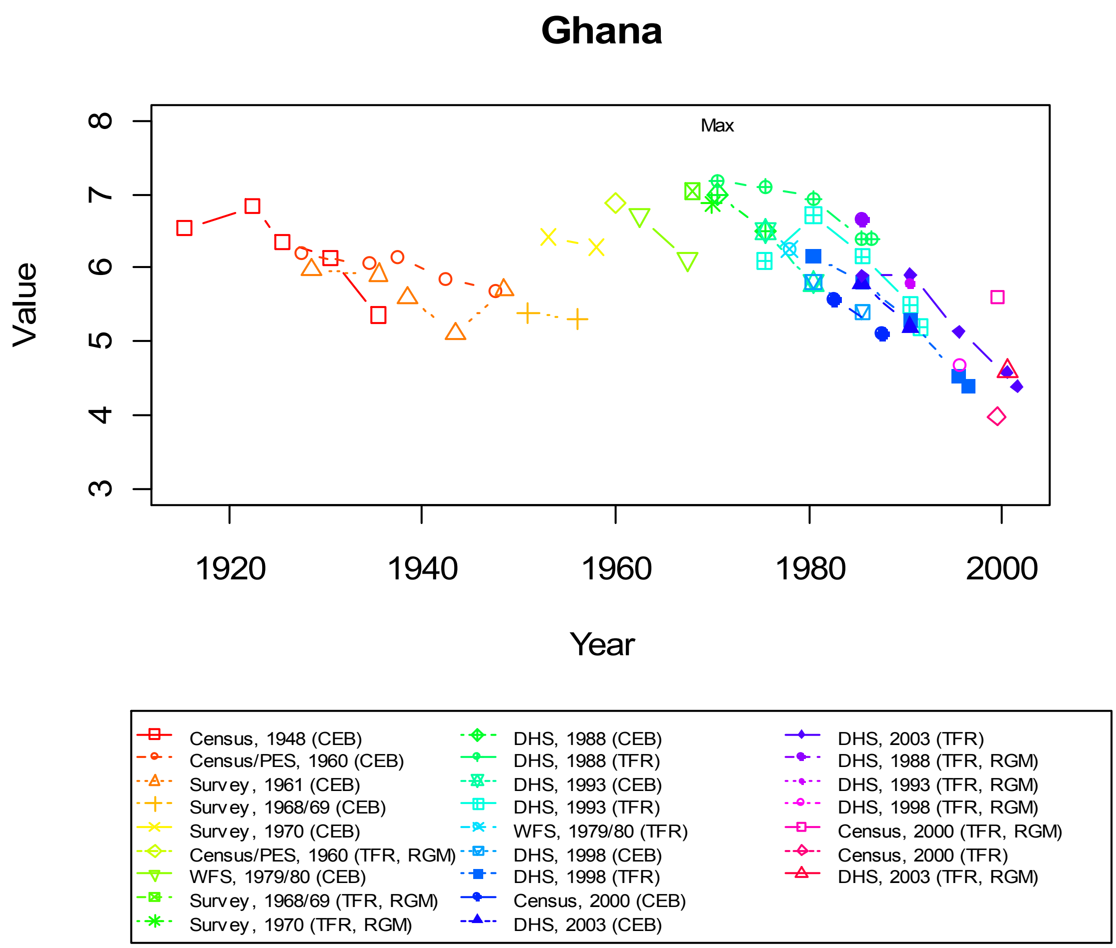


Figure 4. Cohort and period fertility in Ghana since the onset of fertility decline

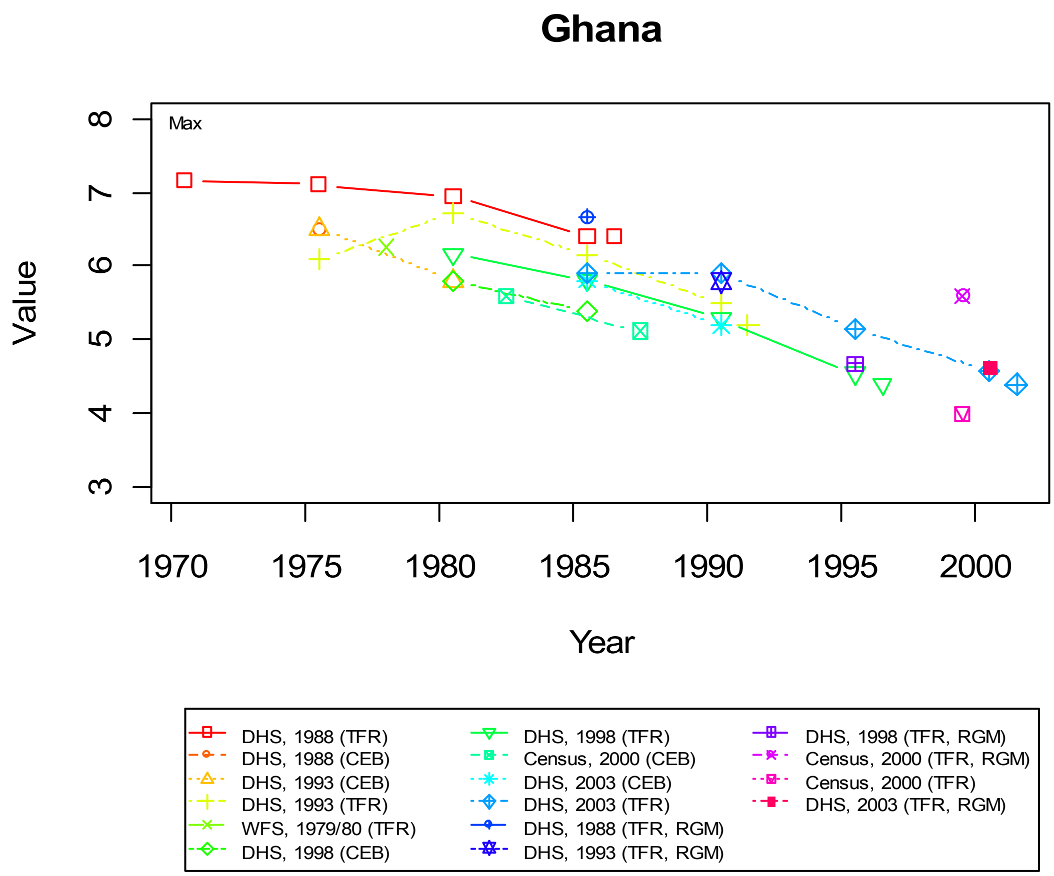


Figure 5. Cohort and period fertility in Kenya

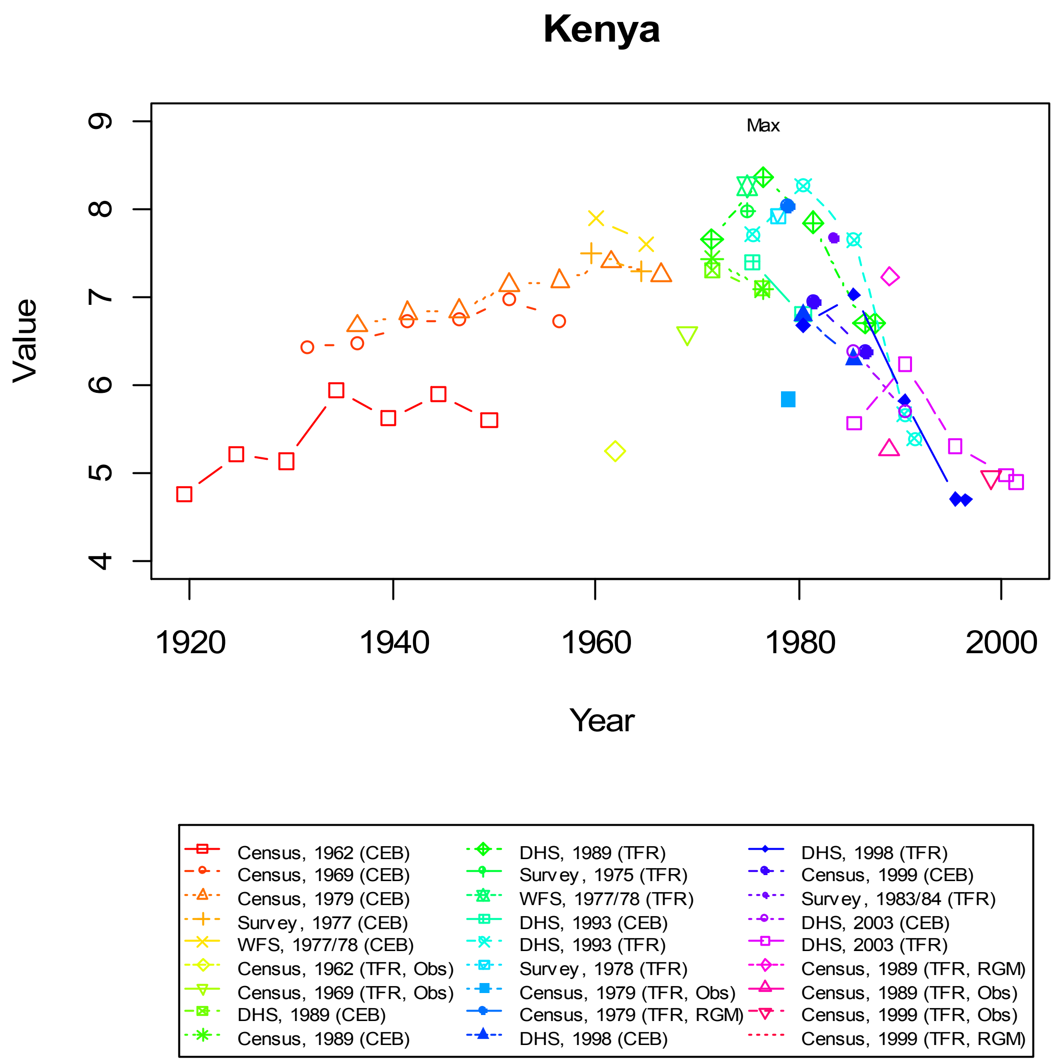


Figure 6. Cohort and period fertility in Kenya since the onset of fertility decline