

First draft, do not quote

Trends in age at marriage and fertility transition in Africa: what connections?

Tendances de l'âge au mariage et transition de la fécondité en Afrique.

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We examine the connections between nuptiality trends and the onset of fertility transition, following a systematic and comparative analysis of long terms trends (1960-2014, 55 countries) in women's age at union and fertility. We use a panafrikan database on nuptiality (INED, 490 censuses and surveys) and the UN-WPP fertility database. Three main findings are highlighted. First, there is no experience of fertility decline in a national context of early marriage (median below 18years). Second, in most of the countries, a nuptiality transition (increase in age at marriage) preceded the onset of fertility decline. Finally, there is no one but several patterns of connection between nuptiality and fertility trends. The expected pattern (decline in fertility with increasing age at marriage) is observed in North and Southern Africa while in the other regions a two-stage and counter-intuitive pattern prevails (increase in age at marriage is first associated with a fertility increase).

Over the last 40 years, the question of the "African exception" has regularly come to the forefront when fertility trends are discussed. In the 1980s, there were doubts about whether sub-Saharan Africa would ever fit in to the fertility transition model: while fertility was declining at a steady pace in Latin America and Asia, the sub-Saharan countries practically all had remarkably stable, even increasing, fertility levels. In the 1990s, the fertility transition spread to sub-Saharan Africa and the region is no longer seen as an outlier in the pattern of transition. But with a slowdown in the pace of fertility decline, or even stagnation at relatively high levels in various countries (Bongaarts, 2008), the question of Africa's exceptionality has arisen again over the last 15 years. As yet, convergence with the other continents has not occurred: the fertility level in sub-Saharan Africa is the world's highest (5.4 children per women versus 2.3 in Latin America and Asia in 2005-9, United Nations 2013) (Table 1). Compared with the experience of other world regions, Africa stands apart not only in terms of fertility levels, but also with regard to various other factors: a flatter age pattern due to longer birth intervals, the persistence of high ideal family size and a low level of contraceptive use, partly due to unmet need in family planning (Bongaarts and Casterline, 2013).

In terms of nuptiality, sub-Saharan Africa (SSA) also deviates from international standards. The "traditional" nuptiality regime has been defined by a particular combination of features, both for first marriage (early marriage for girls, large age gap between spouses, almost universal marriage for both sexes) and for later conjugal life (polygamy for men, prompt and nearly systematic remarriage for widowed and divorced women of childbearing age) (Lesthaeghe et al, 1989; United Nations, 1988, 1990; van de Walle, 1968). This dominant pattern existed with geographical differences, however, and also exceptions (especially Southern African countries). It has also been affected by significant changes in the last decades, especially through the increase in women's age at first union (Antoine, 2006; Garenne, 2004, 2014; Hertrich, 2007, 2012; Mensch, 2005; Mensch et al., 2005, 2006; Tabutin and Schoumaker, 2004; Westoff, 2003), the tendency of a narrowing gap between male and female age at marriage and recent evidence of polygyny decline in Western Africa (Hertrich, 2010). Despite these trends, sub-Saharan Africa still stands out in international comparison, holding the records for the youngest woman's age at first union and for the age difference between spouses at first union (Table 1). In 2005-2009, the median age at first union was about 21 years for women in SSA, 1.5 years earlier than in Asia, and much earlier than in the other parts of the world (26 to 28 years). Except in Southern Africa, the pattern is even earlier (20.0-20.4) at sub-regional levels, but it has an equivalent counterpart in the subregion of South-Asia. The difference in age at union between spouses also remains significantly higher in sub-Saharan Africa (5.3 years on average) than in the rest of the world, where the regional average is around 3 years or below.

To what extent are these specific sub-Saharan fertility and nuptiality patterns bound up with each other? Is there a nuptiality transition linked to the fertility transition? Is nuptiality change a component, if not a driver, of the onset of fertility decline? Or is nuptiality to be considered rather as part of a general socio-cultural background, with no more than a loose connection to fertility transition?

Table 1. Age at first marriage and fertility. World regions and African sub-regions. 2005-2010.

Region	Age at first union						Fertility		Average year	Nb countries
	Women		Men		Difference		TFR (15-49)	P25		
	SMAM	Median age	SMAM	Median age	SMAM	Median age				
World	23,8	23,7	27,0	27,2	3,2	3,5	2,5	1,0	2008	220
Africa	22,3	21,8	27,2	27,1	5,0	5,3	4,9	1,6	2007	57
<i>Sub-saharan Africa</i>	21,6	21,1	26,6	26,5	5,0	5,3	5,4	1,8	2008	50
Eastern Africa	20,9	20,3	25,2	24,8	4,4	4,4	5,4	1,8	2009	20
Middle Africa	20,6	20,0	25,3	25,0	4,7	5,0	6,2	2,1	2006	9
Southern Africa	29,6	31,6	32,0	34,2	2,4	2,6	2,6	1,0	2010	5
Western Africa	21,1	20,4	27,6	27,4	6,5	7,0	5,7	1,8	2008	16
<i>Northern Africa</i>	25,0	24,2	29,7	29,6	4,7	5,3	3,1	0,9	2003	7
Asia	23,0	22,6	26,1	25,8	3,2	3,2	2,3	0,9	2008	50
Eastern Asia	25,2	25,0	27,1	26,8	1,9	1,8	1,6	0,7	2010	7
South-Central Asia	20,6	20,1	25,1	24,8	4,6	4,6	1,2	0,3	2007	14
South-Eastern Asia	23,3	22,9	26,3	26,0	3,0	3,1	5,9	1,8	2008	11
Western Asia	24,2	23,4	27,2	26,9	3,1	3,5	2,9	0,9	2007	18
Europe	28,0	28,2	30,4	31,4	2,4	3,2	1,5	0,4	2008	43
Latin America and the Caribbean	25,1	26,4	27,7	29,5	2,6	2,9	2,3	1,0	2009	45
North America	26,7	26,8	28,3	29,5	1,6	2,7	2,0	0,7	2009	5
Oceania	27,0	27,0	29,1	29,6	2,2	2,6	2,5	0,7	2006	20

Sources:

Age at marriage: United Nations (2013), World Marriage Data 2012. Latest available data provided in the database (including updates for some Subsaharan countries when the indicator is based on data collected before 2005 and when a more recent estimate was found)).

Fertility: United Nations (2013), World Population Prospects: The 2012 Revision. File FERT/4 (Total fertility by major area, region and country) and File FERT/7 (Age-specific fertility rates by major area, region and country).

Indicators:

Age at marriage: our calculation, using cross-sectional data on the proportions of never-married women (men) by five-year age group.

SMAM = singulate mean age at marriage (Hajnal method); Median age : age at which the percentage never-married reaches 50%.

TFR=Total fertility rate (15-49); P25=cumulative fertility (15-24)

Average year= average year of the data collection for women's indicators, weighted by the population in 2005 (WPP2012)

There are various ways to address these issues, including sociological and anthropological approaches to the institutional frameworks of marriage and reproduction, as well as statistical modeling of the impact of nuptiality on fertility in comparison with competing proximate determinants.

In this paper, I adopt a comparative approach to examine, on a systematic basis, long term trends in age at marriage and fertility in all African countries. The analysis is mainly descriptive, and technically simple. The issue is to explore the connections between the trends and the timing of fertility and nuptiality. I am looking for possible similarities between countries in their experience of nuptiality and fertility changes. The assumption is that if fertility transition is linked to nuptiality change, then it should be reflected in regularities, in common patterns followed by different countries. The analysis is conducted at the macro, country level, with a focus on the median age at first union for women (based on cross sectional data), and on the total fertility rate (15-49).

The analysis will basically focus on three questions: Is the onset of fertility decline disconnected from women's age at first union (i.e. is there a threshold in age at marriage to be reached before fertility starts to decrease?)? To what extent is fertility decline preceded by changes in nuptiality patterns? Are there regional differences in the link between nuptiality and fertility changes?

1. Fertility transition and nuptiality in SSA. Main frameworks.

Nuptiality has always been taken into account in the study of fertility and of fertility transition. But there have been changes over time in the way the connection between both phenomena is approached, and also in the attention devoted to the topic.

The idea that nuptiality change is part of the demographic transition was conceptualized in the 1960s. In Kingsley Davis' "theory of change and response" (1963), the restriction of nuptiality (through increases in age at marriage and/or in permanent celibacy) is, like emigration or limitation of marital fertility, one of the "multiphasic responses" to the sustained natural increase generated by the mortality decline. Postponement of marriage is not a deliberate effort to reduce fertility, but it has often been, with migration, a first response to demographic pressure, easier to adopt than the restriction of marital fertility (United Nations, 1990). Ansley Coale (1967, 1973) went further and distinguished two steps in the fertility transition: first a "Malthusian transition"¹ where general fertility is lowered by the restriction of marriages, and second a "neo-Malthusian transition" with a decrease in marital fertility, due to the deliberate choice of couples to limit the number of their children. From the assessment he conducted in the 1980s; Jean-Claude Chesnais (1986) concluded that nuptiality transition could be considered as a first step in the fertility transition across a large part of the world: *"In all countries where there is appropriate statistical information, control of marriages preceded birth control by couples."* For Chesnais, the late marriage pattern prevailing in Europe in the 18th and 19th centuries is not in contradiction with this theory: it might be the result of an earlier transition in nuptiality, possibly in the 17th century (when mortality began to decline) (Burguière et Lebrun, 1986 ; Chesnais, 1986) and was maintained until the decline of marital fertility took over. However, without mentioning the debatable case of European countries, notable

¹ In reference to Malthus who advocated the postponement of marriages and celibacy as preventive checks on population growth.

exceptions already existed in the 1980s, especially in Latin America. Furthermore, African countries, which had not begun their fertility transition, were not included in the study.

A new and important wave of studies on nuptiality and fertility developed in the 1980s, thanks to the refinement of the framework of the proximate determinants of fertility and the availability of a large and new body of data provided by the World Fertility Surveys program. During the 1970s and the 1980s, there was intensive investment in modeling fertility, in building indicators on intermediate fertility variables and combining them (for an overview, see Leridon, 2006). The direct effect of nuptiality on fertility (through a reduction in the years of reproductive life spent in union) in the original analytical framework of the proximate determinants (Davis and Blake, 1956), became even more central in the revised and simplified version developed by Bongaarts (1978, 1992). Indeed nuptiality (the proportion of married women) is one of the four variables which explain most² of the variation in fertility levels between countries and over time (the three other determinants are contraception, abortion and post-partum infertility). The WFS surveys were designed to gather data on the different intermediate variables and these empirical data on a large number of countries make it possible to draw a general picture of their respective impact during the different stages of the demographic transition. According to this outline, the inhibiting effect of nuptiality increased in the first stages of fertility transition, but the impact of contraception became dominant and much stronger as the fertility transition progressed (Bongaarts, 1992). Concerning SSA, the WFS were especially useful to document the pattern of traditional fertility and to highlight the impact of postpartum infecundability, resulting from breastfeeding and postpartum abstinence. They also show the strongly “pro-natalist” nature of the African nuptiality system: first, early marriage for women and quite systematic and rapid remarriage in case of divorce or widowhood mean that women spend most of their reproductive life in union (ref), exposed to the risk of pregnancy; second, polygyny gives fluidity to the marriage market, and eases the process of systematic marriage and remarriage; finally, early marriage and polygamy, together with large age gaps between spouses and other characteristics (such as arranged marriages) generate distance between spouses and limit conjugal autonomy, including fertility decisions. However WFS surveys were not able to document the fertility transition in SSA, as it had not yet started.

Nuptiality received much less attention in the 1990s, the decade in which the fertility transition spread across Africa. The data collected on nuptiality became poorer: while the WFS questionnaires recorded the complete marital histories, in the DHS program implemented in the mid-1980s, there are only a few questions on marriage, limited to the first union and the current one. Research is now mostly directed on the issue of contraception, which is ultimately the main determinant of fertility decline, for instance on the gap between demand and supply in family planning services (the “unmet need in family planning”). On the other side, the mechanical approach of the link between nuptiality and fertility (in limiting the exposure of women to childbearing) was qualified, not only because births outside marriage are not rare in different African countries, but also because marriage patterns include other dimensions that may affect reproductive behaviors. For instance, female education could be a determinant both for later marriage and for lower fertility, or the age gap between spouses could influence reproductive behavior indirectly as a marker of gender inequality or low level of spousal autonomy. Finally, it is through the issues of gender and decision making

² 96% of the variance in the total fertility rate in a sample of 41 populations including developing and developed countries (Bongaarts, 1992)

process that nuptiality and its impact on fertility is reconsidered these last twenty years. On one side, nuptiality variables have been included in the analysis to understand individual, and more precisely women's agency in the chain of reproductive behaviors, from fertility preferences to contraceptive demand and practice, including possible discussion and negotiation between spouses on reproductive choices. The relationship between women's autonomy and nuptiality related variables works both way: at the individual level, being married at a young age, with a much older husband will affect women's freedom of action, power of negotiation and decision making after her marriage; at the institutional level, living in a country where gender inequalities are strong will influence age at marriage and age difference between spouses (Oppenheim Mason, 1987, 1997). On the other side, nuptiality variables appear also as a convenient way to include information on female and conjugal autonomy in the analysis: actually they are often used as proxies for gender inequality (ref).

While the consideration of nuptiality in connection to fertility has progressively moved to individual analysis, more classical approaches to measure the direct impact of marriage change on fertility have become rarer. However, two recent publications examine the contribution of nuptiality to fertility declines in SSA, using DHS surveys. David Shapiro (2014), comparing the index of marriage from Bongaarts between the first and last DHS surveys (cross-sectional data) in 25 countries, found mixed results: reduction in proportion married makes a significant contribution to national fertility decline (over 30% of the decline) in few countries only, but its impact is more common in urban places, especially in capital cities. Michel Garenne (2014) analyzed the trends in age at marriage, using retrospective information from DHS and WFS surveys for 33 sub-Saharan African countries, and compared their impact on fertility decline to the impact of contraception. He concluded to the overwhelming contribution of contraception. In contrast, the trends of marriage have a little impact, if any, to the fertility decline: *"Fertility trends /.../ had virtually no correlation with trends in age at marriage in countries studied. Trends in age at marriage could explain only a tiny fraction of fertility trends. /.../ whatever the model the age at marriage appeared small, explaining less than 10% of fertility decline."* (p.xvii)

In light of these recent publications, one might consider that the subject is over, and that there is no reason to discuss again if there is a connection between nuptiality and fertility trends.

However without wanting to be the devil's advocate, it seems to me that there is still room for this issue, as far as we adopt a perspective a little bit different. I will address the issue not with the objective to measure a direct contribution of nuptiality decline to fertility decline, but with the objective to see if there is an historical connection between nuptiality and fertility trends. Indeed, nuptiality change could be connected to fertility change, without being simultaneous, neither having a direct quantifiable effect on fertility.

2. Data and indicators

The analysis will focus on women's age at first marriage³, i.e. the changes in the patterns of entry in union. In comparison to celibacy, marriage behaviors⁴ at older ages (divorce, widowhood,

³ Marriage and union are used as synonymous, to speak about the "de facto" situation. As a general rule censuses and surveys consider conjugal unions without restriction.

⁴ However to examine the influence on fertility of changes in conjugal and nuptiality patterns, these components of marriage system should be taken into account as well as others (polygamy, age at marriage for men, age gap between spouses). But data is poor, and sometimes inexistent, for these aspects.

remarriage) have little impact in the time spent out of union during childbearing ages, as remarriage is usual after union breakdown and, in most countries few women are recorded with the marital status of widow or divorcee, except in older ages.

Cross sectional versus retrospective estimates of age at first unions.

In the absence of vital statistics, there are two main methods for measuring age at marriage within a population, using either respondents' retrospective reports (age at or date of marriage) or the proportions of never-married individuals by age recorded at a given point in time. Retrospective data are provided by most demographic surveys and can be used to estimate trends directly. However, their quality is limited not only by the recall errors common to all retrospective reporting but also by difficulties, particular to sub-Saharan Africa, in dating unions. For one thing, marriage processes involve various ceremonies and stages, and this leads to flexible and varying interpretations of the timing of entry into union (van de Walle, 1968; Meekers, 1992; Hertrich and Locoh, 1999; Antoine et al., 2009; Hertrich, 1998, 2007b). Furthermore, it remains difficult to determine a precise date or age in contexts where these concepts may only recently have come into use (Roger et al., 1981; Ewbank, 1981; Waltisperger, 1988), so there is a risk of recording normative, imprecise responses. Methodological studies have concluded that these retrospective data on age at marriage in Africa are of poor or, at best, middling quality (van de Walle, 1968, 1993; Lesthaeghe et al., 1989; Blanc and Rutenburg, 1990; Gage, 1995; Hertrich and Lardoux, 2009, 2014). Ron Lesthaeghe (1989) and Étienne van de Walle (1968, 1993) advocated rejecting them in favour of cross-sectional indicators.

Using cross-sectional data we can avoid the risks of mistaken interpretation and dating of past events by focusing on the structure of the population by sex, age and marital status at the time of the survey or census. Under the approach proposed by Hajnal (Hajnal, 1953; United Nations, 1984; Gubry, 1984), the series of proportions of never-married individuals by age can be equated with that of a theoretical cohort and summarized by a standard indicator such as mean age or median age at first marriage. Where entry into union is concentrated within a narrow age range, the indicator captures the nuptiality of the cohorts reaching those ages at the time of survey. In sub-Saharan Africa, where most women marry young, median age at first union is strongly correlated with the proportion of never-married women aged 15-19 and 20-24. Another advantage of this method is that it can be applied to most data collection operations: marital status is generally recorded by censuses and surveys and published in a statistical table by sex and age group.

A database on African nuptiality

To be able to analyze nuptiality trends in Africa on the long run, with a systematic approach, we set up at INED a panafrikan database (Hertrich, 2007) which brings together the statistical tables on marital status from the censuses and national surveys carried out in Africa since 1950. Updated a couple of weeks ago, this database currently includes 490 data collection operations for 55 countries, with about 40% of censuses and 60% national surveys (half of the surveys are DHS, the others are national surveys or MICS). We have at least 6 data collection operations for most of the countries (87%), and at least 10 operations for nearly half (44%) of the countries⁵. These data are numerous

⁵ Two countries have less than 3 operations (2 for Erythrea and 1 for Western Sahara). The maximum is 16 operations (Senegal, Rwanda and Egypt).

enough to draw long-term trends in age at marriage at least since the seventies for most of the countries (45/55), and often since the sixties (37/55).

Building consistent series on age at first marriage

The indicator used for each data collection operation is the median age of women's first union,⁶ calculated from the proportions of never-married women by five-year age group. The data used for the estimates are similar whatever the operation (the basic statistical tables on marital status, according sex and 5-years groups of age); however a systematic comparison between census and survey estimates show that there tend to be standard pattern of difference in sub-Saharan Africa: median age at first marriage is generally higher when estimated from census data than from survey data. Several error mechanisms combine to create this effect (Hertrich et Lardoux, 2014). In censuses, imprecise recording of marital status leads to overestimation of numbers never-married, and therefore to overestimation of median age at marriage. In surveys, meanwhile, the tendency to underestimate young women's age, thereby excluding a disproportionate number from the survey sample of women aged 15-49, and the less thorough coverage of never-married women lead to under-representation of those never-married and therefore to underestimation of age at marriage.

To be able to examine and compare long-term trends of age at first union, adjusted trends were built for each country. The rule was first to consider, for each country, two series of estimates of median age at marriage - the censuses series and the surveys series – and second to generate a new, harmonized, series, which corresponds basically to the average trend. Occasional adjustments were introduced in case of inconsistency, especially to the exclusion of outliers. About 8% (40/490) of the available points (census or survey) were excluded for this reason.

The method includes a degree of arbitrariness. Actually the objective was mainly to have harmonized and regular series that could be compare, without the “noise” generated by the technical differences between censuses and surveys.

Fertility and nuptiality series

The data on fertility come from the World Population Prospects (2012 revision) (United Nations 2013).

Annual series for fertility and age at marriage were computerized by linear interpolation between the existing points.

Following a common definition (Bongaarts and Casterline, 2013), the onset of fertility decline was dated by the year the TFR reached a level 10% below the maximum value of the 1960-2010 period.

For most of the analysis we will focus on continental Africa and large countries, excluding 10 countries (7 islands and 3 with less than 1 million inhabitants in 2010) and keeping 45 .

⁶ i.e. the age at which the never-married proportion is 50%. This median age is calculated by linear interpolation between the age groups on either side, according to the formula:

$$Me = (x + 2,5) \times \frac{C_{(x,x+5)} - 50}{C_{(x,x+5)} - C_{(x+5,x+9)}} \times 5,$$

where $C_{(x,x+5)}$ is the never-married proportion in the relevant age group (x,x+5).

3. Long term trends in women's age at first marriage

Carried out in the early 1980s by Ron Lesthaeghe and his team (1989) and updated by Etienne van de Walle's (1993), the pioneering comparative work on trends in African nuptiality, based on a systematic consideration of various existing censuses and surveys, (1996), showed an increase in the age of women at first union in the countries which have performed at least two censuses or surveys, but remained cautious on the actual scope and the future of the trends. Over the last 20 years, a growing number of comparative studies, usually based on one type of data⁷ (Garenne, 2004, 2014; Mensch, 2005; Mensch et al., 2005, 2006; Ortega, 2014; Shapiro and Gebreselassie, 2014; Tabutin and Schoumaker, 2004; Westoff, 2003), provide consistent evidence on the rise in women's age at marriage.

Our data confirm, at a large scale and with extensive data, the substantial change in first marriage pattern over Africa. The early female marriage pattern⁸, which was a main pillar of the sub-Saharan nuptiality system, has been seriously challenged.

Figures 1 and 2 show how the trend spread to the entire continent during the last five decades. In the sixties, an early marriage pattern was clearly dominant. The median age was below 18 in most of the countries, with the main exception of Southern Africa where late marriage was already the rule, and to a lesser extent some countries from middle Africa neighboring Southern Africa and some isolated cases. In the 1970s, in the greater part of the continent, the age at first marriage of women began to increase significantly, and only a minority of countries, mainly Western African, still had at that time a median age at first marriage under 18. During the next decades, the increase spread to the greater part of Western Africa and the pattern was confirmed in the other regions. In the mid-nineties, the early marriage model, dominant fifty years before, had practically disappeared. In 2010 it resisted in one enclosed country, Niger⁹. The main standard now is a median age over 19.5 years at the beginning of conjugal life, which actually exceeds 21 years in a large number of countries.

The delay of women's first union has been quite a systematic trend: there are only a couple of cases where data suggest a decrease (CAR, Swaziland, Sudan) or a stability (Somalia, Zimbabwe); some of these apparent exceptions may be due to an heterogeneity between the sources of data.

⁷ The approaches varies but most of the studies use only a small proportion of the existing data: for example, some compare period estimates based on data from successive DHS studies, others limit themselves to retrospective measurements from a single survey, while others again compare only two points in time; etc. The recent launch by the United Nations (2008, 2012) of an international database on nuptiality, with several data collection operations for each country, may encourage a return to this systematic approach (Ortega, 2014).

⁸ There is also a tendency towards later marriage for men, but it is more gradual and less systematic. As a result, the gender gap in age at marriage has narrowed. The large gap between male and female ages at first union is another pillar of the sub-Saharan nuptiality which has been challenged (results not presented).

⁹ The case of Central African Republic is more debatable as data suggest a decrease in age at marriage, after a first trend towards later marriage (figure 2). It is not excluded that this decreasing trend is an artifact due to an heterogeneity of data: the recent points (since 2000) are provided by MICS surveys, while the previous ones are provided by censuses and other surveys (DHS and national). Another explanation to explore is a possible link with the political instability.

Figure 1. Trends in women’s age at first union and fertility. 1965-2010.

(Sources: WPP2012 for fertility, our database on African nuptiality for median age at first union)

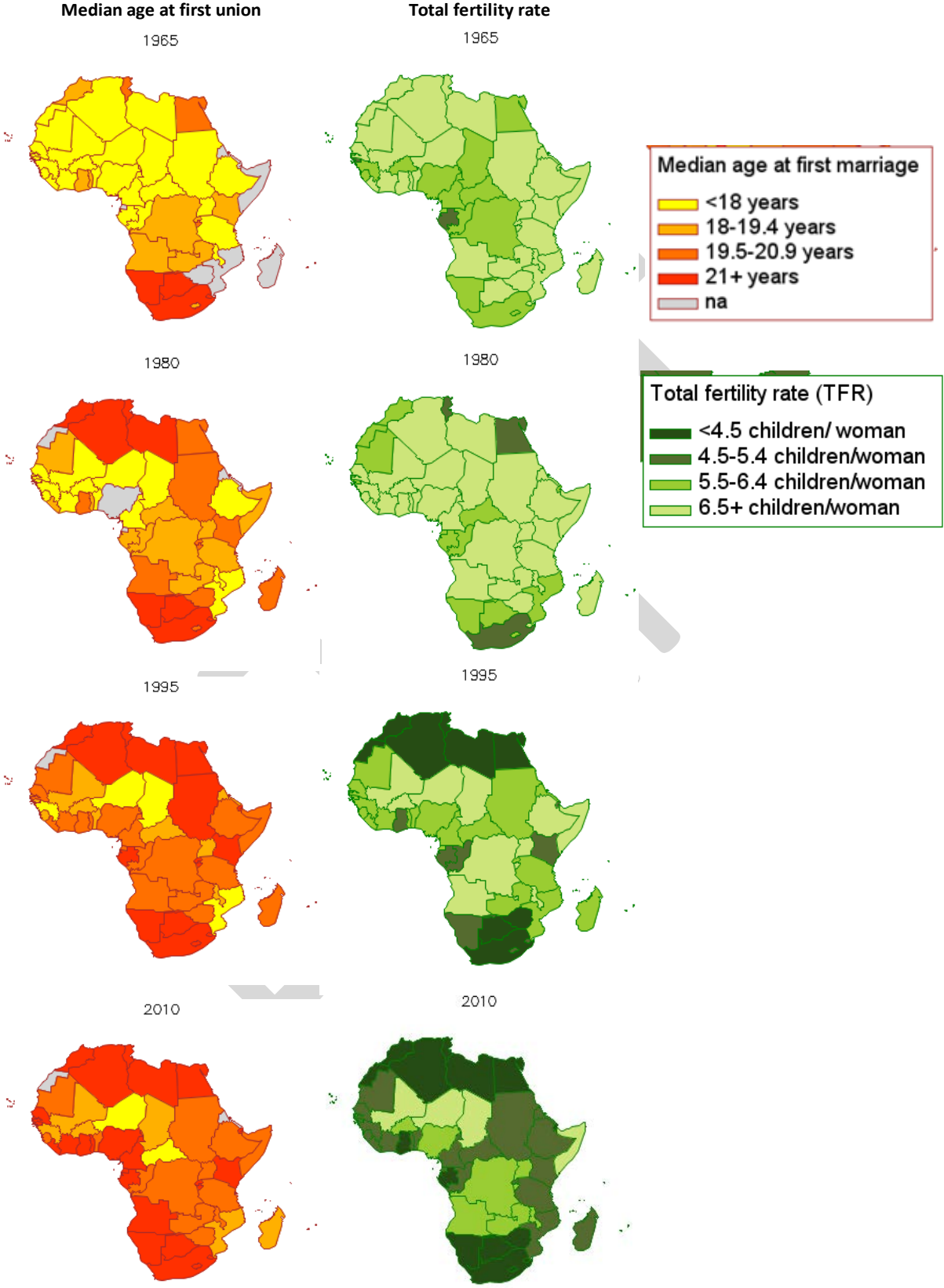
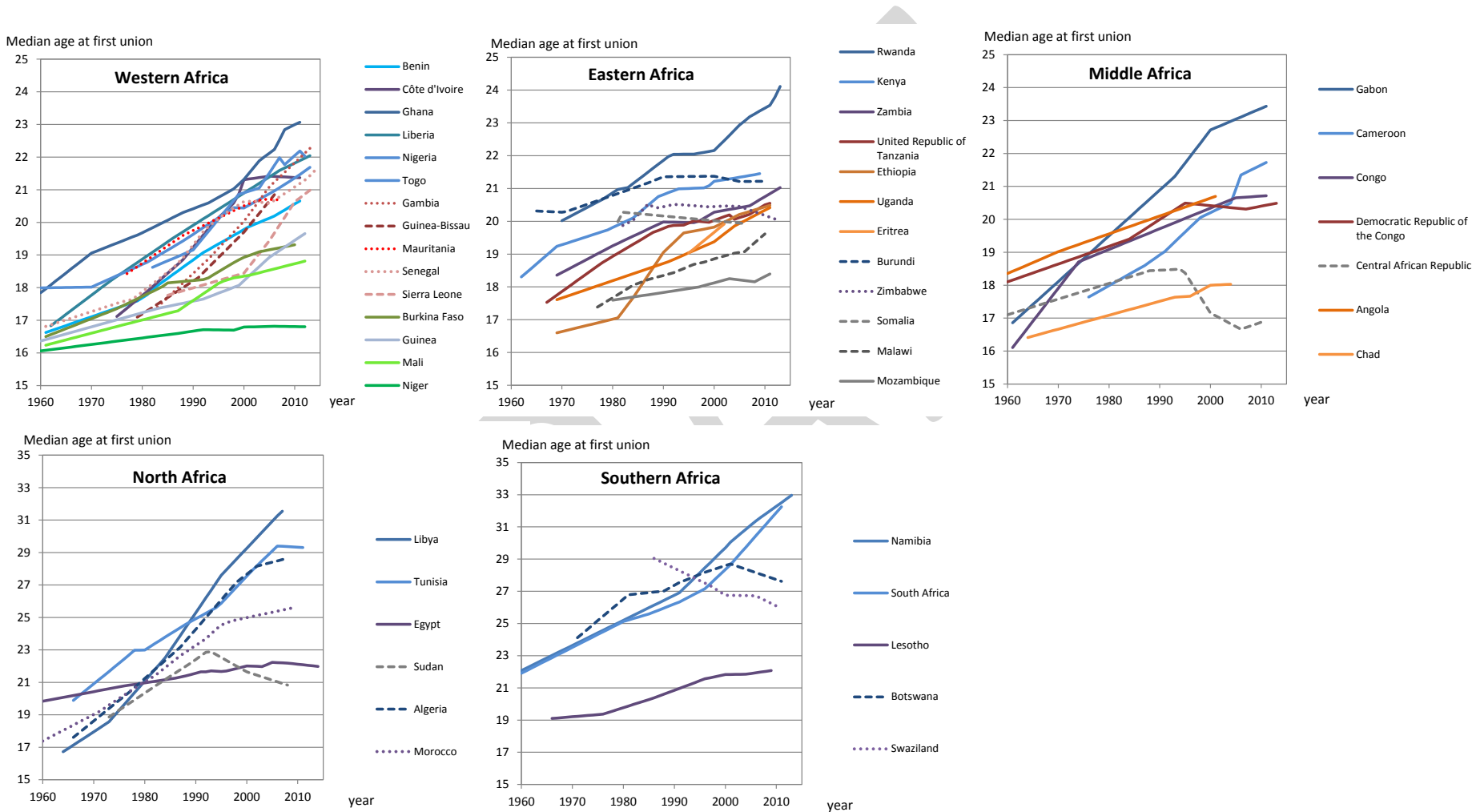


Figure 2. Long-term trends of the median age at first union for women, by country. (Continental countries, population over 1 million inhab. In 2010)



In terms of geographical differences, Northern Africa and Southern Africa stand out sharply. In both regions there was a rapid increase in the age at first marriage. Except very few cases (Lesotho, Egypt, Sudan), median age at first marriage is now higher than 25, and even near 30 in most countries. While the pattern was quite similar for North Africa and Western Africa in the sixties, now the gap is considerable (for instance the difference in median ages is now of 7 years between Morocco and Mali, while it was negligible in 1960).

In the other regions, trends comparable to those observed in North Africa and Southern Africa are rare. A median age over 25 years has never been registered (in continental countries). But there are country cases of sharp increases in age at first marriage in each region (Gabon and Congo in middle Africa, Rwanda in Eastern Africa, countries from the Coast of Guinea in Western Africa).

For Eastern and Central Africa, the general picture is that of a slow but regular increase from the 1970s to the 1990s, but with an apparent stall since then, with a median age around 20-22 years in most of the countries.

Considered as the region with the most emblematic, the most traditional features of African nuptiality, West Africa however does not derogate to the general pattern of change. Indeed the postponement of women's first marriage is true in all these countries but with differences in timing and pace of change. Three sub-regions can be distinguished: the Gulf of Guinea (Nigeria to Liberia, with blue lines on Figure 1) with strong and long-term changes since the 1960s; the Western Coast (Sierra Leone to Mauritania, red and dotted lines), close to the previous group but where the increase in age at marriage begun later, usually in the eighties; and the Sahelian countries (Niger to Guinea, green lines), with slower but continuous trends. In the West-African region, differences between countries increased clearly during the last 50 years. In the sixties and even the seventies, all West-African countries shared similar pattern of early marriage (16 to 18 years), while the range of variations is large (17 to 23 years) nowadays. But similar trends are in progress and it is possible that the differentiation is mainly a question of timing.

4. Fertility decline and age at marriage

Is there a connection between fertility and the age at marriage, in terms of levels and trends? Do the differences between countries in terms of fertility correspond, to some extent, to the differences in nuptiality?

A simple correlation between TFR and median age at marriage at a recent date (2007¹⁰) shows indeed, as expected, a positive and significant correlation (Figure 3), though moderate ($r^2=0.64$). However the correlation is much weaker if we consider older periods of time when the range of variation of fertility was smaller, as it was the case, for instance in 1980 (Figure 3).

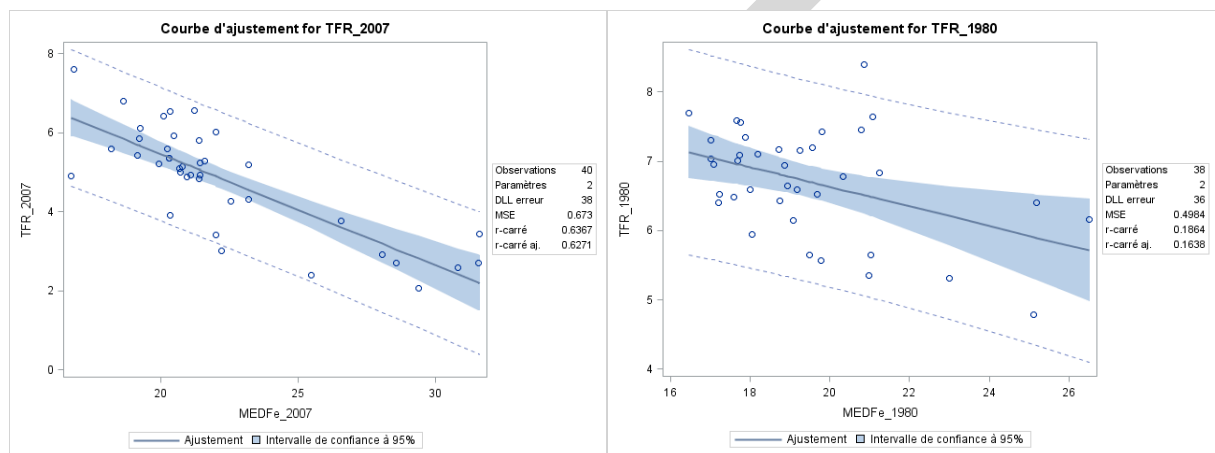
If we examine the trends in fertility and nuptiality through the maps (Figure 1), once again the picture is mixed. Similarities appear for the two recent periods, especially for the countries with the most distinctive patterns. This is the case on one side for the South-African and North-African countries where marriage is especially late and fertility low; and on the other side for the remote Sahelian countries where age at marriage had increased but is still low while fertility stands over 6.5

¹⁰ The more recent the year, the lower the number of countries with updated information. For 2007, the data is available for 40 among 45 countries, while it is the case for 33 countries in 2010.

children per woman. The similarities during the pretransitional period are scanty: apart some spots (Egypt, Southern Africa), it is very hazardous to draw parallels. For instance the group of countries with lower fertility in Middle Africa in 1965 has no specificities in terms of marriage, it has rather to be considered in connection with the issue of infertility.

However there is a finding which emerges from the comparison of both series of map: it is the time lag between the changes in nuptiality and the changes in fertility. The overall picture is that marriage age increased first, before fertility transition. Does it mean that a nuptiality transition is a prerequisite to fertility transition?

Figure 3. Correlation between TFR and the median age at first union for women in 2007 (40 countries) and 1980 (38 countries)



5. Age at marriage at the onset of the fertility transition

To what extent is fertility transition independent of marriage pattern? Does empirical evidence support the hypothesis that fertility may decline whatever the pattern of age at marriage? Or is there a threshold in age at first marriage below which fertility decline is not observed?

To examine this question we estimate (Table 2), for each country, the median age at first marriage on several dates related to the fertility transition: the year of the onset of fertility decline (i.e. TFR 10% below the maximum observed since 1960); 10 years before the onset of fertility decline and the year of the maximum of TFR. As all countries, except two (Mali and Niger), have experienced fertility decline, we can have an overview on the nuptiality context at the time FT begun and on the occurrence of nuptiality change before FT.

The data clearly show that fertility transition is unlikely to begin in a country where median age at marriage has not reached at least 18 years (Table 2, Figure 4¹¹). Actually there is only one country (CAR) where median age was below 18 the year of the transition, but this is actually a fallacious case, as age at marriage was previously higher and seems to have decrease. So finally no country had experienced fertility decline in a context where median age of marriage never reached 18 years. In the large majority of the cases (88% of the sub-Saharan population) the median age at marriage was even over 19 years.

¹¹ The case of Mozambique (yellow on the map) is actually not specific: the media age at marriage was 17.97 at the onset of fertility transition, ie the limit of the 18 threshold.

As most countries had previously earlier pattern of marriage, it means that they experienced a nuptiality transition before the fertility transition. When fertility was at its highest value, most of the populations in Eastern and Western Africa still have an early marriage pattern, respectively 86% and 99%. It was the case of only half of the population in Middle Africa because fertility increased until the eighties for this region where infertility was previously an issue. In part of Middle Africa, as in most North Africa and in all Southern Africa, age at marriage was already over 19 years when fertility level was the highest.

During the year of the highest fertility and the year of the onset of FT, the median age at marriage increased, on regional average, between 1.4 and 2.4 years, except in Middle Africa (0.7 years). In all regions except Middle Africa, at least 50% of the increase occurred in the 10 years preceding the onset of fertility decline.

The question of nuptiality change before fertility transition receives finally a clear affirmative answer. There is no experience of fertility decline in sub-Saharan Africa in a national context of early marriage (median below 18 years). A previous increase in age at marriage, and a median age over 19 years at the onset of the fertility decline, were experienced by most countries.

Figure 4. Median age at first union for women's, at the onset of fertility transition and 10 years before.

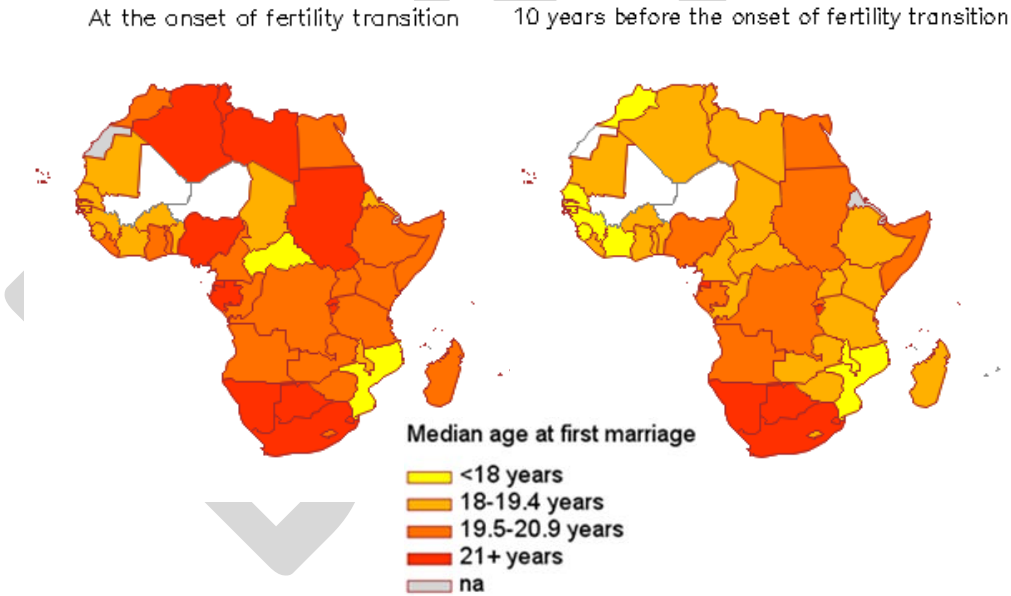


Table 2. Median age at marriage and the onset of fertility transition. Countries of continental Africa, population over 1 million in 2010.

Indicators	Eastern	Middle	Southern	Western	North	Sub-Saharan (all)	Africa (all)
Age at first marriage at the onset of fertility transition. (% population living in countries where the median age is in the corresponding range)							
Below 19	13	13	0	14	0	12	10
<i>(Below 18)</i>	0	4	0	0	0	1	0.5
19-20.99	81	86	3	28	55	57	56
21 and over	7	1	97	59	45	31	34
	100	100	100	100	100	100	100
Age at first marriage at the highest point of TFR. (% population living in countries where the median age is in the corresponding range)							
Below 19	86	49	0	99	35	79	70
<i>(Below 18)</i>	68	9	0	27	35	47	37
19-20.99	11	51	0	1	65	13	23
21 and over	3	0	30	0	0	8	7
	100	100	30	100	100	100	100
Increase in median age at first union during the 10 years preceding the onset of fertility decline (% population living in countries responding to the criteria)							
at least 0.5 years	88	28	100	100	100	86	89
at least 1 year	0	24	100	79	59	42	45
Median age at first marriage. Regional weighted average							
at the onset of fertility transition.	19,8	20,0	24,0	20,2	20,9	20,3	20,4
10 years before the onset	19,1	19,7	22,3	19,0	19,3	19,4	19,4
at the highest point of TFR (*)	18,4	19,4	22,0	17,9	19,1	18,9	19,0
Median Age (onset)-Median Age (max TFR)	1,4	0,7	2,0	2,4	1,8	1,4	1,5
Median Age (onset)-Median Age (10 y before)	0,7	0,3	1,7	1,2	1,6	0,9	1,1
% increase 10y / % increase (max-onset FT)	51,4	40,5	86,7	51,6	87,7	65,2	71,6
Year (weighted average). Onset of FT	1995,0	2004,5	1973,6	1997,7	1976,6	1995,9	1991,9
Year (weighted average) of the highest TFR	1973,4	1986,6	1961,1	1978,8	1965,4	1976,6	1974,4
Year(onset)-Year(max)	21,6	17,9	12,5	18,9	11,2	19,3	17,5
Nb countries with FT (all countries)	12	7	5	13 (15)	6	37 (39)	43 (45)
Population 2010 (thousands)	307 687	124 103	58 803	274 717 (304 596)	199 105	765 309 (795 189)	964 415 (994 294)
(*) reservation: data available for less than 70% of the population in Eastern countries (60%) and Western countries (41%). Over 75% in the other regions.							

DRAFT

6. The trends of fertility during nuptiality transition

If the increase in age at marriage was a direct factor of fertility decline, as we are used to approach it in the frame of the proximate determinants, then we would expect some synchronicity between the trends. As noticed, this is not the case, as the rise in age at marriage happened before the fertility decline. So what is happening at the level of fertility when marriage is postponed?

To examine this question, we have represented, for each of the 45 countries, the path followed by the relationship between median age at marriage and TFR (by year from the first to the last year with available data on nuptiality). Three types were distinguished according the connection between marriage and fertility over times (Figure 5).

The first one includes over half of the countries (23 countries). It tells a story in 2 steps. In the first stage, age at marriage increases but fertility does not decrease. Actually in most of the cases, fertility even increases. In the second stage, fertility decreases sometimes in line with additional increase in age at marriage (this is the story for most West-African countries), sometimes without further increase in age at marriage (this is the story for most East-African countries).

The second category (10 countries) corresponds to the expected profile with a simultaneous trend in age at marriage (increase) and in fertility (decrease). This is the main type for North-African and Southern African countries. A couple of West-African countries share also this profile.

Finally a third category (8 countries) gathers the cases with no connection between nuptiality and fertility trends. This concerns the countries of Western and Middle Africa where fertility is still very high despite increasing age at marriage, and two Eastern countries where fertility decreased without change in marriage.

The classification of the countries depends in part to the available data: it is possible that some countries ranged in the categories 2 or 3 would be reattributed in the first category if we were able to build longer series.

Despite the data limitations, this exercise highlights a specific pattern of connection between nuptiality and fertility in a large part of sub-Saharan countries. According the classical framework we expected a decrease in fertility during the period of increasing age at marriage. This is actually mainly observed in North and Southern Africa, the two regions with strong and rapid trends both in nuptiality and fertility. But in most of sub-Saharan countries, the story is very different as the increase in age at marriage is concomitant with an increase in fertility. Nuptiality trend may have had an inhibiting effect on fertility, but not enough to offset the increase in fertility. In other words, the increase in fertility would probably have been even higher in the absence of lower rate of marriage.

Figure 5. Relationships over time between median age at marriage and TFR

Type 1. The “hairpin” shape. (23 countries)

A trend with 2 stages:

- 1) age at marriage increases, fertility increases also or is stable
- 2) fertility decreases, age at marriage continues to increase or is stable.

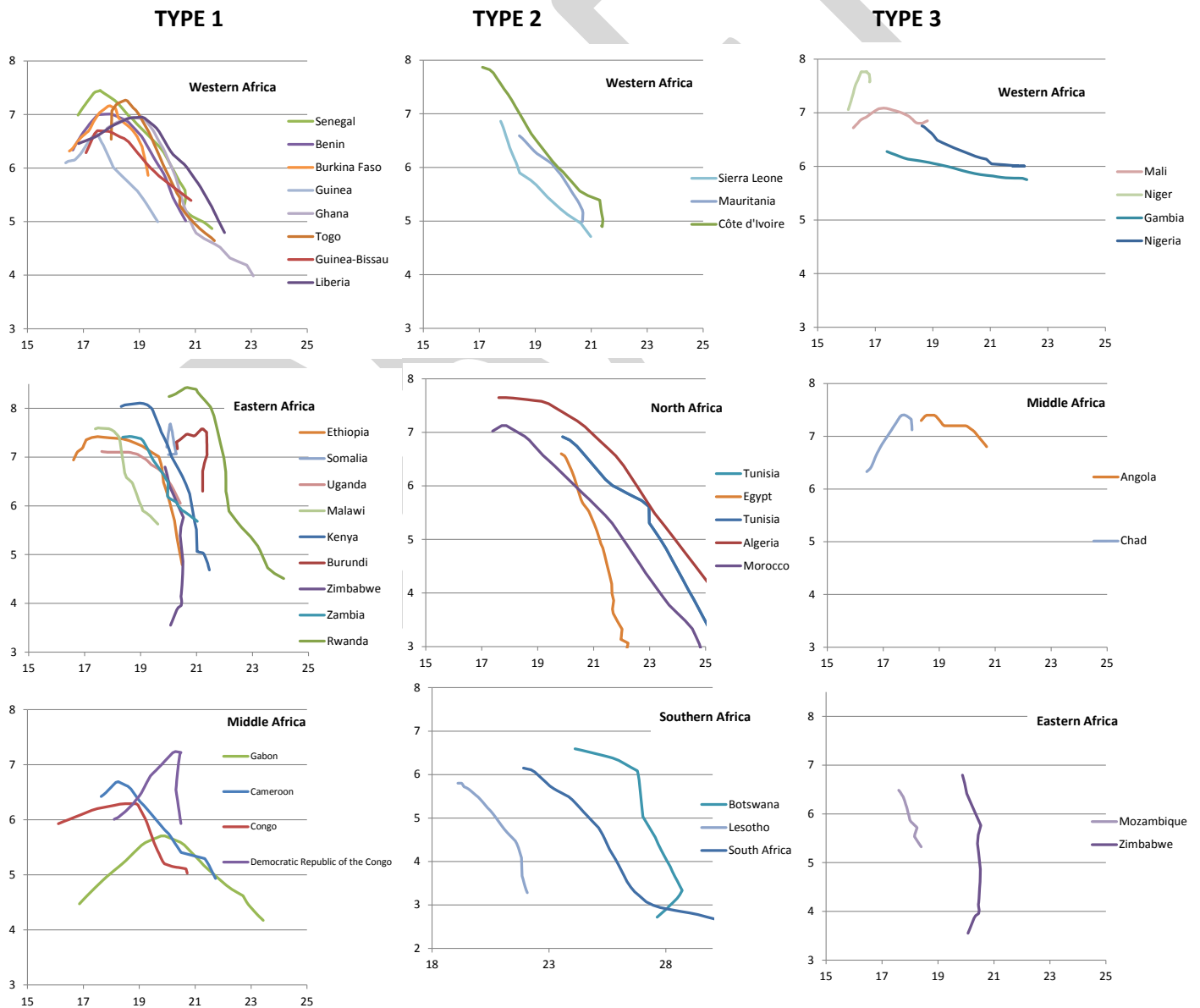
Type 2. A simultaneous trend. (10 countries).

Age at marriage increases, fertility decreases (without previous stage)

Type 3. No connection. (8 countries).

- Age at marriage increases, fertility is stable
- Fertility decreases, age at marriage is stable

(4 atypical countries not represented)



To conclude

From different points of view, our analysis suggests that nuptiality change is part of the story of the fertility transition in Africa. The connection is not a direct, a mechanical one: for most of the countries, except in Southern and North Africa, there was no decrease in fertility concomitant with the increase of women age at first marriage.

The connection is rather in historical and sociological terms. Some changes in nuptiality patterns seem necessary before any decline in fertility. There is no country in Africa which begun its fertility transition while an early pattern of marriage prevailed: everywhere the median age of marriage was over 18, and usually over 19, at the onset of fertility decline. This means that most of the countries experienced a nuptiality transition before their fertility transition.

This nuptiality transition has probably to be considered primarily in terms of social and family changes. The deliberate limitation of fertility is hardly compatible with strong community control over individual's life, it needs at least some agency at the individual or conjugal level for fertility plans to be conceived and concretely developed. Early marriage is one of the components of the traditional reproductive regimes and their efficiency to achieve high levels of fertility. On the opposite, an increase in the age at first marriage of women means that women are allowed to spend part of their adult life before endorsing the role and duties of wife and mother. The option of a preconjugal life means also possible time for training, self-development, and more maturity, if not agency, at the beginning of conjugal life. From this point of view, the breakdown of early marriage for girls as a prerequisite of fertility decline is not surprising.

We observe that, in most countries, the increase in the age of marriage did not directly produce a decline in fertility. On the opposite, the period of increase in age at marriage was often also a period of increase in fertility. This paradoxical result can probably be referred to the same framework: the weakening of the family and community controls is potentially realized in different registers including the traditional inhibitors of fertility (post-partum abstinence, breastfeeding patterns) as well as the early marriage patterns. In this perspective, a decrease in early marriage and an increase of fertility could be different and non-antagonist outcomes of the changing context of reproduction. This does not mean that nuptiality change does not contribute to fertility transition. Actually in a first step it may have contributed to lower the phase of fertility increase while the decrease in fertility is observed in a second step only.

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