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Proposal for Theme 1 (Fertility)

Half a century of changes in the geography of fertility in Tunisia : divergences and convergences?

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Introduction

Fertility transition was rather fast in Tunisia. From 1966 to 1999, the total fertility rate (TFR) fell dramatically, from 7,1 children per woman to 2.1 (Figure 1). Then it remains quite constant for ten years before starting slightly increasing in 2010. According to provisional estimates by the *Institut national de la statistique (INS)*, TFR would have reached 2.4 in 2014 ([source et actualiser](#)).

Figure 1 gathers all existing sources measuring Tunisian fertility levels and trends since the mid 1960s (former expert estimates, National demographic surveys as well as vital statistics based on the civil registration system). They are all consistent with each other. And that makes possible to consider official vital statistics as complete at least since the mid 1970s.

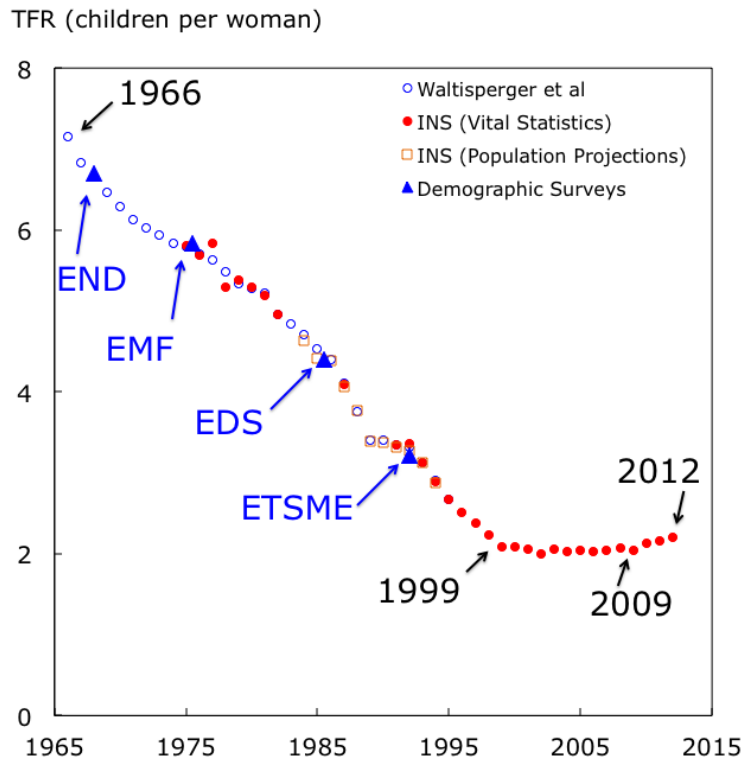


Figure 1 Total Fertility Rate at the National level

Sources:

- 1966-1995 (all years): Walperger et al. (2001);
- 1975-2012 Vital statistics (interrupted series): (INS ***, ***, etc.);
- 1984-1994 (Population projections): (INS ***)
- specific surveys: Enquête nationale démographique (***), Enquête mondiale fécondité (***), Enquête démographique et de santé (***), Enquête tunisienne sur la santé de la mère et de l'enfant (***)

Ajouter les enquêtes plus récentes

Figures 2 and 3 assess the both the radical change that occurred in age-specific fertility rates. In Figure 2, the period of fertility decline is shown separately from the recent years of regain, to make graphs easier readable. From 1975 to 2002, fertility rates declined at all ages and the fall was particularly deep at ages 20-24 and 25-29. From 2002 to 2012, the rise is rather small and mainly concerns age 35-39, for which it actually started from 1998 (Figure 3). Clearly, the recent increase in TFR is a combination of contrasted trends by age. Fertility at age 20-24, for example, continued decreasing until 2008, while at age 35-39 it rose by more than 15%.

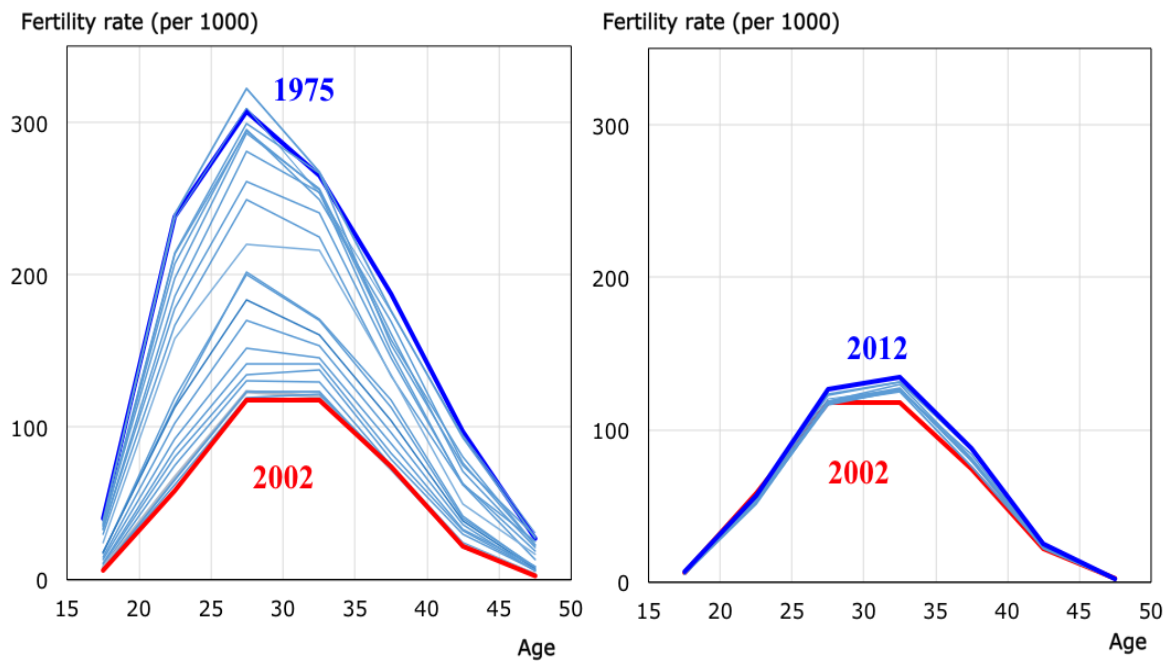


Figure 2 Age specific fertility rates
 Source: à retrouver pour chaque année

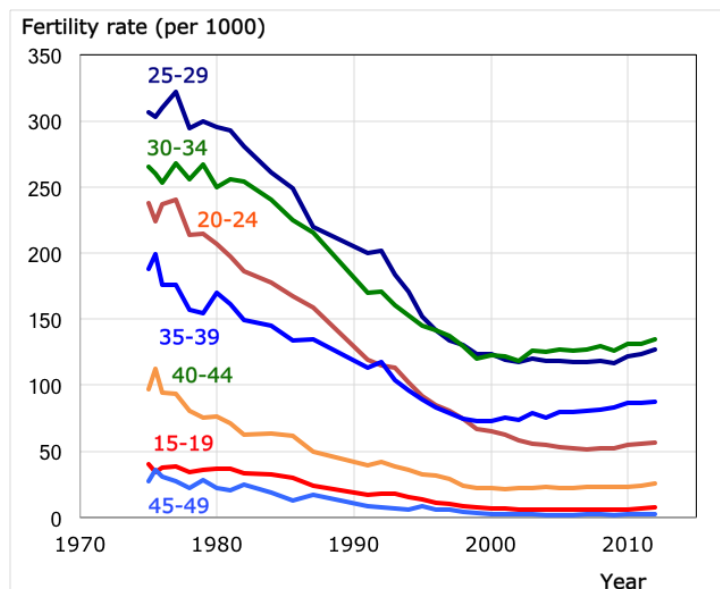


Figure 3 Age specific fertility rates
 Source: à retrouver pour chaque année

Such variations between age groups give the idea that variations could be observed between geographical entities. In the same time, the quality of vital statistics, the only ones that gives significant results at an infra-national level of interest, make reasonable to investigate about it. We would like to ask three questions:

- 1) Are national fertility level and trends also observed everywhere in Tunisia? Or are they resulting from geographical compensations?
- 2) Has the geographical distribution of fertility changed over time?
- 3) Is there any relation between geographical variation of fertility and that of nuptiality

To answer these questions we shall develop the following 4 points :

- 1) Data and methods
- 2) Trends in geographical variations of fertility
- 3) Trends in geographical variations of nuptiality
- 4) Possible links between trends in fertility and trends in nuptiality through their geographical variations

1) What data? What methods?

➤ What kind of regional data are available?

- Tunisia has a rich source of information on births and marriages. The civil registration system collects very detailed information, from that, the INS produces vital statistics rather in detail, more or less regularly, not only at the national level but also at the level of the main administrative division :the *gouvernorats*.
- Thus we have births counts by mother's age-group, since 1975 and for marriages, detailed data by age at marriage and marital status were available to us since 2005 only.
- To compute rates we have population by sex, age and marital status from censuses. Tunisia held 7 censuses since its independence : 1956,1966, 1975, 1984, 1994, 2004 and the last 2014. We also have annual population estimates by age and sex since 1984 from the national institute for statistics.

➤ **Limitations** : these data collected presents some limitations :

- The first limit concerns unavailable birth and marriage data of certain years (those of the middle of the 1980s for fertility and those of the period before 2005 for marriages. (*difficultés à retrouver les données pour toutes les années, dans certains on retrouve des taux mas pas les données brutes et parfois le contraire*))
- The second limit concerns the issue of the proportion of births for which age of mother is unknown. This proportion sometimes is very high in some regions and especially around the capital Tunis and its suburbs. (*à détailler*)
- An other problem is that data on the residence of the mother are not established clearly in certain regions especially between Tunis and its suburbs. (*expliquer*)

- The final limitation we must indicate is that concerning the changes in administrative subdivisions between the censuses.

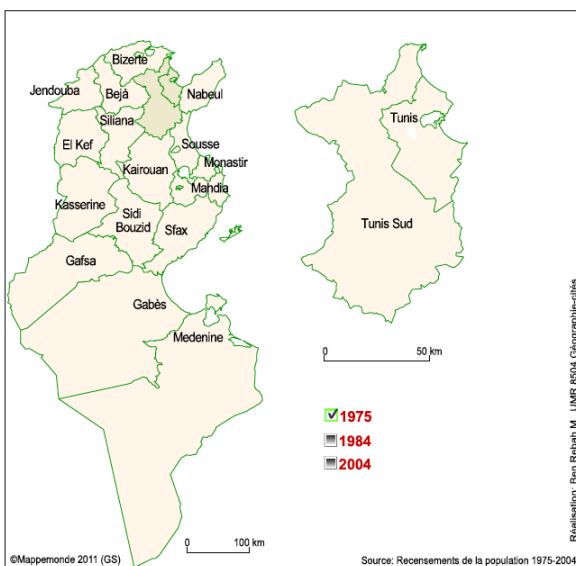
Indeed, Tunisian territory is divided into governorats which are the 1st administrative localities. Since Independence, this administrative division changed 3 times. At the moment of the 1975 census, Tunisia was divided into 18 gouvernorats. This map shows the administrative limits of these areas. On the right of the slide you have a zoom on the region of Tunis.

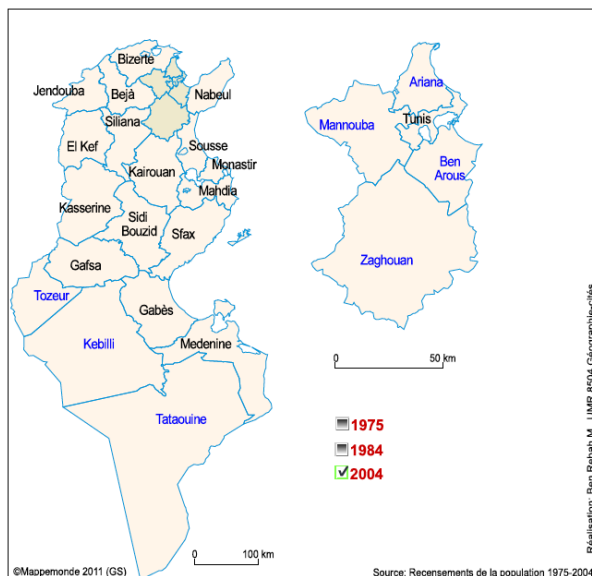
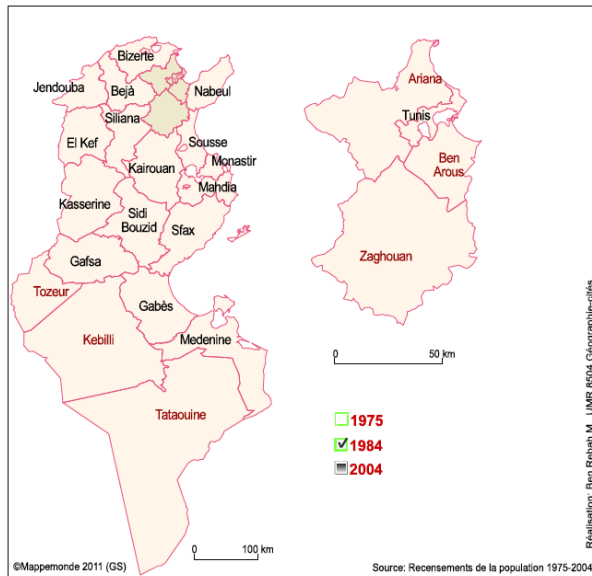
Ten years later, at the 1984 census the number of gouvernorats had risen up to 23. Five gouvernorats are split into two new ones.

- Tunis-Sud gives : Ariana, and Zaghouan
- Tunis gives Tunis and Ben-Arous
- Gafsa gives Gafsa and Tozeur
- Gabes became : Gabes and Kebili
- And mednine was divided into Medenine and Tataouine

Finally at the moment of 2004 census, one more gouvernorat had been created : MANOUBA

This latest is the result of a more complexe change : one part of Ariana became the gouvernorat of Manouba and a part of Tunis was transfered to Ariana





➤ Which indicators to be used at the regional level?

In spite of this limitations, we are able to calculate with a high degree of accuracy the two fundamental indicators for our research :

For measuring fertility we used **Total fertility rates**. We were able to produce annual TFR since 1975, based on age specific fertility rates by governorats

For measuring nuptiality, we used **Mean age at First marriage**. Unfortunately we could not produce direct measurement since 1975 but indirect Hajnal indicator based on proportions of never married women observed at censuses.

Only of the years since 2005, it was possible to build nuptiality tables by governorat and compute mean age at 1st marriage directly.

For all these measures, we had redistributed proportionally births with unknown age of the mother and marriages with unknown age at marriage.

2. Trends in geographical variation of fertility

➤ Trends in TFR

The rapid fertility decline until 1999 followed by stabilisation during the years 2000s, that we observed at the national level, occurred in every governorate.

But rather important differences appear mainly resulting into a strong convergence towards the stabilisation around 2 children per woman.

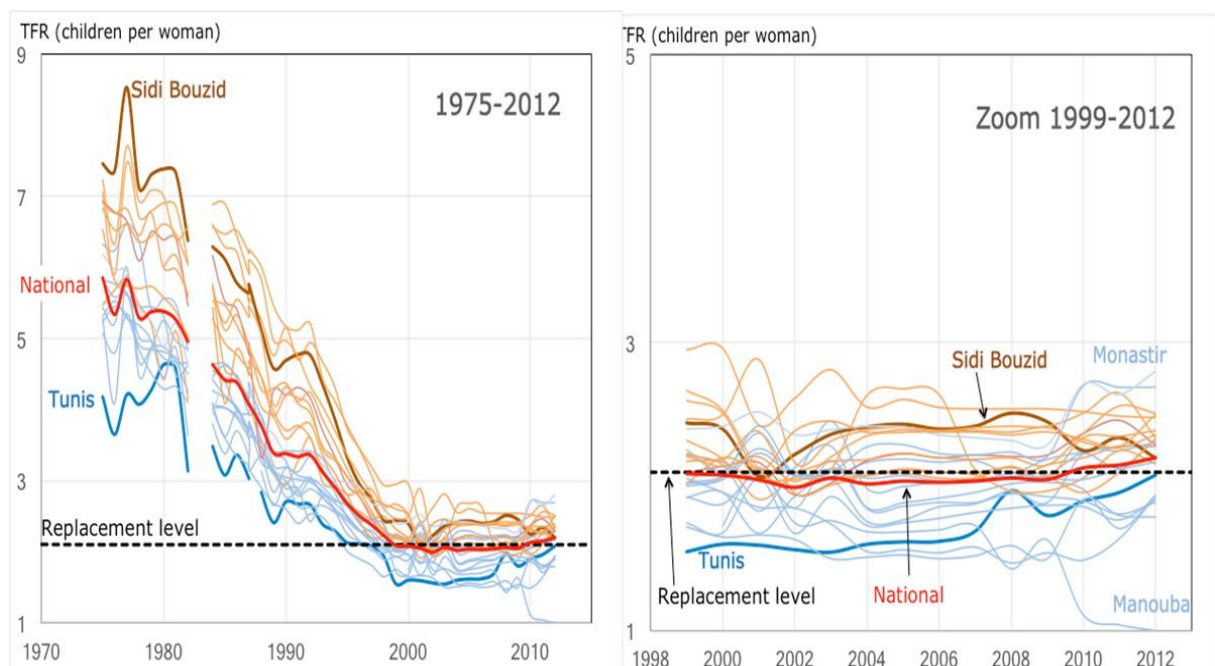
In the 1970s, the maximum gap was as large as 4.2 children per woman (between 8.4 in Sidi Bouzid and 4.2 in Tunis).

In 1999, the gap between these two governorates was reduced to 0.9 only.

It is true that at that time the maximum fertility was no longer observed in Sidi Bouzid but in Kasserine and the maximal gap was about 1.4 between 1.55 children per woman in Tunis and 2.95 in Kasserine.

This reveals that in spite of some general trends, important changes of geographical structure in fertility are observed.

This is even more obvious when looking at the most recent fluctuations around the current low level of fertility as you can see on the right part of the graph which gives a zoom of the most recent years.



The 6 following maps illustrate the geography of fertility in such way that follow general trends by mapping the level of fertility with the same range of values (from a minimum of 1 child per woman observed in 2012 to a maximum of 7.45 in 1975)

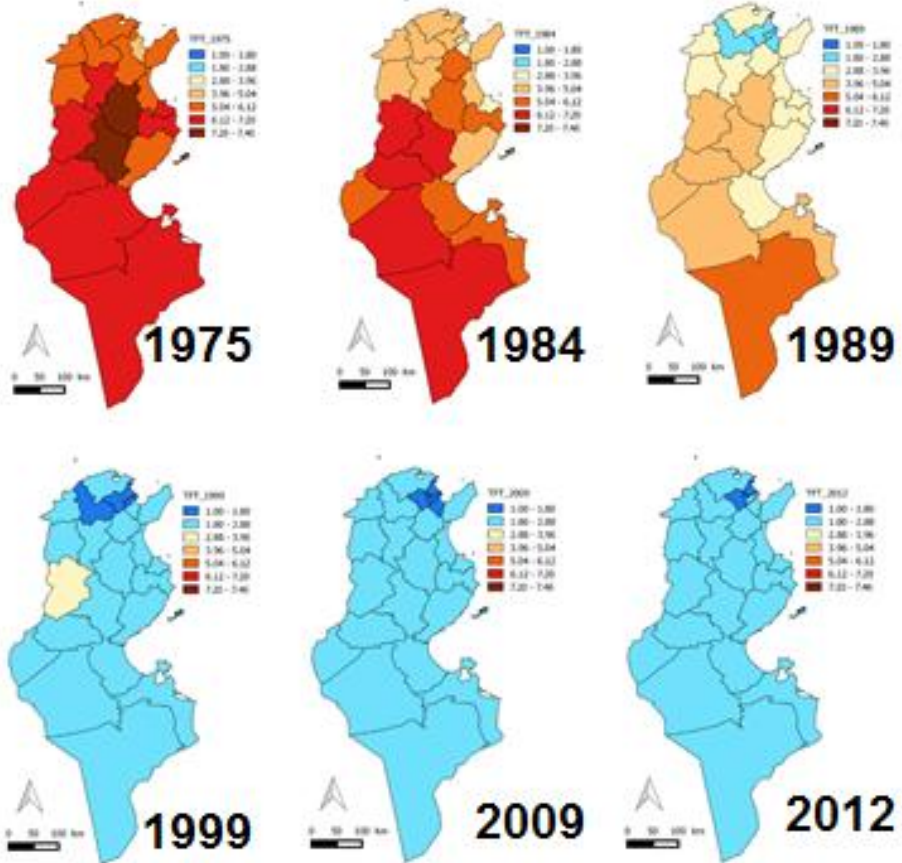
Thus, the 1st map of 1975 is quite red and the two following maps show the transition to the lower values in blue while the three following maps reflect the recent stabilisation.

These maps were constructed with the most interesting years. 1999 and 2009 are mapped to illustrate the results of the historical decline in Tunisian fertility and a possible turning point toward a new increase. For the rest, we took the 1st available year 1975, the last available one 2012 and two intermediate points (1984 and 1989) to better describe the period of declining fertility

In the middle of the 70s, fertility was at its maximum in the center of the country (Sidi Bouzid and Kairouan) and the lowest level was observed in Tunis.

15 years later, the maximum moved to the very south (Tataouine) while a clear divide of Tunisia into 3 parts appears opposing the south to the coastal regions with the center region in between. However, 10 years later, such huge contrasts almost disappear with the spread of low fertility everywhere.

TFR by
gouvernorat
from 1975
to 2012

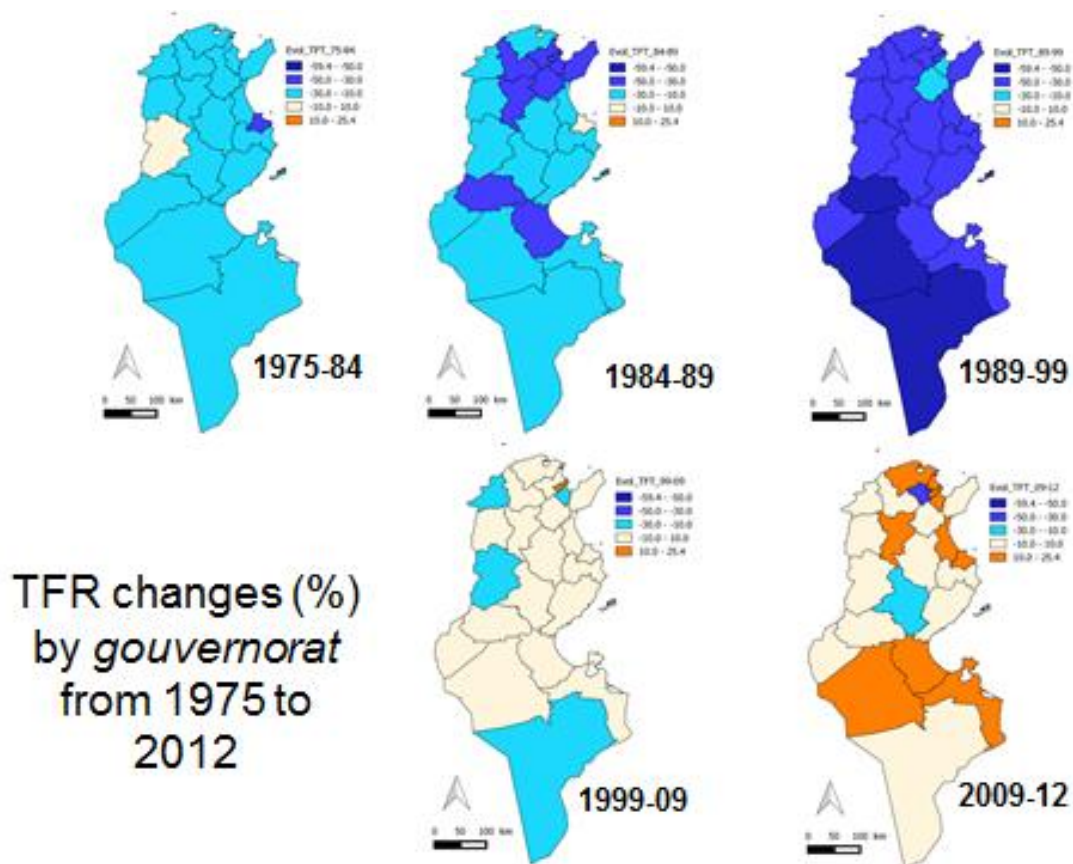


These 5 maps illustrate the speed and the direction of the change. Blue is getting down, orange is getting up.

Changes vary from of un minimum of -55% to a maximum of +62%

We see here, how much the fertility decline spread out very fast from 1975 to 1999 with a strong acceleration in the 3rd period (from 1989 to 99)

By contrast, we see the stabilisation in 1999 to 2009 and the start of a new rise in some governorats for the last 3 years

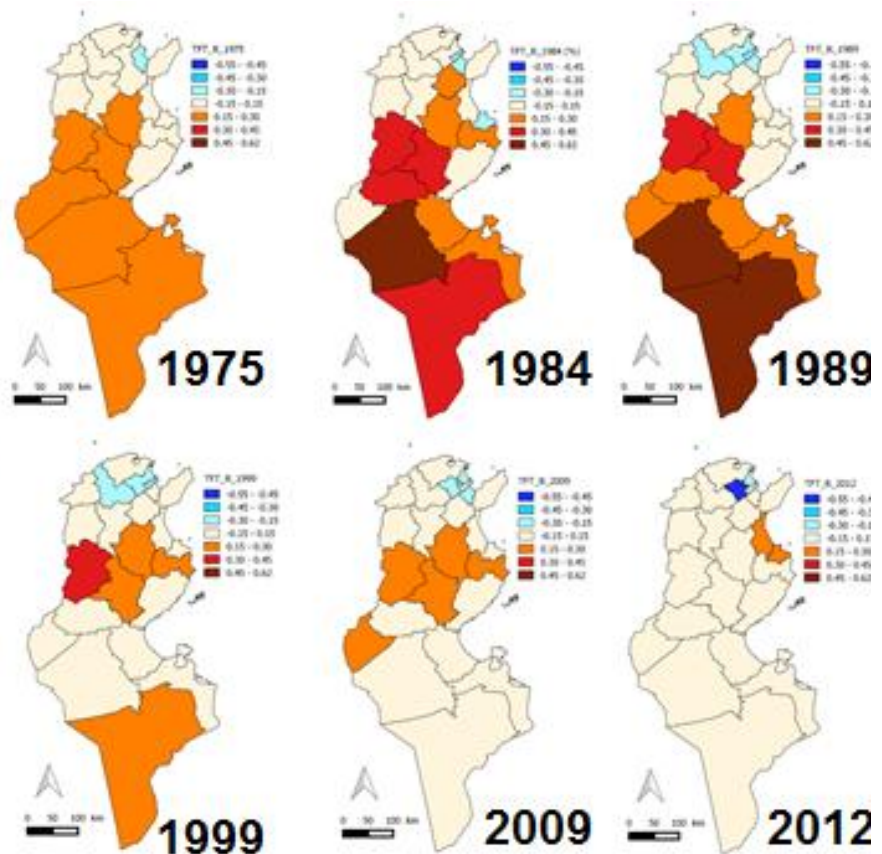


In the 6 final maps concerning fertility changes, we can appreciate better the change in relative geographical diversity by ranking the gap with the mean national level.

Clearly the two first steps of declining fertility lead to the maximum of geographical diversity when the maximum fertility was characterising the south.

On the contrary the last step of decline and of course the time of stailisation resulted in a vanishing diversity.

Relative TFR by *gouvernorat* from 1975 to 2012



3. Trends in geographical variation of nuptiality

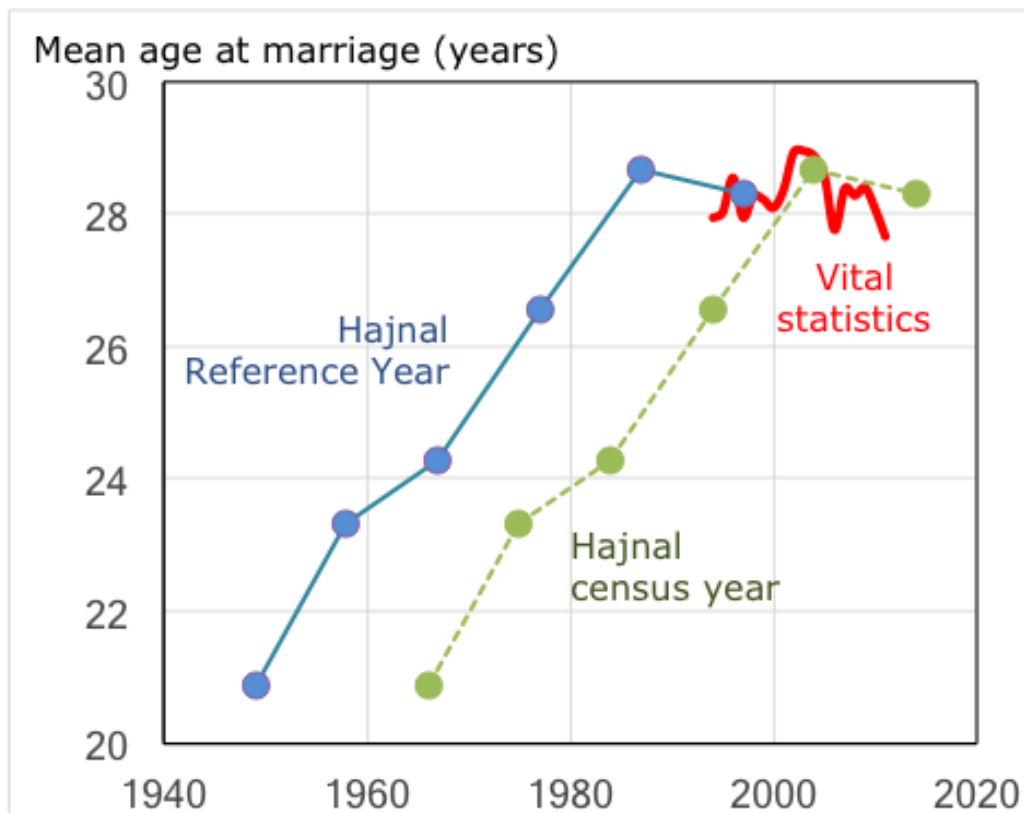
Before trying to compare geographical trends in fertility to those of one of its main determinants, the nuptiality, let us have a look on the national trends in mean age at first marriage (MAFM).

As I told you before, we have direct measure at the national level for the years since 1989 only (in red on the graph). Fortunately we can complete them by computing Hajnal indicators from census data. However, these measures, reflect the mean nuptiality of various cohorts that get married during various years in the past. To combine these information with direct measurements it is necessary to know the mean time spent between their marriage and the census. Thanks to a special tabulation of the age at marriage declared by ever married women at the 2014 census, we were able to estimate it at about 17 years.

Consequently, instead of the year of the census (in green on the graph) a reference year (in blue on the graph) is to be considered to extend to the past the trend shown by the red line of the mean ages at marriage directly measured.

This graph shows how fast age at first marriage grew in the past, from about 21 in the 1950s to more than 28 at the end of the 1980s. But it also shows that such an increase stopped in

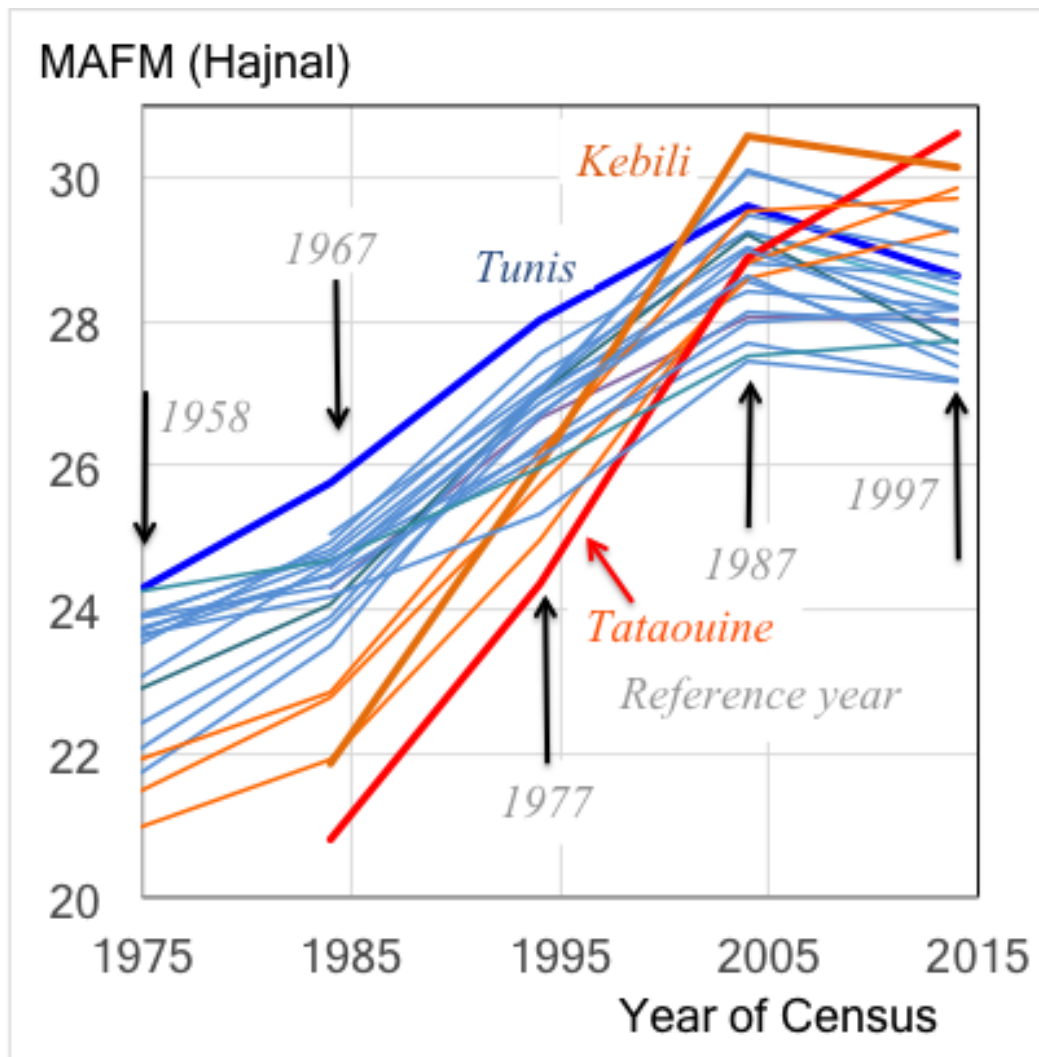
the early 1990s almost ten years before fertility also stabilized. It even seems to have slightly decreased in the recent years, sooner than fertility started to increase again.



The next graph, based on Hajnal indicator (the only one that we can compute by gouvernorats before 2005), shows that a rather similar scheme is observed at the level of gouvernorats. However, as for fertility, important differences appear among them.

During the period of rising Mean age at 1st marriage, the speed of rise varies a lot : Very fast increases in Kebili and Tataouine contrast with much slower ones in Tunis, for example.

Even more important, the stabilisation observed at the national level during the more recent period from 1987 to 1997 appears to be the results of a clear divergence between gouvernorats where MAFM continues to increase (including Tataouine) and others gouvernorats where it is deeply decreasing (including Tunis).



As for fertility, in order to follow general trends we have constructed 6 maps to illustrate the geography of nuptiality and we also mapped the level of nuptiality with the same range of value varying from a minimum of 20.6 years to a maximum of 30.6 years

In this case, the choice of the mapped years is based on the available data which are those of the 5 last censuses (1975, 84, 94, 2004 and 2014).

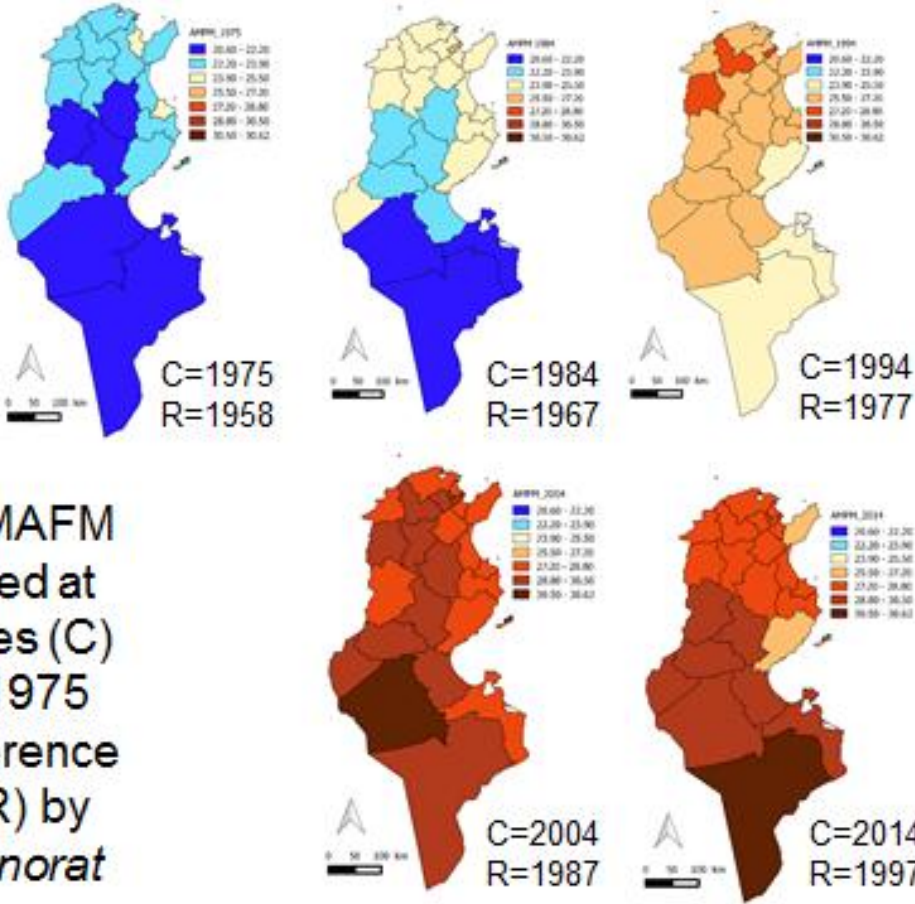
As we saw previously, the reference year of this indicator is delayed in the past with about 17 years. So these maps are presented here with two dates (the year of observation and the reference year)

In contrast with the fertility maps, we can see that the 1st map of 1958 is quite blue, meaning a low level of age at marriage with a two-part stratification: the south and the center contrasting with the rest of the country.

The two second maps refer to the level of age at marriage in 1967 and 1977 corresponding to the 1st period of fertility decline.

These maps show an increasing of female age at 1st marriage and with a clear stratification North, center and south in 1977.

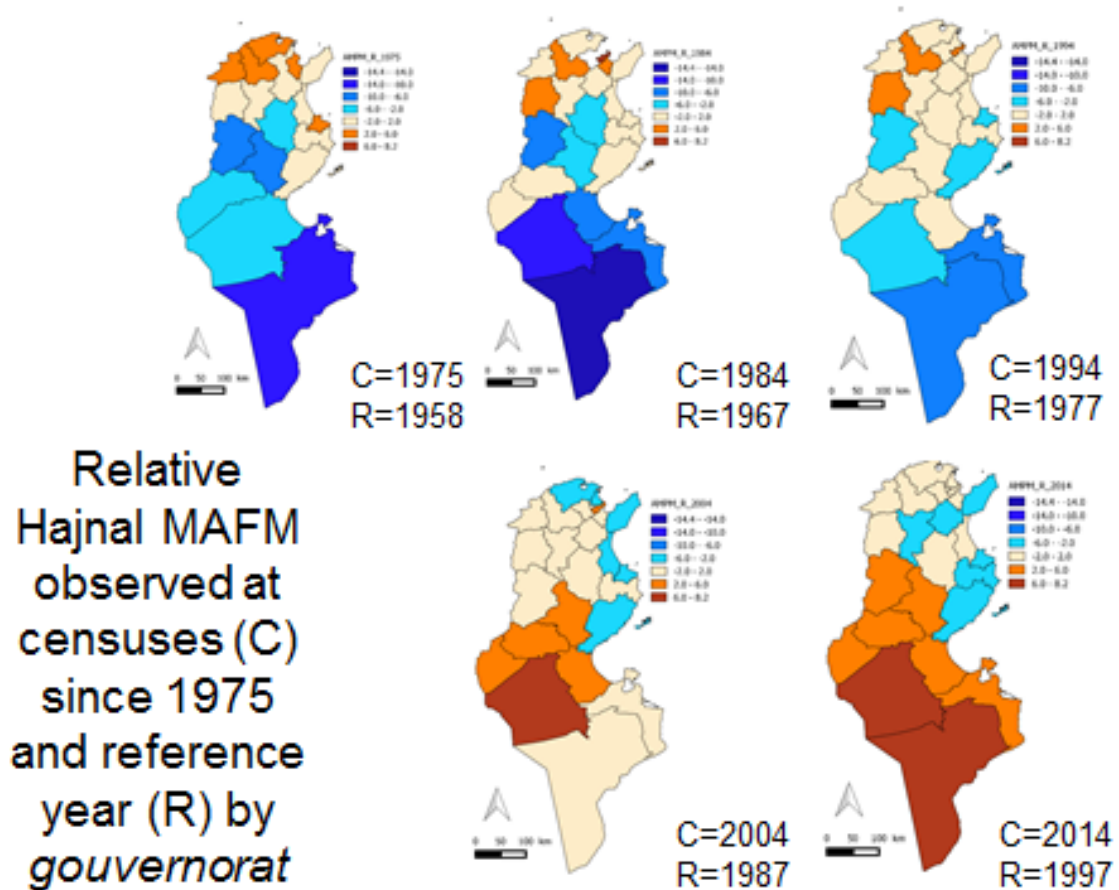
In 1987 and 1997, maps became completely orange that Means age at 1st marriage increased everywhere with 3 clear parts increasing levels from north to south. The gouvernorats who had the lowest level of marriage became those where ages at marriage increases more quickly.



Hajnal MAFM observed at censuses (C) since 1975 and reference year (R) by *gouvernorat*

To make clearer the geographical diversity of nuptiality trends, we produced 5 other maps of the mean age1st marriage by ranking the gap with the mean national level, as we do it for fertility.

The two latest maps that refers to the period of fertility analysed here, shows an increasing of the diversity between 1987 and 1997, corresponding to the last period of fertility decline.



4. Link between change in MAFM and change in TFR by *Gouvernorat*

Let us see now in what extent the impact of changing age at marriage on fertility trends results in some correlation between the fertility and nuptiality geographies.

As we know, at the national level, the fertility decrease was mainly due to two main factors: increasing female age at marriage and spread of contraception.

Unfortunately we have no data on contraception by *gouvernorat*. What about age at marriage?

- First at the time of fertility decrease

- Second during the fertility stabilisation

- **At the time of the historical fall of fertility, we must distinguish two periods:**

- when age at marriage was growing (till the end of the 1980s (seen on left graph)

- When age at marriage stabilizes during the 1990s (on the right graph)

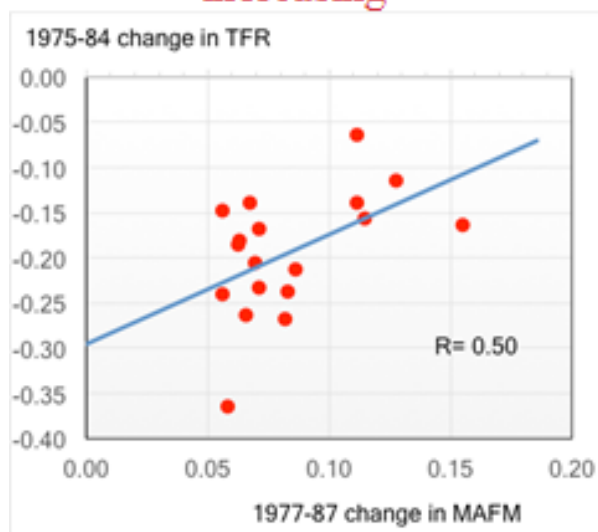
We compare here the amount of decrease in fertility to the amount of increase in age at marriage.

On the left, we observe a negative relation: the more the age at marriage increases, the less the fertility decreases. This means that in the governorats where fertility decreases the more, age at marriage was already high and did not increase much, while in the governorats where the fertility decreases the less it was the reverse.

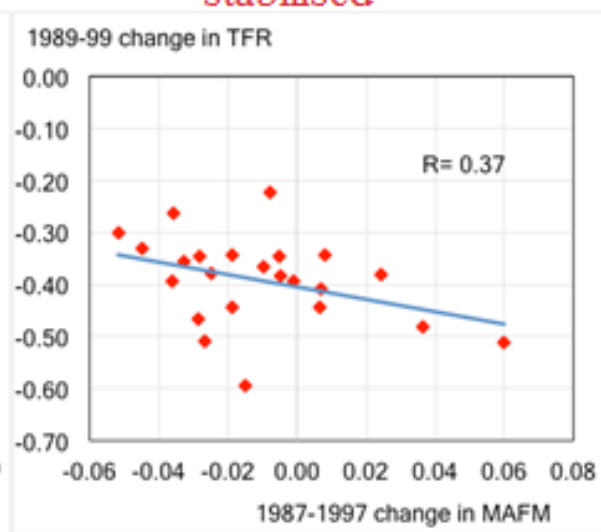
On the contrary, the right graph shows a positive relation, which means that the governorats that were late to increase age at marriage are catching up those which were in advance.

During a period of fertility decline

When age at marriage was increasing



When age at marriage stabilised



When fertility ceased declining

When fertility stabilises

When fertility increases

