FOREIGNERS' CONTRIBUTION TO THE EVOLUTION OF FERTILITY IN ITALY: A RE-EXAMINATION ON THE DECADE 2001-2011

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1. Introduction

Immigration to Italy has dramatically increased in the last two decades (Strozza, 2010), counterbalancing fertility that, like other Southern countries, had reached in the mid-nineties lowest-low levels (Delgado Perez and Livi Bacci, 1992; Kohler *et al.*, 2002). The proportion of foreigners within our borders has dramatically increased in the last 12 years passing from 2.4% at the end of 2001 to around 8% in 2013, bringing Italy to be the fourth country in EU for number of foreign population (Strozza and Buonomo, 2014). In the last decade Italy has also experienced a slight recover of fertility, passing from a Total Fertility Rate (TFR) of 1.2 in 1999 to 1.4 in 2011. In the same period the incidence of births from foreign mothers has also increased passing from 4% in 1999 to 20% in 2013. We know that values of period TFR recorded by foreign women were remarkably higher than those of nationals. At the same time, mean age at childbearing is significantly lower than that of native women. Although the synthetic values of period fertility for migrants must be considered with great caution (see Toulemon, 2004), they give an indication of the contribution of foreign population to changes in fertility indicators. The aim of this article is to measure the contribution of foreign women to the variation in the period 2001-2011 of the intensity and the timing of the fertility of the female population living in Italy. To this end, it will be proposed and used specific decomposition models.

The paper is structured as follow: the next section contains the theoretical framework of the research; in the third section, the data and the method of analysis are described; in the fourth and fifth sections the results coming from decomposition models and concerning respectively the variation of TFR and mean age at childbearing are illustrated, in the final section, the main outcomes are discussed.

2. Theoretical background

Although the issue of migrants' childbearing has risen importance in the last decades, especially in Europe, only a handful of studies has explicitly looked at

levels and patterns of fertility of immigrants compared to those of natives over time. Studies estimating the contribution of foreigners to fertility levels in the destination countries are even less, leaving this field still largely unexplored.

Furthermore, the most of population forecasting takes into consideration only the direct influence of immigration on population size and composition, ignoring the remarkable indirect contribution given by immigrants reproductive behaviors (Sobotka, 2008). The few studies that estimate immigration demographic impact, taking fertility into account, show diverging results: from an extreme high impact in countries like Estonia, Belgium and Switzerland to small influence in Norway, where the strong growth of immigrant population has paralleled the continued increase of native population (Haug *et al.*, 2002).

However the estimation of the impact of immigrant fertility is not straightforward as it may seem. First of all, it can appear of a different magnitude whether we look at number of births from immigrant parents or to the net contribution of immigrant fertility to TFR of the total population. Generally the former is much larger than the contribution over TFR. In fact, although immigrant women have higher fertility level than native women, they represent a limited share of population, and thus the effect of higher fertility on overall TFR is minimal. This has been excellently pointed out by Heran and Pison (2007) for France. In that context foreign women accounted for about 12% of births in 2004, but these extra births increased period TFR of France by just 0.1. Similar results have been achieved for Belgium (Poulain and Perrin, 2002); Swizerland (Wanner, 2002), Spain (Roig Vila and Castro Martìn, 2007) and Italy (ISTAT, 2012), with net effects of fertility of foreign women on period TFR ranging from 0.07 to 0.14. A recent study performed in the Belgian region of Flanders has estimated the contribution of a specific subgroup of immigrant population, i.e. foreign women who acquired the host country nationality, showing that their contribution to TFR is limited to 0.01 (Van Landschoot *et al.*, 2014).

The existing evidence consistently indicates that the contribution of foreign women to period total fertility rate is limited, albeit births from foreign parents represents a remarkable share of total number of births. However, as far as we are concern, no studies have ever highlighted the contribution of foreigners' fertility to "temporal change in period TFR and mean age at childbearing". This issue can be particularly interesting in low fertility countries where a slight recovery on fertility has been observed. In such a situation it can be reasonable to suppose that foreign population plays a more important role on the fertility recover, rather than the general fertility level. Furthermore, immigration may slow the rise in the average age at childbearing due to reduced fertility at young ages and the intensification of late fertility. This work tries to give a contribution in this direction, disentangling the contribution of foreigners to TFR and mean age at child bearing variation in Italy over the period 2001-2011.

3. Data and methods

We make use only of ISTAT aggregated statistics: census data for the enumeration of reference populations and vital statistics for the estimation of births. In particular, the study focused on the period 2001-2011 using data coming from Survey on Live Births (i.e. vital statistics, recorded by Municipal Population Registers) and the last two (2001 and 2011) demographic censuses. Both the sources allow us to have information on age and citizenship of the woman, and therefore to calculate 5-year age-specific fertility rates by citizenship (Italian and foreign citizens).

Decomposition methods of TFR variations (Strozza *et al.*, 2007) have been used in order to quantify the contribution of the foreign component to the total period fertility rate. The model makes it possible to measure the absolute and relative contribution of national and foreign women to total fertility. The absolute variation of the TFR in a given period is decomposed in three effects: a) TFR variation of national women; b) TFR variation of foreign women; c) variation of foreign women's incidence in the reproductive age group.

Following a classical approach, the contribution of each of the three factors was assessed as simple effects; the effects of conjoint variation of two factors are hypothesized to be equally distributed over the single factors.

Period fertility (*TFR*) can be expressed as the sum by age of the average of age-specific fertility rate of Italians (f_x^I) and foreign women (f_x^F) weighted with the proportion of the two national groups (${}_t\bar{d}_x^I$ and ${}_t\bar{d}_x^F$) in every given age:

$$TFR = \sum_x f_x = \sum_x f_x^I \cdot \bar{d}_x^I + f_x^F \cdot \bar{d}_x^F = \sum_x f_x^I \cdot \bar{d}_x^I + \sum_x f_x^F \cdot \bar{d}_x^F$$

The variation of TFR between two years (0 and 1) can be expressed as follows:

$${}_1TFR - {}_0TFR = \sum {}_1 f_x^I \cdot {}_1\bar{d}_x^I - \sum {}_0 f_x^I \cdot {}_0\bar{d}_x^I + \sum {}_1 f_x^F \cdot {}_t\bar{d}_x^F - \sum {}_0 f_x^F \cdot {}_0\bar{d}_x^F$$

And with simple passages we arrive to this formulation where the three components are isolated:

$${}_1TFR - {}_0TFR = \left[\tfrac{1}{2} \sum ({}_1\bar{d}_x^I + {}_0\bar{d}_x^I) \cdot ({}_1f_x^I - {}_0f_x^I) \right] + \left[\tfrac{1}{2} \sum ({}_1\bar{d}_x^F + {}_0\bar{d}_x^F) \cdot ({}_1f_x^F - {}_0f_x^F) \right] +$$

$$+ \left[\tfrac{1}{2} \sum [({}_1f_x^F + {}_0f_x^F) - ({}_1f_x^I + {}_0f_x^I)] \cdot ({}_1\bar{d}_x^F - {}_0\bar{d}_x^F) \right]$$

The first factor is the effect due to the variation of fertility of Italians, the second the effect due to the change in fertility of foreigners and the last one captures the effect of the variation in the proportion of foreigners over total population (weighted for the "excess of fertility" of foreign women with respect to natives).

A similar model can be applied for the first time to mean age at birth in order to get an estimation of the contribution of migrants to timing of fertility in the total population. The hypothesis is that a slowing down in the increase of mean age at birth can be explained by the effect of the younger age at childbearing of foreign women. We intend to decompose the variations in mean age at birth in: a) variation in mean age at birth of Italian women; b) variation in mean age at birth of foreign women; c) variation of the contribution of foreign women to total period fertility.

Mean age at childbearing ($\bar{x}$) for the general population can be expressed as the weighted mean of mean age at childbearing of Italian and foreign women ($\bar{x}^I$ and $\bar{x}^F$) with weights that are equal to the contribution of each of the two groups to period TFR:

$$\bar{x} = \frac{\sum (x+\frac{1}{2}) \cdot f_x}{\sum f_x} = \frac{\sum (x+\frac{1}{2}) \cdot \left[f_x^I (1-\bar{d}_x^F) + f_x^F \bar{d}_x^F \right]}{TFT} =$$

$$= \bar{x}^I \cdot \frac{\sum f_x^I (1-\bar{d}_x^F)}{TFR} + \bar{x}^F \cdot \frac{\sum f_x^F \cdot \bar{d}_x^F}{TFR}$$

In truth, the values of $\bar{x}^I$ and $\bar{x}^F$ are similar (especially for Italians) but not equal to the mean age at childbearing of Italians and foreigners, being weighted averages of age with weights given by the age-specific fertility rates multiplied by the proportion of women of that given citizenship in each age. These two values are exactly equal to the mean age at childbearing of Italian and foreign women only if the share of foreign women is constant in all reproductive age ($\bar{d}_x^F = \bar{d}^F$).

According to the previous formulation, the variation of mean age at childbearing between two years (0 and 1) can be expressed as follows:

$${}_1\bar{x} - {}_0\bar{x} = {}_1\bar{x}^I \cdot \frac{\sum_1 f_x^I (1-{}_1\bar{d}_x^F)}{{}_1TFR} + {}_1\bar{x}^F \cdot \frac{\sum_1 f_x^F \, {}_1\bar{d}_x^F}{{}_1TFR} - {}_0\bar{x}^I \cdot \frac{\sum_0 f_x^I (1-{}_0\bar{d}_x^F)}{{}_0TFR} - {}_0\bar{x}^S \cdot \frac{\sum_0 f_x^F \, {}_0\bar{d}_x^F}{{}_0TFR}$$

We define the contribution of Italian and foreign women to period TFR (*CTFR*) as follows: $CTFR^F = \frac{\sum f_x^F \cdot \bar{d}_x^F}{TFR}$ $\qquad$ $CTFR^I = (1-CTFR^I) = \frac{\sum f_x^I (1-\bar{d}_x^F)}{TFR}$

Consequently, the variation of mean age at childbearing between two years can be rewritten as follows: ${}_1\bar{x}-{}_0\bar{x}={}_1\bar{x}^I\cdot{}_1CTFR^I+{}_1\bar{x}^F\cdot{}_1CTFR^F-{}_0\bar{x}^I\cdot{}_0CTFR^I-{}_0\bar{x}^F\cdot{}_0CTFR^F$. Through simple steps and in the hypothesis of equidistribution of interactions between the single effects we can express the variation of mean age at childbearing as the sum of three components:

$${}_1\bar{x}-{}_0\bar{x}=\frac{1}{2}\cdot({}_1CTFR^I+{}_0CTFR^I)\cdot({}_1\bar{x}^I-{}_0\bar{x}^I)+\frac{1}{2}\cdot({}_1CTFR^F+{}_0CTFR^F)\cdot({}_1\bar{x}^F-{}_0\bar{x}^F)+$$

$$\frac{1}{2}\cdot[({}_1\bar{x}^F+{}_0\bar{x}^F)-({}_1\bar{x}^I+{}_0\bar{x}^I)]\cdot({}_1CTFR^F-{}_0CTFR^F)$$

The first component represents the effect due to the temporal variation of mean age at childbearing of Italians (weighted with Italians average contribution to TFR over the period), the second component represents the effect of variation of mean age at childbearing of foreigners (weighted with their average contribution to TFR over the period) and the last component expresses the effect produced by the variation of the contribution of foreign women to total fertility rate (multiplied by the difference between foreign and Italian women in their mean age at childbearing, considered for both groups as the average of the two examined years).

4. Descriptive results: fertility changes in the decade 2001-2011

Over the whole period 2001-2011 we can appreciate a positive variation of TFR for the general population (190‰), which it is the average of very different situations at territorial level: Central and Northern divisions of Italy register a quite substantial recovery, whereas Southern part and Islands present stable TFR or minimal increase (Table 1). This result is paralleled by that of mean age at childbearing, which increases all over the Country, but the magnitude of the increase is much stronger in South and Islands, where the TFR did not experience any recovery.

A more detailed territorial overview of fertility variations between 2001 and 2011is illustrated in Figure 1. The regions that drive the recovery of TFR are Lazio and Lombardy, the two regions with the highest number of foreign residents, followed by Emilia-Romagna, Valle d'Aosta and Friuli Venezia-Giulia. All the South is characterized by very low changes in TFR, which are even in the negative direction for 2 regions: Campania and Basilicata. The map of mean age at childbearing variation substantially mirrors the one of TFR variation. The strongest increase (more than 1 year) concerns South and Islands, while Central and particularly in Northern regions register smaller increases.

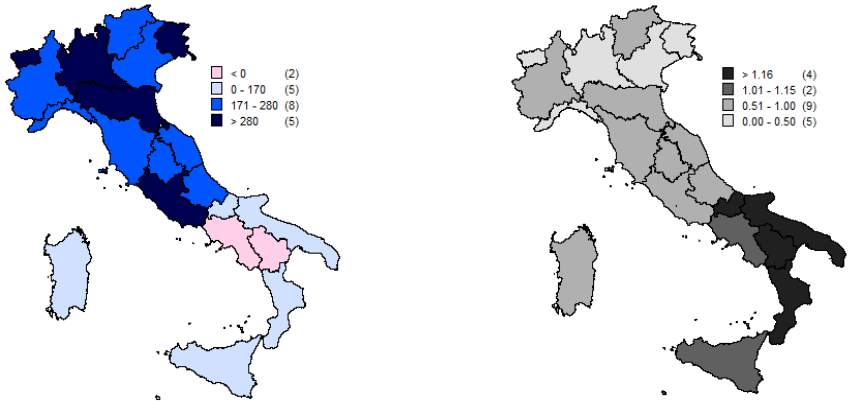
Table 1 – *TFR and mean age at childbearing in 2001 and 2011 and absolute variation by geographical division.*

Geographic divisions	TFR (‰)			Mean age at childbearing		
	2001	2011	Difference	2001	2011	Difference
North-West	1,193	1,500	307	30.9	31.4	0.4
Nord-East	1,227	1,498	271	30.9	31.3	0.4
Centre	1,168	1,440	272	31.2	31.7	0.5
South	1,347	1,362	15	30.0	31.1	1.1
Islands	1,277	1,369	92	29.8	30.8	1.0
ITALY	1,250	1,441	190	30.5	31.3	0.8

Source: Istat data.

Figure 1 – *Variation of TFR and mean age at childbearing in Italian regions, period 2001-2011.*

a. Variation of TFR *b. Variation of mean age at childbearing*



5. Results from decomposition models

After observing the temporal trend of fertility indicators we intended to better understand the role played by foreigners' on fertility changes. Table 2 and Figure 2 show the results of decomposition model for TFR. The decomposition model illustrates clearly how the components that contribute more to the fertility recovery are positive changes of TFR of Italian women together with the increase of the proportion of foreigners over the total population. In matter of fact, TFR of foreign women is decreasing over the whole period and in all the geographical repartitions, thus it cannot be responsible for the fertility recovery observed.

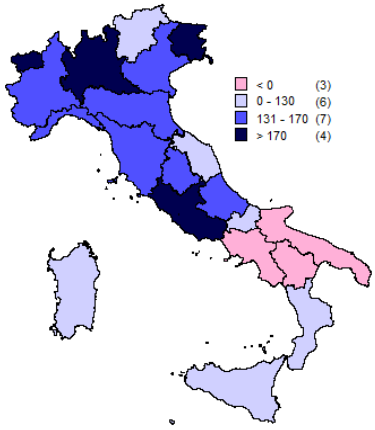
Table 2 – *Decomposition of TFR change in 2001-2011 period by Italian geographic division.*

Geographic divisions	Variation of TFR (per 1,000 women)	Effects due to variation of			Total foreigners' contribution (b+c)
		TFR of Italians (a)	TFR of foreigners (b)	Share of foreigners (c)	
North-West	308	170	-17	155	138
Nord-East	274	144	-30	159	130
Centre	273	202	-53	123	71
South	6	-11	-8	25	17
Islands	78	58	-7	27	20
ITALY	187	113	-22	96	74

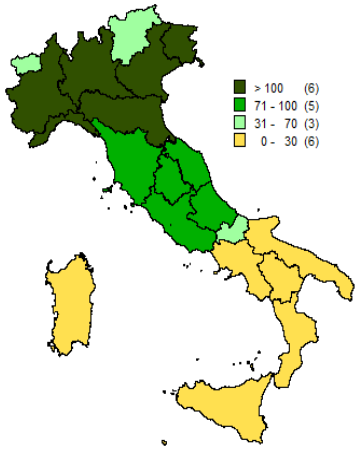
Source: our elaboration from Istat data.

Figure 2 - *Contribution of Italians and foreigners to TFR variation in 2001-2011 period by Italian regions.*

a. Effect due to variation of TFR of Italians



b. Total foreigners' contribution



We expected fertility recovery to be not linear over the decade 2001-2011, thus we split the decade in 3 sub-periods (2001-2004, 2004-2008 and 2008-2011) and observed TFR variation in these intervals (Table 3). This analysis showed how the most of the TFR growth takes place in the period 2004-2008, in which the change is double than what is observed in the previous interval. Conversely the last sub-period, 2008-2011, gives almost no contribution to the fertility recovery. Of course, it is confirmed that the growth of the TFR is limited to central and northern divisions of the country. During the period 2004-2008 the increase was nearly 0.2 children per woman, for more than half due to the recovery of fertility of Italian women.

Table 3 – *Decomposition of TFR changes in sub-periods 2001-2004, 2004-2008 and 2008-2011 by Italian geographic division.*

Geographic divisions	Variation of TFR (per 1,000 women)	Effects due to variation of		
		TFR of Italians	TFR of foreigners	Share of foreigners
North-West	93	54	-3	42
North-East	92	42	2	47
Centre	89	79	-17	27
South	-5	-5	-3	3
Islands	31	32	-3	2
ITALY	59	41	-5	23
		2004-2008		
North-West	196	106	16	74
North-East	169	87	-3	85
Centre	163	113	-4	54
South	30	17	2	11
Islands	35	20	2	13
ITALY	121	72	4	46
		2008-2011		
North-West	19	12	-36	43
North-East	13	16	-39	37
Centre	21	13	-28	36
South	-19	-23	-7	10
Islands	11	7	-7	11
ITALY	7	2	-23	28

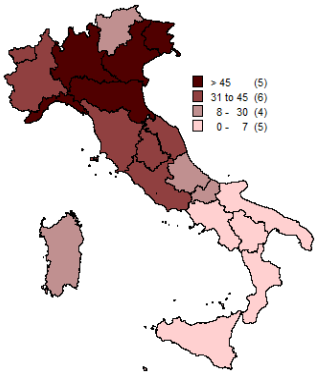
Table 4 and Figure 3 show the results of decomposition model for mean age at childbearing. The increase of mean age at birth is due to an increase of the age at childbearing for Italian women (about 1 year) which is slowed down by the growing contribution of foreign women to fertility, a sub-population with a significantly slower men age at childbearing. This containment of the increase of mean age at childbearing is especially pronounced in the North, whereas it is almost inexistent in South and Islands. Mean age at birth of foreign women does not register substantial changes over 2001-2011; however the trend is in the direction of a slight increase, thus there is no containment due to a modification of age profile of foreign fertility behaviors. It should be remembered, however, that foreign women have a mean age at childbearing of a little over 28 years, about 4 years less than Italian women. Therefore the increase in the weight of foreigners among women in reproductive age increases their contribution to fertility and in this way determines the containment of raising mean age at childbearing of all women residing in Italy. In the last column of table 4 we expressed this containment to the increase of mean age at childbearing as percentage with respect to the increase that would be observed in absence of foreign presence.

Table 4 – *Decomposition of mean age at childbearing change in 2001-2011 period by geographic division.*

Geographic divisions	Variation of mean age at birth	Effects due to variation of			Containment due to foreigners (%)
		Mean age at birth of Italians	Mean age at birth of foreigners	contribution of foreigners to TFR	
North-West	0.44	0.89	0.17	-0.62	50.2
North-East	0.40	0.86	0.20	-0.65	54.6
Centre	0.50	0.91	0.04	-0.45	37.9
South	1.11	1.18	0.02	-0.10	5.7
Islands	1.00	1.06	0.00	-0.06	3.8
ITALY	0.76	1.02	0.08	-0.34	23.9

Source: our elaboration from Istat data.

Figure 3 – *Containment of mean age at childbearing due to foreigners by Italian regions, 2001-2011 period*



As for TFR also the increasing trend of mean age at childbearing was expected to follow a nonlinear trend over the decade. We observed the same sub-periods already discussed for TFR (Table 5). In the Southern regions the increase is almost linear with a pace of 0.3-0.4 years in all of the three sub-periods. Differently in the rest of Italy there is no substantial increase until 2008, and mean age at childbearing registers a significant positive variation only in the last sub-period under examination. This effect is largely due to the cessation of the containment effect exerted by the increasing importance of foreign contribution to period TFR.

Although mean age at childbearing did not vary among foreigners over the whole period, it remains on average largely lower that the one of Italians; thus, foreigners increasing importance in determining the overall levels of fertility indirectly produce a slowdown of the process of increasing mean age at birth. This effects stops in 2008-2011, when fertility of foreigners starts to decrease (see Table 3) producing a reducing indirect effect over mean age at childbearing.

Table 5 – *Decomposition of mean age at childbearing changes in sub-periods 2001-2004, 2004-2008 and 2008-2011 by Italian geographic division.*

Geographic divisions	Variation of mean age at birth	Effects due to variation of		
		Mean age at birth of Italians	Mean age at birth of foreigners	Contribution of foreigners to TFR
North-West	0.14	0.33	0.00	-0.19
North-East	0.06	0.29	0.00	-0.23
Centre	0.11	0.26	-0.03	-0.13
South	0.37	0.38	0.01	-0.02
Islands	0.36	0.37	0.00	-0.01
ITALY	0.24	0.34	0.00	-0.09
		2004-2008		
North-West	0.06	0.37	0.04	-0.35
North-East	0.09	0.37	0.08	-0.37
Centre	0.22	0.44	0.01	-0.23
South	0.44	0.49	0.00	-0.05
Islands	0.39	0.45	-0.01	-0.04
ITALY	0.27	0.45	0.02	-0.19
		2008-2011		
North-West	0.24	0.18	0.17	-0.12
North-East	0.26	0.19	0.17	-0.10
Centre	0.17	0.21	0.08	-0.12
South	0.30	0.32	0.01	-0.03
Islands	0.24	0.25	0.01	-0.03
ITALY	0.25	0.24	0.09	-0.08

6. Discussion

This work explores for the first time the contribution given by immigrant women not just on period TFR, rather to fertility change over a decade (2001-2011). What has been observed for the Italian context is that the increase in TFR was determined in first place by fertility recovery of native women, and secondly by the incidence of foreign women over total population. The TFR of foreign women is, contrary to some expectations, decreased over time, but it remains higher than the one of Italian women. Concerning mean age at birth, the increasing trend was the consequence not only of the remarkable ageing of fertility among Italians, but also of a slight increase in age at birth among foreign women. However, the growing contribution of foreign women to TFR, with their younger age profile of fertility, has generally slowed down the process of increasing mean age at birth. This holds true at a National level, although with important differences among territorial divisions. In the Northern and Central part of Italy the recovery of fertility is connected with an increase of fertility rate of Italians, particularly at higher ages. Increase age at childbearing is due both to

the increase of Italians and foreigners, although this trend is counterbalanced by the growing weight of foreign women in determining period TFR. In the South TFR did not register any recovery, hence, the increase of age at birth is twice as high as that in the Central and Northern part of Italy, especially because of the smaller contribution that foreigners give to the total population in reproductive ages. Over time the most of TFR recovery took place in the interval 2004-2008, whereas the increase discontinued in 2008-2011, possibly because of the international economic crisis that Italy has intensely experienced in that period. In that same period age at childbearing increases significantly also in the areas of Centre and Northern Italy.

The contribution of immigration to fertility is a debated issue (Sobotka, 2008). This research has shed light on the role that immigration plays on fertility recovery, showing that when the temporal variation of fertility is considered, the impact of immigration is much stronger than when the simple period TFR is taken into account (Heran and Pison, 2007; Roig Vila and Castro Martìn, 2007).

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SUMMARY

Foreigners' contribution to the evolution of fertility in Italy: a re-examination on the decade 2001-2011

The aim of our article is to describe the evolution of migrants' fertility in Italy in the inter-census period (2001-2011) and to estimate its impact on the change of total fertility and mean age at childbearing at national and regional level. Making use of decomposition models we demonstrate as the recovery of TFR (concentrated in the period 2004-2008) was determined by Italians' fertility recovery and by the increasing weight of foreign women. The younger age pattern of foreign fertility, together with the growing contribution to total fertility, have generally slowed down the process of increasing mean age at childbearing of female residing in Italy.

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