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Fertility and Child Mortality in the Sardinian Demographic Transition. Micro-level evidence for Alghero (1866-1935)

Abstract

The reduction in infant and child mortality rates has been considered one of the key factors prompting fertility decline. However, our knowledge in this regard is still limited; the relationship between early life mortality and fertility, indeed, is complex since involves multiple dimensions that are difficult to disentangle. Furthermore up to now research on this topic has not permitted to measure adequately the interaction mechanisms involved, since it has mostly relied on aggregate data. This paper aims to explore this complex relationship during the Sardinian demographic transition on the basis of an individual level data set reconstructed for the north western community of Alghero for the years 1866-1935. Sardinian experience is particularly interesting because the island, where infant mortality rates were amongst the lowest in the country, has known the most delayed fertility decline process.

1. The study area

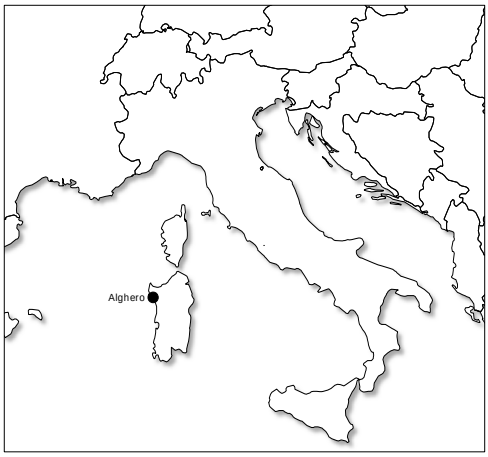
Alghero is a large costal town in north-western Sardinia that, before national unification (1861), formed part of the Kingdom of Sardinia, along with the regions of Piedmont and Liguria (figure 1). The first Italian Census (1861) records Alghero as having 8,831 inhabitants, making it the fourth biggest municipality on the island. Besides the urban centre, the municipality included the "Nurra", a vast area which was marshy and barely inhabited until the 1920-30's, which guaranteed Alghero a certain degree of geographical isolation. The nearest large towns were Sassari, the capital of the province, about 35 km away, and Villanova Monteleone, located on the adjacent hills, at a distance of 25 km. While there were a number of smaller communities nearby, their population rarely exceeded a few hundred, such as Olmedo and Putifigari. Alghero's isolation was ensured not only by geographical distance and weak communications, but also by its high town walls, which remained intact until the start of demolition in 1886[1], and the presence of the sea to the west.

Being a coastal town with a port, there were a large number of fishermen, sailors and coral fishers, as well as artisans and traders, which together accounted for 45% of the labour force. However, Alghero's socioeconomic structure was dominated by farmers and shepherds,

[1] In the late 19th Century, the old town structure was radically modified following the demolition of the walls that had long protected it (Principe 1983; Sari 1988a; 1988b; 1999).

which is unusual, considering its vicinity to the sea.

Figure 1. Geographical location of Alghero



The presence of a port and the Alghero's historical traditions gave rise to a particular social stratification which set the town apart from the rest of the island, which was almost homogenously agro-pastoral. While many occupations were connected to the sea, there was also a large spectrum of professions and trade-related services based in the town itself, and there was also a small but relevant group of "elite". Another of the town's peculiarities was the population concentration in the historical centre. The majority of farmers and fishermen, who worked elsewhere, lived in the town centre alongside the wholly town-based artisans, shopkeepers and service providers.

At the time of Italian unification, the Sardinian economy was based on agriculture, sheep-farming and mining. Farming was not intensive and was traditionally limited to olives, vines, fruits, cereals and legumes. The cultivation and production techniques were extremely rudimentary, giving rise to poor yields and unprofitable produce. Land use was organised according to a long standing semi-feudal land tenure system that was still prevalent in the late 19th century. Farmers endured especially low standards of living and were often obliged to supplement their modest earnings with additional activities such as sheep-farming or handicrafts (Coda 1977). According to the lists of indigent families kept in the local municipal historical archive, around 35-40% of families in Alghero were classed as "poor". Over three-quarters of the population were almost entirely illiterate, as was true throughout

the rest of Sardinia. The town's hygienic conditions were far from satisfactory, as attested by national surveys and a variety of documents (petitions, requests and protestations). The poor sewer system and population density, especially in the dirty harbour side alleys, meant that water provision was insufficient and of bad quality. These problems were partially addressed at the end of the 19th century and further improved in the early 20th century.

The health status of Alghero's population was very poor, as seen by the extremely high incidence of (permanent and temporary) discharge of young men from military service, accounting for over 50% of the cohorts born between 1866 and 1900 at first enrolment (Breschi et al. 2011). Furthermore, conscripts from Alghero initially show a downward trend in physical stature up to 1870-1874, with mean height diminishing from 160.0 cm to 158.2 cm before stabilising at around 158 cm (Manfredini et al. 2012). Malaria was endemic, trachoma was also particularly widespread among children (Melis, Pozzi, 2010) and tuberculosis was common (Tognotti 2012) - all clear signs of a continuous and enduring health "stress" afflicting the population.

2. Data and sources

The demographic data used in this study are taken from civil records of birth, death and marriage which were introduced in Sardinia in 1866, as decreed by the newly unified Kingdom of Italy. All the nominal data reported in the civil records (for the years 1866-1935) was digitised. Standard cross-check procedures were carried out to reconstruct individual biographies and family histories. Checks were made to verify the consistency between information reported in civil records and data from other sources, such as military enrolment records, Population Registers and family sheets from the 1921 Alghero census. Lastly, demographic information obtained from the civil status registers and data from parish registers of baptisms, burials and marriages were also combined. The crosschecking and combining of data from civil and religious sources was necessary to overcome the consequences of the long-standing state-church oppositions regarding marriage[2].

Adopting a cohort approach, our statistical analyses considered each couple's date of marriage from either church or municipal sources in the event of single registrations, or the

[2] For a more detailed analysis of this topic and the measures adopted to overcome the consequences of new marriage-related legislative proceedings see: Breschi et al. 2009; Mazzoni et al. 2013.

earlier of the two dates in the case of double registration. Particular attention was given to fertility patterns of Alghero's female population, married between 1866 and 1905, given the opportunity to trace their reproductive histories up to 1935[3]. For the purposes of our analysis, we first screened for marriages celebrated in Alghero between spouses who both claimed residency there. From this group we selected couples whose reproductive history duration could be established, or in other words, where it was possible to ascertain the end of the marriage reproductive history[4]. Lastly, to control for population mobility, the couples selected were included in the analysis up to the date of the last event recorded for a component of the respective family[5]. We selected a total number of 2,209 couples, which formed 79% of all marriages celebrated in Alghero between spouses with dual residency. The remaining 21% (about 542 cases) is presumed to consist of couples who migrated or were generally mobile. Our multivariate analysis took only 1,949 marriages into account because, as detailed below, we consider predominantly second or higher order births.

In order to analyse socio-professional differentials, particular attention was paid to the husband's occupation[6]. SES was stratified into occupational groups, coded according to the Historical International Standard Classification – HISCO – (Van Leeuwen, Mass, and Miles 2002), and each HISCO code was then converted into classes using HISCLASS (Van Leeuwen and Maas 2011). These classes were subsequently grouped into 6 categories, given in table 1. Given Alghero's socioeconomic structure described above, all professions were divided into two main groups: manual and non-manual workers. The former includes: "unskilled", "low-skilled", "farmers" and "skilled"[7]. "Unskilled" or "low-skilled" manual

[3] Note that for the most recent marriage cohorts (1901-05), we can trace the reproductive history young married women (under 20 years) up to the age of 45.

[4] Our analysis therefore includes: a) marriages where the date of death of both spouses is known; b) marriages where the date of death of one or both spouses was/were unknown but it was possible to reconstruct the reproductive history up until the end of the fertile period (woman aged 50 and over) thanks to the 1921 Census family sheets.

[5] Despite the lack of precise information on mobility, the detailed and wide-ranging set of data available allow for a fairly accurate identification of the entire reproductive history of resident couples. This data set is still being finalised, and we are currently engaged in the record linkage process using information from the 1961 Census family sheets. Notably, this census includes a marital fertility survey, the results of which, naturally refer only to the surviving women, are consistent with our reconstruction.

[6] Female occupational categories have no purpose in our analysis, since the overriding term used is "housekeeper" or the like.

[7] Craftsmen have been classed as "skilled" manual workers.

workers included the large number of fishermen and sailors, whereas “farmers” were kept separate because of their numerical relevance and specificities.

Within the “non-manual” workers group, the “low and medium skilled” category includes individuals linked to local public administration and services. The “higher occupation” category amounts to little over 1% of the total number of couples examined with a mere 20 couples, and includes only the most prestigious of professions (doctors, pharmacists, lawyers, engineers, professors, army officers, bank managers, local nobility and military).

Tab. 1. HISCLASS, categories adopted

Socioeconomic status		*HISCLASS*	*%*
Manual workers	unskilled	11-12	21.2
	low skilled	9-10	13.7
	Farmer	8	50.3
	Skilled	7	10.0
Non-manual workers	low med. skilled	4-5	3.7
	higher occupation	1-3	1.1

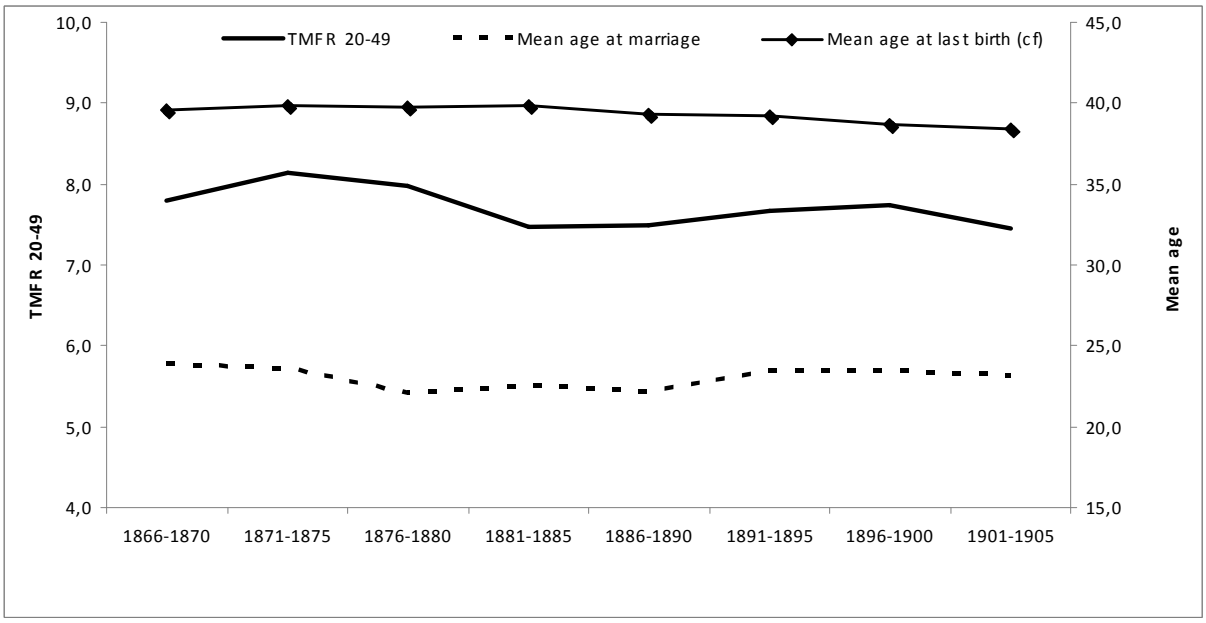
Note: Hisclass 6 is not present in the dataset

3. Trends and Patterns of Fertility in Alghero

To provide an initial historical overview, we examined TMFR using certain indicators (mean age at first marriage, mean age at last birth and Coale-Trussel indices) (Fig. 2 and Tab. 2). This analysis of five-year cohorts emphasizes an overall stability, especially in mean ages at first marriage and birth of last child, for couples with completed fertility. The TMFR shows a slight fall, from around 8 for the first cohorts to around 7.5 for the latter.

The picture that emerges at the aggregate level reveals a population still immersed in a pre-transitional stage, with an extremely small and gradual decline in fertility across the five-year marriage cohorts. Further confirmation of this is also provided by the values of the Coale-Trussel indices, the most commonly used measures for detecting parity-specific control (table 2). The *m*'s for Alghero are in most cases close to 0.1, suggesting that the age-specific schedules closely resemble natural fertility schedules and therefore no parity-specific control was practiced. It is only in the last cohort (1901-1905) that the *m*-value nears, but remains below 0.2, which is widely considered the minimum to indicate a population practicing parity-specific control. The *M* parameter values (0.85-0.95) also indicate somewhat high levels of marital fertility.

Fig. 2. TMFR, mean age at marriage and mean age at last birth. Alghero 1866-1905



Tab. 2. Coale-Trussel indices. Alghero 1866-1905

Cohorts	Marriages	Coale-Trussell	
		M	m
1866-1870	269	**0.91**	0.08
1871-1875	288	0.98	**0.15**
1876-1880	261	0.94	0.11
1881-1885	253	**0.91**	**0.16**
1886-1890	280	**0.86**	0.07
1891-1895	291	**0.91**	**0.12**
1896-1900	258	**0.91**	0.10
1901-1905	309	**0.91**	**0.18**
1866-1905	2209	**0.91**	**0.10**

Note: In bold coefficients statistically significant ($p \leq 0.05$)

Although some fluctuation is visible, the overall picture is one of homogeneity and stability, revealing a population that has not yet begun the transition process. However, this homogeneity decreases when we focus our attention on socioeconomic differentials in female reproductive behaviour (table 3). In this case, differences between the two socioeconomic groups (non-manual low-medium skilled and higher occupation) are clearly evident even regarding age at first marriage and age at last birth. Women's age at marriage is higher for the

non-manual skilled group, with a similar but more evident pattern emerging for the higher occupation category, and the age at last birth is particularly low for the higher occupation group, as is true for the skilled and non-manual skilled groups. The average birth interval does not show any significant variation, with the exception of the well-off category, which is 3-4 months longer, and a sign of a simultaneous action of stopping and spacing, albeit moderate. Corresponding indicators for the manual worker groups are more similar to the trend observed at the aggregate level.

The non-manual, low-medium skilled category and especially the higher occupation category show the lowest TMFR (20-49 years), with a value of below 6 for the latter and around 7 for the former. The average values are higher for the other socioeconomic categories, reaching 8 in the case of farmers. Differences between the upper classes and those less affluent are, once again, highlighted by the Coale-Trussel indices (last two columns in table 3). The *m* index, intended to detect the presence of forms of birth control, is over 0.6 in the highest socioeconomic group and a value of little over 0.2 in the two "Skilled" categories (manual and non-manual). Contrarily, *m* is significantly lower in the other groups ("unskilled", "low-skilled" and "farmers"). It clearly emerges that the higher ranking components of the population had already adopted some form of fertility control, which appears to be entirely absent in the other socioeconomic groups.

Tab. 3. Mean age at first marriage, mean birth intervals, mean age at last birth, TMFR $_{20\text{-}49}$, and Coale and Trussel indices by social status. Alghero 1866-1905

Social status	Mean age at first marriage	Mean birth interval	Mean age at last birth	$TMFR_{20\text{-}49}$	M	m
Manual						
Unskilled	21.2	2.47	39.7	7.8	**0.89**	0.04
Low-skilled	21.8	2.47	38.9	7.6	**0.91**	**0.11**
Farmers	21.5	2.54	39.8	8.0	**0.93**	**0.01**
Skilled	22.0	2.55	38.0	7.4	0.94	**0.25**
Non-manual						
Low-medium skilled	23.8	2.56	37.3	6.9	0.89	**0.27**
Higher occupation	26.8	2.82	34.9	5.8	0.80	**0.64**
Total	21.7	2.47	39.3	7.7	**0.92**	**0.12**

Note: In bold coefficients statistically significant ($p \leq 0.05$). Marriages with unknown SES are excluded; Mean birth interval and mean age at last birth for completed families

4. Reproduction from an Individual Perspective (Preliminary results)

The complex framework of fertility determinants makes it difficult to understand the role and impact each of them had individually, and thus interpret fertility patterns and reproductive behaviour. The reproductive framework put forward by the Eurasia Population and Family History Project (EAP), singles out three different and concentric levels of context, each of them overlaying groups of variables at the individual (couple), household and community level (Tsuya et al. 2010). A multivariate statistical analysis was conducted to disentangle the respective role and impact of each component, using event-history techniques and estimated risk of having another child.

A micro-level analysis was performed on legitimate births of parity 2+, since the birth of the first child frequently corresponds with marriage patterns, suggesting that intervals between marriage and first birth were strongly affected by courtship traditions and prenuptial conceptions[8]. The population under study here is limited to currently married women, aged 15-49, who had already had one birth.

Table 4 shows the models and full set of covariates used in our multivariate analyses, with the individual and couple level consisting of seven variables. The physiological and biological capacity for woman to bear children obviously functions in relation to age, accounted for by a categorical variable consisting of seven age groups, with the reference category of age 25-29. The onset of reproductive life – and, indirectly, the marriage pattern – is caught by women's age at first birth, coded into three age groups (<20 years, 20-24, 25 and over). This variable was included to account for the well-known behaviour that late access to reproduction possibly implies accelerated subsequent childbearing.

Total children ever born, age difference between spouses and order of marriage were also included to take account of other important characteristics of the couple and their reproductive history. The first is widely recognised as significant in the presence of some form of family size control; as family size increases, the propensity to have another child reduces.

Age difference between spouses is related to the quality of marital relationship which can affect fertility through "variables such as marital stability, marital satisfaction, family size

[8] Moreover, in the period analysed in Alghero as in the entire country, the question was also further complicated by the effects of the battle between Church and State on the validity of marriages celebrated only in front of the priest. Therefore, firstborn children are excluded from our analysis.

preferences, and contraceptive use" (Casterline, Williams, McDonald 1986: 354). Our models use three categories, namely wife older than husband, husband older by 0 - 3 years, and husband older by 4 years or more. They include a dichotomous variable indicating whether the union was the first or a remarriage. The reproductive patterns of remarried women may differ from those in first marriages in a variety of ways. They may form a select group with a higher probability of conception due to second husband desiring more children, but they are just as likely to be discouraged from having more babies if they already had children from previous marriages.

The variables of survival status of previous birth and time since last birth (current birth interval) attempt to account for the effects of infant and child mortality on fertility (Van Poppel et al. 2012). The former captures the "child replacement" effect, that is to say the couple's deliberate choice to replace the lost child, while the latter accounts for the involuntary component of the relationship between infant mortality and fertility, which is the shortening of the postpartum amenorrhea period caused by the interruption of breastfeeding and lactation (Tsuya et al. 2010: 45). In short, the above covariates aim at determining the role of bio-demographic factors of reproduction.

The last individual-level variable included is "migration" or rather a proxy of migration, given the lack of precise information on mobility. We considered whether the spouses were born in Alghero, given the possibility that non-natives would adopt a different reproductive behaviour (e.g. more inclined to control the number of offspring) or that the absence of social position or a structured support network of relationships within the adopted community could act as a deterrent to reproduction. Four categories were used, namely; both spouses born in Alghero; both spouses non-native; only the husband non-native; and only the wife non-native.

Household-level effects on fertility have been measured using household socioeconomic status and the literacy "relationship" between the husband and wife. As outlined in section 2, it is possible that the association between SES and fertility in pre-transitional and transitional populations changed during the transition process. The slowness of the Sardinian transition gives the opportunity to capture the complex influence of socioeconomic status on reproductive behaviour. Literacy level (or rather the spouse's ability to sign the marriage certificate) was also included, with particular attention to when there were differences within the couple. The combination bride literate and groom illiterate could indicate a situation of

relative prestige of the woman not only in respect to her husband but also to other members of the family.

In consideration of the wider context, we also included a dummy variable to account for the collapse of births that occurred between 1915 and 1918 as a result of World War I and the Spanish flu. Alghero, like the rest of the island, experienced a decrease of over 1/5 compared to the trend in that period. Lastly, the year of marriage was introduced to capture any tendency towards fertility decline as well as the process of modernisation of Alghero population.

Results from the first event history analyses share some features of general marital reproduction for the Italian population (Breschi et al. 2009). As table 4 shows, the likelihood of marital birth decreases as the women's age increases. In relation to the reference category (wives age 25-29) the probability of giving birth falls by 12% only after the age of 35, decreases markedly (50%) after 40 and drops away after 45. This pattern confirms the decline of fecundity in the later years of a woman's reproductive period. In Alghero, women whose reproductive history started early (first child under the age of 20) are more likely to have more children compared to the reference category. However, women who had their first child after the age of 25 have a reduced risk of having additional children, although this result is not statistically significant. This result is unexpected for a seemingly uncontrolled fertility regime, where women who married later in life had less time to reach the targeted family size and would be less inclined to postpone births.

The number of previous births was added to the model to detect the degree of deliberate marital fertility control given that the onset of natural sterility is accounted for by age. We used the propensity to move from the first to second child as a benchmark for higher order births. The absence of parity-specific control is further confirmed by the results shown in table 4. Although the likelihood of another marital birth is lower for women who had two or more children ever born, the differences between women of higher parities are quite small. While marital fertility does decline to a certain degree with parity at higher parities, the effect is not especially relevant and can probably be accounted for by the increasing likelihood of permanent sterility after child-birth due to infections or difficult deliveries (Knodel 1988; Wood 1994), or reduced coital frequency.

Tab. 4. Cox regression. Estimated effect (relative risk) of the likelihood of having another child. Alghero 1866-1905 marriage cohorts

Covariates	Model 1 Haz. Ratio	P>z	Mean
Cohort of marriage (ref. 1866-1885)	1.000	-	47.0
1886-1905	**0.941**	0.005	53.0
Age (ref. 25-29 yrs)	1.000	-	18.7
<20	0.941	0.521	1.9
20-24	1.011	0.787	12.6
30-34	1.004	0.914	19.1
35-39	**0.887**	0.026	17.9
40-44	**0.471**	0.000	16.0
45+	**0.060**	0.000	13.7
Age at first birth (ref. 20-24 yrs)	1.000	-	41.5
<20	**1.091**	0.002	30.3
25+	0.942	0.106	28.2
Children ever born (ref. 1)	1.000	-	13.8
2	**0.482**	0.000	13.7
3	**0.448**	0.000	12.7
4	**0.475**	0.000	11.3
5	**0.484**	0.000	11.0
6	**0.514**	0.000	9.8
7	**0.523**	0.000	8.7
8+	**0.647**	0.000	19.1
Marriage (ref. first marriage)	1.000	-	89.8
Remarriage	**0.915**	0.029	10.2
Age difference between spouses (ref. 0-3 yrs)	1.000	-	22.8
Woman older than man	1.031	0.518	8.5
Man older than woman by 4+ yrs	0.993	0.801	68.7
Life status of the previous child (ref. alive)	1.000	-	79.9
Dead <2 years since previous child	**1.904**	0.000	8.5
Dead ≥ 2 years since previous child	**2.220**	0.000	11.6
Birth place (ref. Alghero)	1.000	-	84.9
Other place husband	**0.933**	0.149	8.1
Other place wife	**0.907**	0.016	5.2
Other place both husband and wife	0.959	0.600	1.8
Socioeconomic status (ref. unskilled)	1.000	-	23.1
Low-skilled	1.000	0.994	12.8
Farmer	1.002	0.954	49.6
Skilled	**0.889**	0.005	10.1
Non-manual low. Med. Skilled	**0.871**	0.039	3.5
Higher occupations	**0.587**	0.001	0.9
Literacy (ref. illiterates)	1.000	-	52.7
Husband literate	1.041	0.221	11.9
Wife literate	**1.103**	0.001	14.8
Both literate	**1.071**	0.023	20.5
Period (ref. no war / influenza)	1.000	-	92.5
War / influenza	**0.898**	0.037	7.5
Log likelihood	-69252.775	-	-
Person-Years	37481	-	-
Marriages	1949	-	-
Births	9607	-	-

For higher order births (above sixth child), we can detect a slight recovery, which is indirect evidence that we are dealing with couples characterised by a strong tendency to have children. In short, parity analysis confirms extremely limited (if not absent) fertility control in Alghero's population, despite the fact that there is a statistically significant decline in the

propensity to have children from the first marriage cohort (1866-1885) to the second.

Age difference between spouses proves to be of little importance. A slight fall (about 10%) in the risk is recorded for marriages of higher order, indicating that previous marriages and more likely the presence their offspring, discouraged further births.

In Alghero, the likelihood of marital birth results as lower for couples where both spouses are non-native, which is probably due to their having a less robust network of support within the community. Statistical significance indicates this difficulty was particularly pronounced for couples with non-native male and native female, which possibly reflects the problematic integration of men born outside the community.

In line with previous research, the relevance of the survival status of the previous child is evident. The likelihood of birth increases by over 80% when the previous child had died (independently of his/her age at death), compared to women with surviving children. This confirms the strong fertility-inhibiting effect of breastfeeding and that the interruption of breastfeeding after an infant death results in a significant short-term increase in the likelihood of an additional birth. In contrast to what has been observed for other Italian and European communities, the risk of having another child when the previous child had died increases in relation to the child's age at death (Tsuya et al. 2010). This suggests a replacement effect that is stronger than the purely physiological effect due to early fecundity resumption caused by the premature interruption of breastfeeding. However, this result should be contextualised. In Alghero, as in rest of the island, infant mortality, especially neonatal mortality, was among the lowest in the country (Breschi et al. 2012) and protracted breastfeeding was commonplace, in many cases lasting over one year (Coletti 1908; Matta 2010).

The results presented in table 4, which show the estimations of a multivariate event-history model controlling for factors including age at marriage, age differences between the spouses and children ever born, demonstrate that summary measures largely conceal the variation of marital fertility between Alghero's social groups. In relation to the reference category (unskilled), the responsiveness of marital fertility to socioeconomic status remains "similar" among low-skilled workers and farmers and reduces by 11% and 13% for skilled and non-manual workers, respectively, but the most striking differentiation emerges for Alghero's small number of elite who had no less than 41% lower chance of marital births. These results are statistically significant and consistent with observations made in the descriptive analysis.

Couples where the women were literate had a greater propensity to have children (around 8%) than totally illiterate couples or those where only the husband was literate. Despite the limitations of this indicator, these results suggest a positive relationship between female level of education and health status and/or breastfeeding duration. Although further verification of these findings are needed, it does provide an initial confirmation of similar findings on Italian pre-transitional populations, namely that more educated couples had moderately higher levels of fertility (Manfredini and Breschi 2008).

Lastly, the relative risk of having another child was reduced (by about 10%) for the period corresponding with the First World War and Spanish flu.

4. Reproduction from an individual Perspective (Future developments for Budapest Conference)

From the results described above it follows:

a) the well-known and strong influence of bio-demographic factors (maternal age, age at first child) on fertility levels;

b) the relevance of birth interval size and the survival status of the previous child born;

c) a significant and stronger fertility control only within the social elite group.

In light of the points b) and c) are very interesting the data in Table 5 including: the number of surviving for three birth cohorts (1866-1885, 1886-1905, 1906-1920), for the total number of births and for the births recorded for the few elite families in Alghero.

The children of this group benefit from a significant decline in the risk of dying between 1866 and 1920, at least in comparison to the rest of the children born in those years. Over 90% of children belonging to affluent families, born in the twentieth century, survives to the second birthday, compared with a corresponding 75% recorded for the whole population belonging to the same last cohort examined.

The question undoubtedly intriguing, briefly described in the abstract, is therefore to examine to what extent the decline in fertility observed for the elite can be attributed to the simultaneous increase in survival experienced by the children belonging to this social group. This is therefore the main objective of research that we plan to investigate in the next few months whose results of which we intend to present at the conference.

Tab. 5. *Survivors (l_x per thousand) in the first years of life. Alghero, 1866-1920*

	Birth color					
	1866-1885		**1886-1905**		**1906-1920**	
Months	**Total**	**Elite**	**Total**	**Elite**	**Total**	**Elite**
1	**925,9**	901,8	**925,4**	969,5	**946,5**	966,3
6	**866,1**	866,1	**870,9**	961,8	**903,2**	966,3
12	**800,0**	857,1	**808,8**	946,6	**837,3**	943,8
24	**689,7**	750,0	**705,7**	900,8	**753,2**	921,3
60	**605,6**	669,6	**632,6**	801,5	**690,5**	876,4
q_0/q_{1-4}	**0,82**	0,65	**0,88**	0,35	**0,93**	0,79

The interrelationship between infant/child mortality, despite its relevance, has received up to now a very limited attention particularly at the individual level (Reher, San Gimeno 2007; Van Poppel et al. 2012). However it represents a crucial question for understanding the mechanisms of reproductive behaviours transition particularly in a region, like Sardinia, which experienced a very slow and delayed fertility decline as well as well a prolonged and very moderate reduction in infant and child mortality (Breschi et al. 2014), moving from a relatively advantaged condition.

Indeed, since the first years following National Unification, Sardinian infant mortality rate was the lowest in Italy. The interpretations advanced to this regard are still a matter of debate (Pozzi 2000; Gatti et al. 2002; Breschi et al. 2012) even if the hypothesis about the protective effect induced by a prolonged breastfeeding, proposed by Colletti (1908), is still largely accepted. As a result of prolonged breast-feeding, infant mortality would have been moderate and at least partially postponed to the immediately following months along with a delayed late weaning: this combination would have, therefore, favoured a broad balance between infant and child mortality.

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