Socioeconomic Mortality Differences in Italy – New Insights from Indirect Orphanhood-Based Estimates

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Introduction

The study of socioeconomic differences in mortality, especially mortality differences by occupation, is of great interest not only to evaluate potential risks related to the type of job performed but also for policy purposes (e.g., for the determination of retirement age for the 'heavy' jobs). Nonetheless, in many countries the quantification of occupational mortality differences is still a problem of difficult solution.

The study of socioeconomic differences in mortality in Italy has been carried on traditionally by computing relative risks on the basis of the information collected in the death certificates. However, the information collected in the death certificate relates only to the current job declared by the relatives of the deceased. Consequently, if people are already retired they are registered as retired and not in connection with the job they performed before. This feature has many consequences in the industrialized societies since among the deceased persons most are already retired since long. In this case no useful information for the analysis can be deducted from the data about the job activity.

More recent studies solve this problem by using more sophisticated techniques linking the death certificates with census information about the population (Istat, 2001) or with INPS retirement registers that contain only a fraction of the retired population (D'Errico et al., 2005). However, in both cases the outcome is not entirely satisfying since the linkage covers maximum 80-90 percent of the deaths and additionally the cost of this operation is very high (see Costa, 2005).

In this paper we propose the use of the so-called "orphanhood method" – a special indirect demographic estimation technique – to study the mortality differences by socioeconomic status by using existing survey data. The method solves all problems mentioned since no complicated and unsatisfying linkage of data is necessary. Specifically we

will analyse the mortality of the parents of the interviewed people. This indirect technique has been proven as an interesting and unexpected well performing tool to analyse mortality differentials not only in the developing countries but also in industrialized countries (see Luy, 2007).

Data and methods

Data

For the analysis we use data stemming from the multipurpose survey "Family and social subjects" carried on by Istat (Italian national statistical institute) in the years 1998 and 2003. The 2003 survey is part of the international project "Gender and Generation Program". Both surveys are representative at the repartition (aggregation of regions) level and the sample case numbers are in both cases very high – over 54,000 respondents in 1998 and almost 50,000 in 2003. The data contain information about the parents of the respondents[1], such as if they are still alive and their age, their highest education level reached and about several characteristics of their job activity when the respondent was about 14 years old. The latter aspect provides an especially interesting information since it enables to link the mortality experiences of respondents' parents with their job in a way that is independent of the current age of the parents. Thus, our study analyses the job experience of parents belonging to different cohorts, i.e. representing different periods of time, when they were all in reproductive ages and compares their mortality until the time of the interview with a method that is explained below. In this way, we avoid that in most of the cases the job status of the parents is in the 'retired' category. Table 1 shows the composition of the respondents by age and by survival status of their father and mother and figure 1 shows the age composition of respondents' parents that are still alive, exemplary for the multipurpose survey 1998.

Method

The estimation of adult and elderly mortality from information on the survival of the parents with the "orphanhood method" belongs to the standard tools for obtaining demographic information for developing countries. Overviews can be found in the United Nation's "Manual X" (Hill, Zlotnik and Trussell 1983) or in some more recent publications (Timæus 1991c; Hill, Choi, and Timæus 2005; Hill 2006). The demographic relationship between the share of orphans and the mortality experiences of their parents has been

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[1] The age range of the respondents is not restricted by the sample design. However, we will use the data only for the respondents aged 18-69, for whom the information about the parents is asked.

described first by Lotka (1939) who proposed to estimate the number of orphans from life table functions for adult survivorship. Later, Henry (1960) suggested reversing this approach in order to estimate adult mortality from the number of orphaned children in cases where the underlying mortality and fertility schedules are known or assumptions can be drawn for applying specific mortality and fertility models. Brass and Hill (1973) further developed this idea and proposed methods for estimating life table survivorship ratios from proportions of respondents of successive five-year age groups with mother or father alive based on a set of weighting factors. In the subsequent years, several scholars suggested successively improved and extended regression-based methods for estimating adult mortality from orphanhood data (Hill and Trussell 1977; Hill, Zlotnik and Trussell 1983; Timæus 1991a; Timæus 1991b; Timæus 1992; Timæus and Nunn 1997).

The basic idea of the orphanhood method is that the age group of respondents represents the survival time of the mother (or father). Consequently, the proportion of respondents of a given age group with mother (or father) alive approximates a survivorship ratio from an average age of childbirth to that age plus the age of the respondents. The available methods model this relation using different patterns of fertility, mortality and age distribution to allow the conversion of a proportion with parent surviving into a life table survivorship ratio, controlling for the actual pattern of childbearing. Moreover, Brass and Bamgboye (1981) developed a general method for estimating the reference date of estimates derived from data on survival of parents (see Hill, Zlotnik and Trussell 1983).

The multipurpose survey "Family and social subjects" provides all information necessary to apply the orphanhood method with almost maximum possibilities, since in addition to the age of respondents and the information of the survival of their fathers and mothers, the age of the (still living) parents is known as well. Moreover, since official life tables for Italy are available it is not necessary to estimate the basic mortality pattern by choosing a certain arbitrary model life table. Finally, bootstrap confidence intervals will show the statistical significance of the found mortality differences between the different occupation groups.

Expected results

A first analysis of reported deaths of fathers and mothers shows the expected patterns regarding age- and gender-specific mortality (see figure 2), thus proving the usefulness of the Italian multipurpose surveys for applying the orphanhood method as it has been done previously for German survey data (Luy 2007). Note that figure 2 does not reflect life tables

although the percentages with mother and father alive already look very similar to the typical pattern of life tables. By applying the orphanhood method these percentages will be transferred into life table estimates for different socioeconomic, i.e. education- and occupation-specific population groups. A special attention will be devoted to the gender aspect of the problem, i.e. if a socioeconomic differential in mortality has the same meaning and direction among men and women.

More specifically, the orphanhood method will provide a series of period life tables by characteristics of jobs, with the corresponding reference periods. Thus, we will obtain a time series of education- and occupations-specific life tables for women and men that enable both, an analysis of more recent socioeconomic mortality differences in Italy and their development over some decades. Note that the use of the orphanhood method provides also estimates for differences in life expectancy. For most people interested in socioeconomic mortality differences this kind of information is more useful than the traditional calculation of relative risks. As described in the previous section, the information available refers to the time when the respondents were 14 years old. Consequently, the results refer to the time when the parents were with high probability in their active life. This gives us an additional advantage with respect to the usual methods for estimating mortality by socioeconomic status.

To underline the differences between methods, the results obtained with the indirect method about the mortality differences by occupation will be compared with the already existing results obtained with other techniques, and the differences observed will be critically commented. The availability of high quality statistics in Italy permits to overcome some of the limits of the indirect techniques, as described in the previous paragraph. At the same time, the application of the method to the mentioned survey data requires original adjustments of the technique (for example to account for the parity of the interviewed, the number of siblings, etc). Furthermore, the use of two different cross-sectional representative surveys allows assessing the robustness of the estimations. The experiences of this study method might enable us to propose a more diffused use of the indirect techniques in developed countries.

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Tables and Figures

Table1: Respondents with alive/dead father respective mother, by age of respondent, absolute numbers, Multipurpose Survey 1998

	Mother			Father	
	Alive	Dead		Alive	Dead
18-24	5343	69		5149	263
25-29	4084	144		3777	451
30-34	4531	311		3904	938
35-39	4450	531		3440	1541
40-44	3837	867		2551	2153
45-49	2869	1323		1579	2613
50-54	1881	1672		828	2725
55-59	1162	2169		394	2937
60-64	600	2315		168	2747
65-69	280	2394		104	2570
total	29037	11795		21894	18938

Figure 1: Age composition of respondents' living parents, Multipurpose Survey 1998
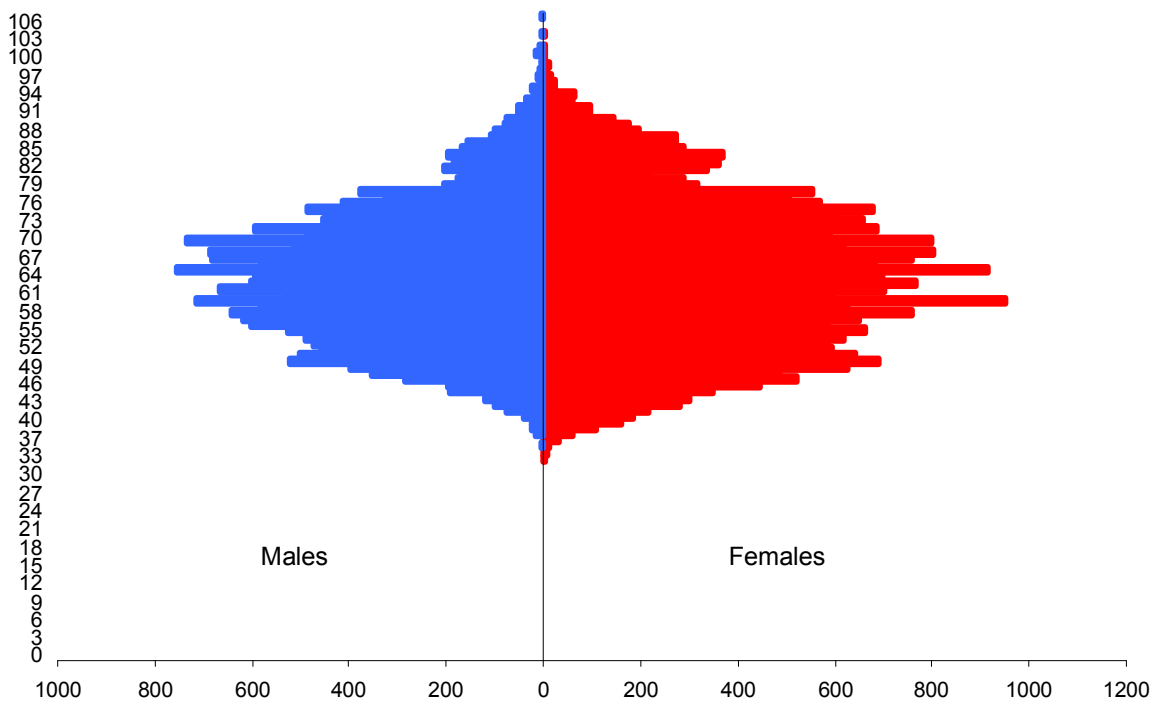

Figure 2: Share of respondents with alive father respective mother (in percent),

Multipurpose Survey 1998

	0-4	5-9	10-14	15-17	18-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69
Mother	99,85	99,84	99,6	99,38	98,73	96,59	93,58	89,34	81,57	68,44	52,94	34,88	20,58	10,47
Father	99,32	99,15	98,22	97,79	95,14	89,33	80,63	69,06	54,23	37,67	23,3	11,83	5,76	3,89