

Mortality synthetic indicators. Theoretical aspects and an application to Italy

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Aim of this paper is the estimation of a non weighted indicator of mortality in the Italian population, and its temporal comparison with a standard indicator based on weighted sums of mortality rates by age derived by mortality tables.

The construction of a non weighted (or synthetic) indicator of mortality has not been matter of detailed discussion in the scientific literature and, as a matter of fact, there's only a limited number of publications on this subject. The starting point of our study is the key distinction, adopted in demography, between renewable events (such as migration – also considered as a non demographic event, and then treated like “noise” – or fertility) and non renewable events (such as death). The main consequence of the aforementioned distinction is that resulting concepts and construction strategies of indicators are classified according to their ability and effectiveness to capture the renewable or non renewable nature of the event analyzed. Moreover, as noted by Termote (1998), beyond that distinction there is a substantial continuity of methodological approach, in the sense that to collapse through a cross measure the behavior of a population disaggregated by age (or age class), there are essentially two approaches, focusing respectively on non weighted sums of specific age rates, and weighted sums. The last approach is adopted almost exclusively for the analysis of mortality, while there is some competition between the two approaches in the analysis of fertility and migration, with a high prevalence of the former.

The rationale of a non weighted approach, in the analysis of fertility and migration, is the immediate interpretability of the measurements obtained in terms of number of events expected for an individual. The same interpretation, on a conceptual basis, has no sense in the case of non renewable event, such as deaths, where the number of events is by definition equal to one, no more, no less. However, in case of non recurring events, this measure can always be interpreted

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as an indicator of the general level of mortality in a population (in terms of timing) historically or geographically determined. Moreover, by this measure, it is always possible to determine the distribution of age at death, summarized by the median age, in order to estimate an alternative indicator to the life expectancy one.

We would like focus therefore on non weighted indicators for their interesting features. First, they are additive, in the sense that also the application of an unweighted sum procedure allows the local decomposition of the index. There are also some practical solutions to ensure the space/temporal comparability of this class of indicators: since it has been shown empirically that there is a point of inflection of the curve of mortality around the age of 10, will be sufficient, in fact, to compare the partial rates obtained before and after the inflection point.

Moreover, non weighted indicators are sensitive to the level of disaggregation by age, unlike the weighted ones. More specifically, the value of the measure is directly related to the number of age groups, then it seems appropriate to apply a breakdown by age classes of the same size. Once adopted this precaution, however, the synthetic indicator of mortality has a key advantage over similar indicators based on a weighted sum, because in space/temporal comparison, it can neutralize the bias resulting from dynamic factors, like age-specific lifestyles resulting in different mortality rates (Sardon 1998), which, as emphasized in the literature, change over time and space. The adoption of this procedures of unweighted sum can neutralize the homogenization effect, a central feature of all weighted sum procedures.

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