The New French Human Mortality Database

Summary: Data on mortality at the local level are scarce in France for the 20th century and debates concerning the territorial divide in France are deep. To bring a contribution to this issue, I compute the departmental lifetables since 1901, for both men and women. In this contribution, I present the raw data collected to do so, namely yearly births and deaths by age as well as population by age at each census carried out during the 20th century. I add statistics according to military mortality and mortality in deportation to cover the periods of the Two World Wars. I also present the methods I use to compute these lifetables, which come mainly from the Human Mortality Database protocol. I revise this protocol to consider the specificities of French departmental data, mainly the few changes in French departmental boundaries, the underestimation of infant mortality and the lack of raw data homogeneity. This new database complements a still limited supply of long-term mortality statistics computed at local level. These life tables are freely downloadable on a dedicated website called "French Regional Database" by anyone interested in mortality issues.

Today, lifetables for the French departments available in the literature do not cover the whole period 1901-2014. Bonneuil (1997) computes women lifetables by five-year period and for five-year age groups during the 19th century and has not studied in the same way men's mortality, because of strong fluctuations due to the wars. From 1954 to 1999, Daguet (2006) groups lifetables established at the departmental level, but only for the census years. Barbieri (2013) uses departmental lifetables calculated by *Institut National de la Statistique et des Etudes Economiques* for the period 1975-2008, but the data are not freely available. Vallin and Meslé (2005) uses departmental life expectancies for the period 1906–1954, but both reconstruction methods and data have never been published. Moreover, all these papers are not based on a unified methodological protocol.

Consequently, I compute the yearly departmental lifetables by sex for all French metropolitan departments and region from 1901 onwards. These lifetables have been computed with a unified methodological protocol, used by many researchers to compute national lifetables for many countries included in the Human Mortality Database. This protocol is also used to compute lifetables at the local level in four OECD countries (Canada, Japan, the United States, Australia). I therefore complement a still limited supply of local mortality data freely available; this will allow international comparisons. Data are available on a dedicated website : https://frdata.org/en/french-human-mortality-database/.

Data and Methods

To compute these departmental lifetables, I gather numerous data coming from both books in archives and on-line databases. According to population movement, I have collected civilian deaths of each department, sex and year over the period 1901-2019; military deaths by birth year at the departmental level for the two world wars; individuals who died during deportation during the Second World War by birth department if they were born in France and birth country otherwise; births by year, sex and mother's home department for the period 1853-2019. According to censuses, I have collected populations by birth year, residence's department, and sex for each census of the period 1901–1962 from hard-copy publications of SGF and INSEE. For the period 1968–2014, these statistics have been found in on-line sources.

Many of the methods used to compute departmental lifetables came from the protocol of the Human Mortality Database, used to compute national lifetables. This includes deaths classified by Lexis triangle and single-age populations at January 1st. It also includes age-specific mortality rates, which are adjusted beyond age 90 by the Kannisto model. This model assumes that mortality rates tend to 1, without reaching this value.

However, other methods have been introduced to consider the specificities of the French departmental data. First, I reintroduced false stillbirths highlighted by Vallin and Meslé (2001) at national level into the statistics of departmental infant mortality. Second, I computed military deaths by year of death, year of birth and department of residence, considering that the distribution of deaths by year was the same regardless of age and department. Third, I considered that the department of residence of each deportee could be inferred from his place of birth and from statistics available from the 1936 and 1946 censuses on the spatial distribution of individuals by place of birth. Forth, the missing data during the two world wars (departments where the fighting took place) were estimated by considering that mortality and fertility had evolved in the same way as in a geographically close department.

An Example of Available Data

The French Human Mortality Database provides French lifetables according to the 3 geographical levels used at the European level to classify regions. These are departments (NUTS 3), French regions prior to 2016 (NUTS 2), and current regions (NUTS 1). They include life expectancy (e_x), the number of survivors (l_x) and the mortality rate at each age (q_x). Note that data for *Moselle*, *Haut-Rhin* and *Bas-Rhin* are available from 1921 only; data for old departments of *Seine* and *Seine-et-Oise* are available from 1901 to 1968; data for new departments of *Ile-de-France* are available from 1968 onwards.

Figure 1 presents a first example of the data available: female life expectancy at age 65 for 4 years and for all departments. One can see that life expectancy at age 65 has increased during the period, from values close to 14,5 years in 1950 and 23 years in 2010. On the other hand, the areas where life expectancy was lower have changed: these were the East and Britanny in 1950 (with life expectancy lower than 14 years); the North of France in 2010 (with life expectancy lower than 22 years).

Figure 1: Women's life expectancy at age 65 in 1950, 1970, 1990, 2010.

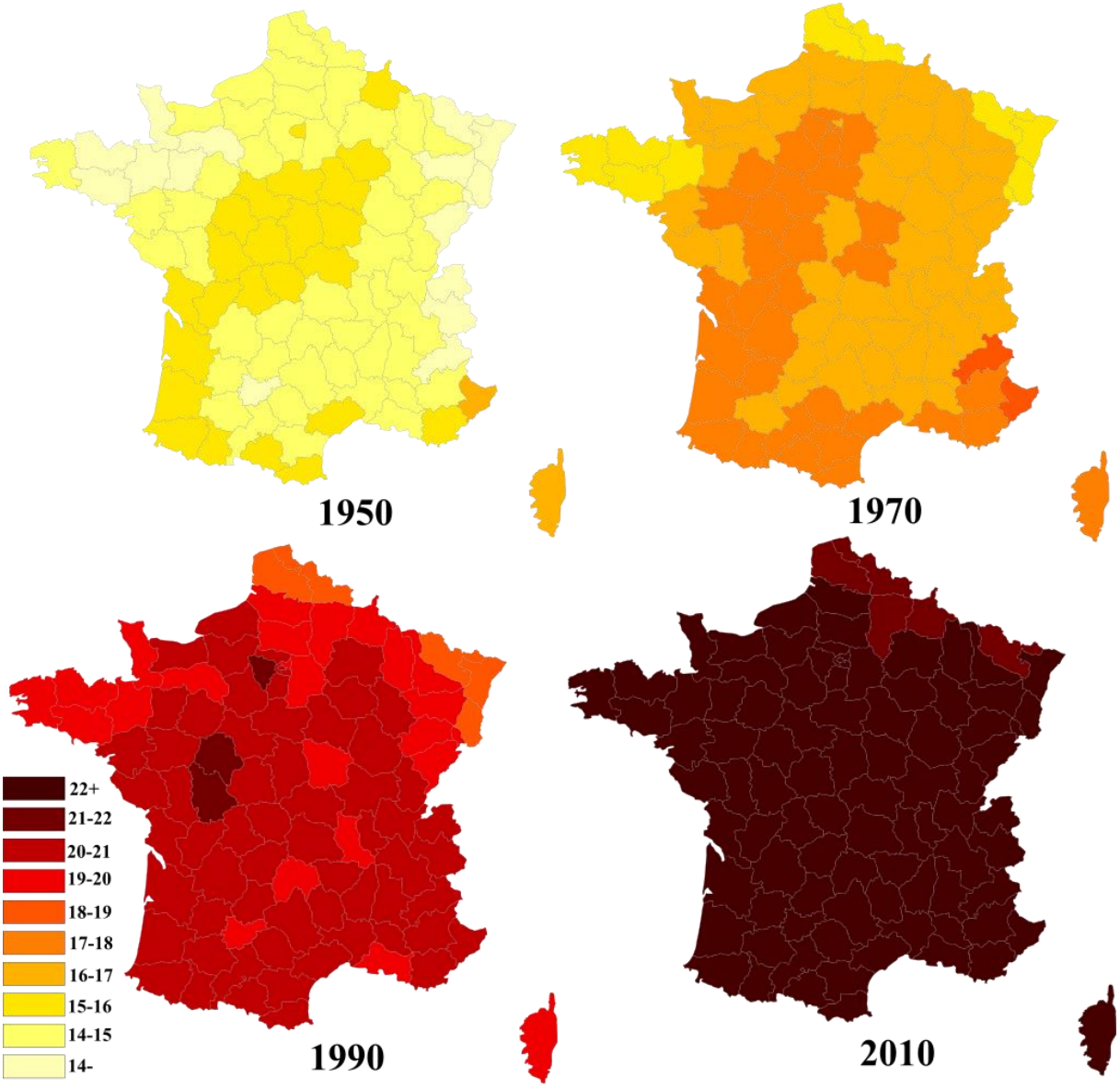
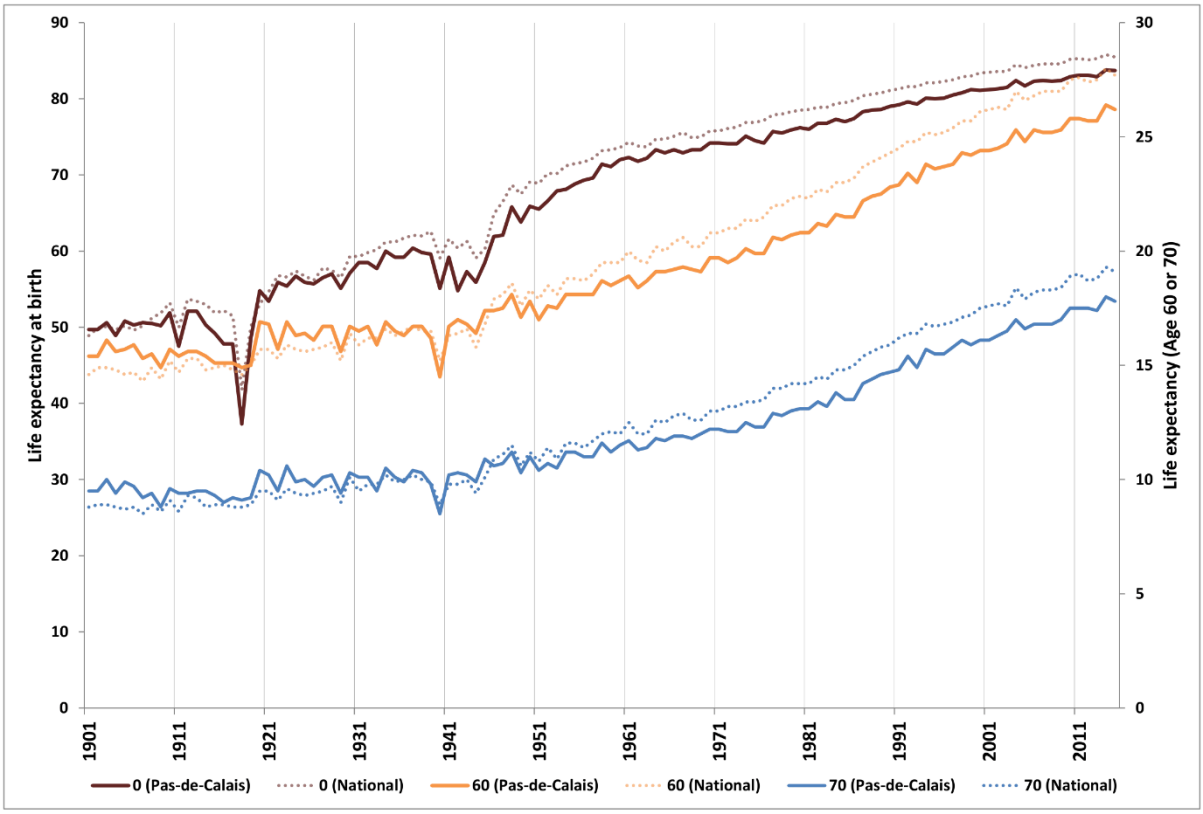


Figure 2 reveals female life expectancy at birth and at age 60 and 70 in *Pas-de-Calais*. These values can be compared with female life expectancies at the same ages at the national level. One can see that the

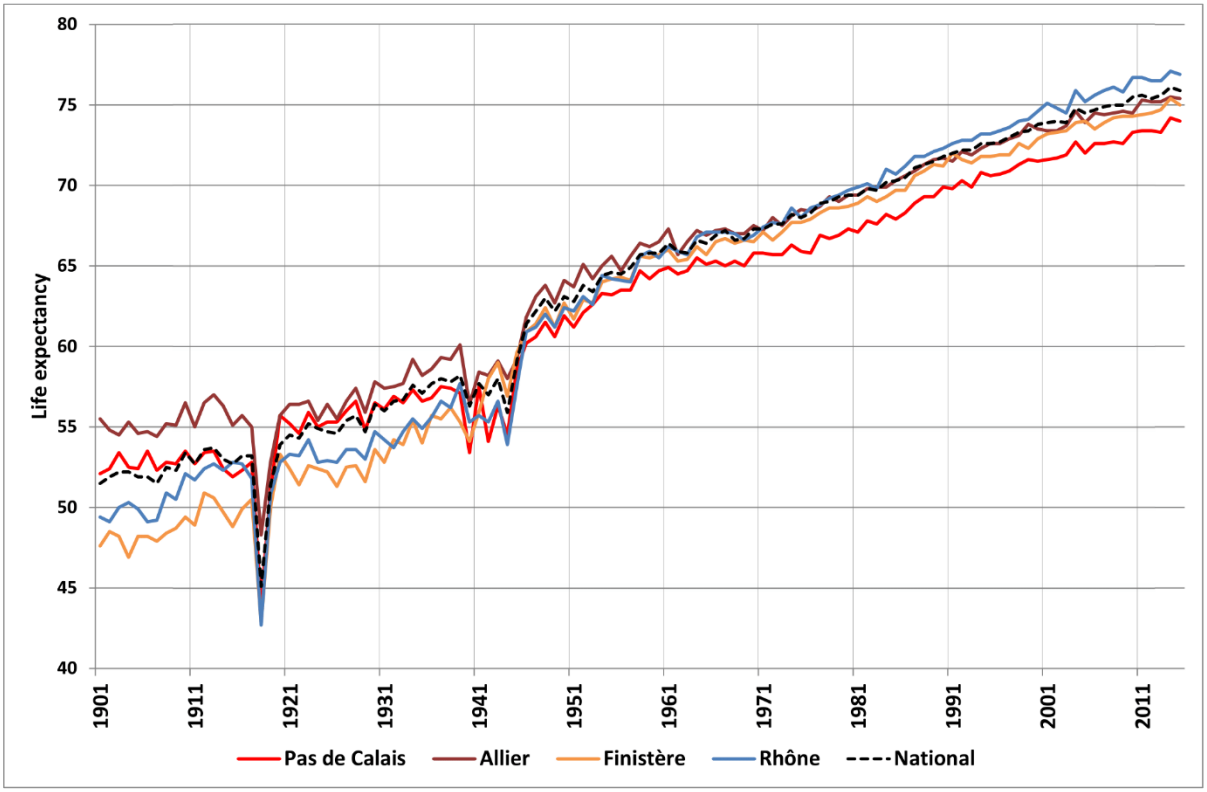
life expectancy in *Pas-de-Calais* was always lower than the national one, contrary to life expectancy at age 60 and 70. Moreover, the gap with the national average is widening today at high ages.

Figure 2: Women's life expectancy at birth and at age 60 and 70, *Pas-de-Calais*.



Finally, Figure 3 presents women's life expectancy at age 10 for 4 departments (*Pas-de-Calais*, *Allier*, *Finistère*, *Rhône*) and at the national level. It shows that the gap was 8 years in 1901 between *Finistère* and *Allier*, whereas it was 0 in 2014. Moreover, positions have changed: people in *Allier* have no longer a life expectancy higher than the national average; in *Pas-de-Calais*, life expectancy is now below the national average.

Figure 3: Women's life expectancy at age 10, *Pas-de-Calais*, *Allier*, *Finistère*, *Rhône*.


Life expectancy
80
75
70
65
60
55
50
45
40
1901
1911
1921
1931
1941
1951
1961
1971
1981
1991
2001
2011
Pas de Calais
Allier
Finistère
Rhône
National

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