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# Population & Societies

## The number of deaths in France will increase over the coming years

Gilles Pison\* and Laurent Toulemon\*\*

Deaths in France increased by 7% between 2014 and 2015. After 70 years in which the number remained stable, is this the sign of changes to come? Gilles Pison and Laurent Toulemon look at the reasons for this surprising period of stability, and explain why the number of deaths will rise sharply in coming years, even if life expectancy continues to increase.

On 1 January 2016, the population of metropolitan France (mainland France and Corsica) was an estimated 64.5 million – an increase of 240,000 (+0.4%) over 2015 – with a further 2.1 million in the French overseas *départements*, making a total of 66.6 million for France as a whole.[1] Growth was slower than in 2014 due to a small drop in births and a sharp rise in deaths (Table, page 3).

### Slightly fewer births in 2015 than in 2014

The number of births fell slightly (762,000 in 2015 in metropolitan France versus 781,000 in 2014), and the total fertility rate likewise, at 1.93 children per woman in 2015 versus 1.98 in 2014 (a 2.4% drop). The postponement of childbearing observed over almost four decades is continuing, and women who gave birth in 2015 were aged 30.5 on average.<sup>(1)</sup> Mean age at childbearing has increased steadily since 1977 (when it was 26.5 years). While the fertility of women aged over 30 is stable with respect to 2014, it is falling among the under-30s.

Cohort fertility trends show that women born in 1965, who turned 50 in 2015 and who have now completed their reproductive lives, had 2.04 children on average. Women born in 1975, who turned 40 in 2015, have already had 1.97 children, and the total should exceed 2.0 by the time they are 50. The youngest cohorts still have

many childbearing years ahead of them, but their completed fertility is likely to reach a similar level.

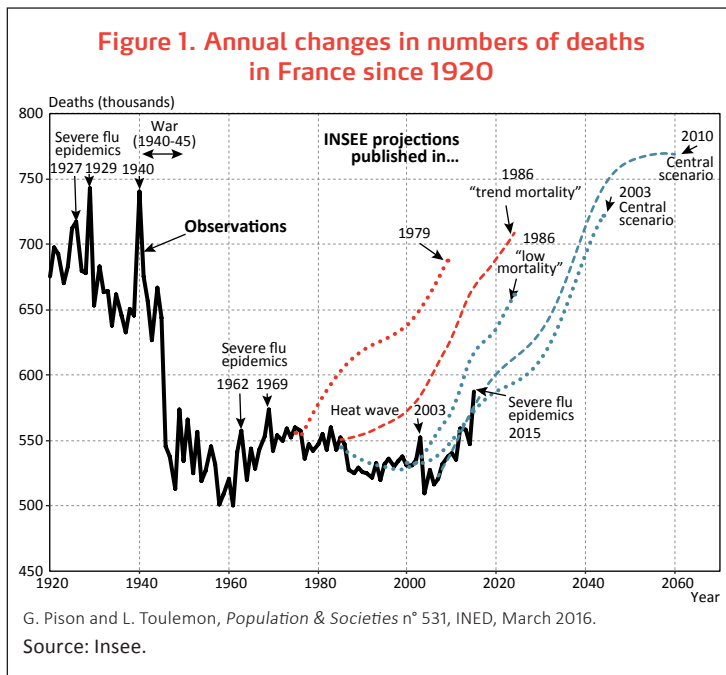
### A sharp rise in deaths in 2015

A total of 587,000 deaths were recorded in 2015, compared with 547,000 in 2014, an increase of 7%. As the population rose by 0.4% and the proportion of older adults also increased, an increase in deaths was expected, though not to the level actually observed. Calculating life expectancy provides a means to eliminate components of mortality linked to variations in population size and age distribution, so that only fluctuations linked to changes in the risk of dying are taken into account. For both sexes, life expectancy at birth fell by 0.3 years between 2014 and 2015, falling from 79.3 years for males and 85.4 years for females in 2014, to 79.0 years and 85.1 years, respectively, in 2015. This drop is linked to an exceptionally severe flu epidemic during the first three months of 2015 that resulted in 24,000 excess deaths compared with the same period in 2014. This was followed by a July heatwave and episodes of cold weather

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(1) The mean age at first childbirth is 28.5 years.



still unimaginable, as illustrated by INSEE’s projections published in 1979 and 1986 (Figure 1). The 1979 projections used just one life expectancy assumption: a progressive levelling off, in line with the tendencies observed in previous years, with a gain of 0.8 years between 1975 and 2000. In fact, the gain was more than 6 years! So the projection largely overestimated the number of deaths from 1977, even before it was published in 1979, announcing a steep rise in the following years when the number of deaths actually fell slightly (Figure 1). The projections published seven years later, in 1986, were more optimistic about life expectancy which, under the “trend mortality” scenario, was forecast to increase by 1.9 years between 1985 and 2000, but still at an ever slower pace. Despite this adjustment, the projection again overestimated the number of deaths from the very outset. Like its predecessor, it announced an uptrend in the following years which was

contradicted by the facts. The authors also published an alternative “low mortality” scenario based on a steady future rate of decrease in mortality rates, with much larger gains in life expectancy (3.4 years between 1985 and 2000 instead of 1.9). In reality, the gain was 3.7 years, slightly above that of the low mortality scenario. The number of deaths in this latter scenario was finally very similar to the trend observed up to 2003.

Mortality projections have been much more optimistic since 1995 and, like the 1986 low mortality scenario, are based on the assumption of a steady rate of progress.[3] They nonetheless forecast a large increase in deaths over the coming years due to two new phenomena: the extinction of the depleted cohorts born during the First World War, and the ageing of the baby-boom generations. We will look first at the effect of the depleted cohorts, which partly explains the stability in numbers of deaths over the last 40 years

in October which led to several thousand additional deaths compared with the same periods in 2014, a year in which mortality was low.[1]

To put the high 2015 death toll into perspective, it is useful to look at annual fluctuations observed in France over the last century. The curve of annual deaths shows an initial period from 1920 to the end of the Second World War where deaths stood at between 650,000 and 700,000 per year (Figure 1). The trend is downward until 1939 thanks to improvements in life expectancy at birth, which rose from 52.1 years in 1920 to 59.5 years in 1939. The spikes observed in certain years are due to severe flu epidemics such as those of 1927 and 1929. [2] The downtrend was interrupted temporarily by the Second World War, but resumed shortly afterwards, in 1946, when the number of deaths fell below 550,000. There followed almost seven decades of relative stability, with numbers fluctuating around 550,000 or slightly below (Figure 1).

This stability between 1946 and 2014 is surprising. Over that time, the population increased by more than half (from 40 to 64 million) and grew older, so the number of deaths should logically have risen. Why did this not happen? Will the number of deaths remain at this level over the coming years? Is the sharp rise in 2015, which continues an upward tendency observed since the low point in 2004, the sign of a new and different trend?

**The effect of rising life expectancy**

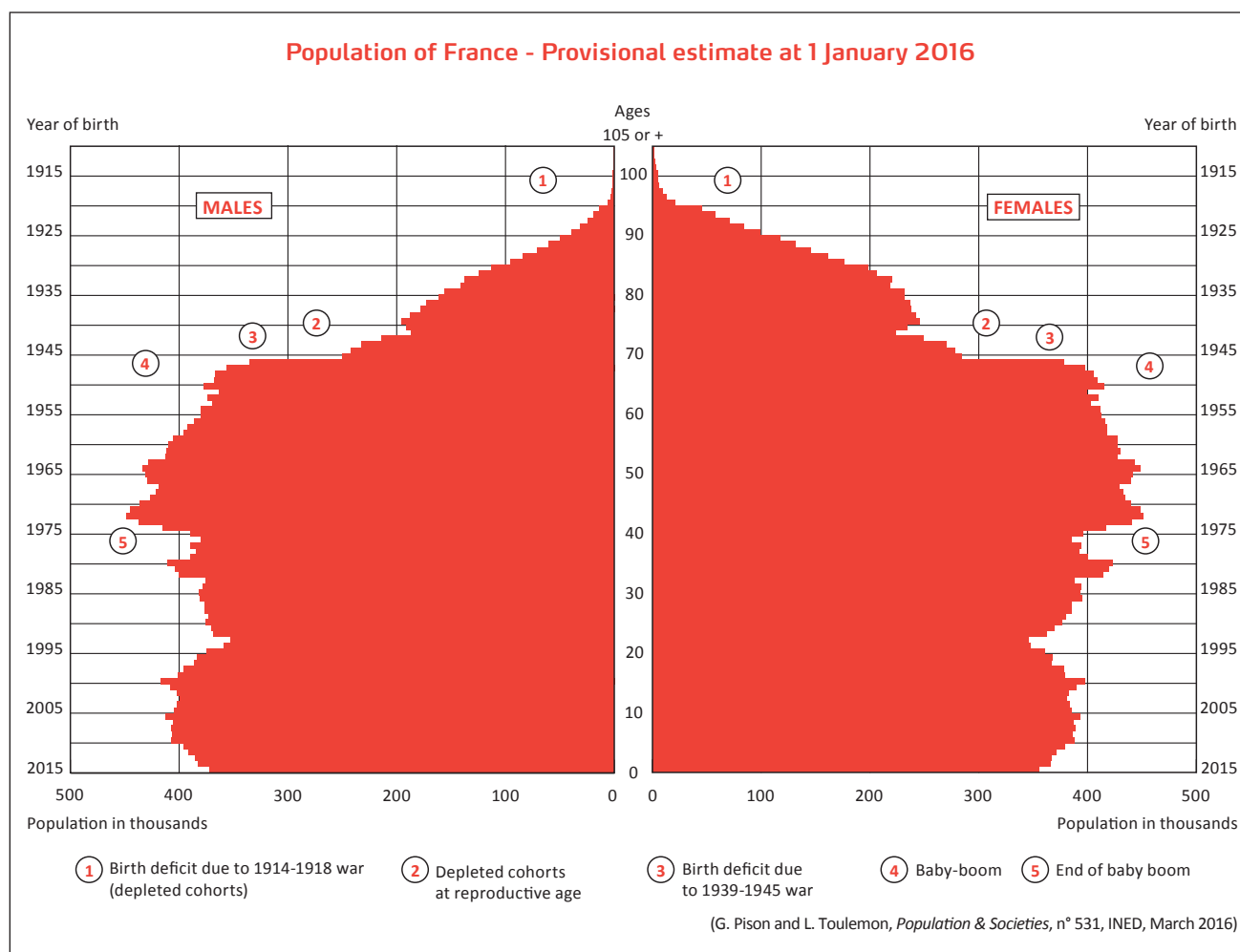
The first explanation for the stable numbers of deaths between 1946 and 2014 is the rise in life expectancy at birth, which increased over the period by 3.5 months per year on average (from 62.5 years to 82.3 years for both sexes combined). Just 30 years ago, progress on this scale was

### Deaths of the depleted cohorts born during the First World War

Between 1915 and 1919, the number of births fell by half with respect to the pre- and post-war periods. When these depleted birth cohorts reach the ages where deaths are most frequent, a “relative deficit” of deaths becomes visible in the form of a notch in the age distribution of deaths in the years 1990, 2000 and 2010 (Figure 2). The notch shifts by 10 years from one curve to the next as these cohorts advance in age. By 2010, few members of these cohorts were still alive, so the notch has become much smaller.

The temporary downturn in deaths observed from the early 1980s is partly explained by these depleted cohorts

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**Table - Demographic indicators 1950 to 2015, metropolitan France**

	1950	1960	1970	1980	1990	2000	2007	2008	2009	2010	2011	2012	2013(p)	2014(p)	2015(p)
Births (m)	858	816	848	800	762	775	786	796	793	802	793	790	782	781	762
Deaths (m)	530	517	540	547	526	531	521	532	538	540	535	559	558	547	587
Natural increase (m)	328	299	308	253	236	244	265	264	255	262	258	231	223	234	175
Net migration (m)	35	140	180	44	80	70	75	67	44	43	47	91	61	61	61
Total growth (m)	363	439	488	297	316	314	340	331	299	305	305	322	284	295	236
Adjustment <sup>(1)</sup> (m)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Birth rate (t)	20.5	17.9	16.7	14.9	13.4	13.1	12.7	12.8	12.7	12.7	12.5	12.4	12.2	12.2	11.8
Death rate (t)	12.7	11.3	10.6	10.2	9.3	9.0	8.4	8.5	8.6	8.6	8.5	8.8	8.8	8.7	9.1
Infant mortality rate (r)	51.9	27.4	18.2	10.0	7.3	4.4	3.6	3.6	3.7	3.5	3.3	3.3	3.5	3.3	3.5
Total fertility rate (e)	2.93	2.73	2.47	1.94	1.78	1.87	1.96	1.99	1.99	2.02	2.00	1.99	1.97	1.98	1.93
Life expectancy:															
Male (a)	63.4	67.0	68.4	70.2	72.7	75.3	77.4	77.6	77.8	78.0	78.4	78.5	78.8	79.3	79.0
Female (a)	69.2	73.6	75.9	78.4	80.9	82.8	84.4	84.4	84.5	84.7	85.0	84.8	85.0	85.4	85.1
Marriages <sup>(2)</sup> (m)	331	320	394	334	287	298	267	259	245	245	231	240	233	235	234
Marriage rate (t)	7.9	7.0	7.8	6.2	5.1	5.0	4.3	4.2	3.9	3.9	3.7	3.8	3.7	3.7	3.6
<b>Population<sup>(3)</sup> (m)</b>	<b>42,010</b>	<b>45,904</b>	<b>51,016</b>	<b>54,029</b>	<b>56,893</b>	<b>59,267</b>	<b>62,135</b>	<b>62,466</b>	<b>62,765</b>	<b>63,070</b>	<b>63,376</b>	<b>63,698</b>	<b>63,982</b>	<b>64,277</b>	<b>64,513</b>
Under 20 <sup>(3)</sup> (m)	12,556	14,665	16,748	16,419	15,632	15,068	15,338	15,369	15,407	15,440	15,458	15,513	15,589	15,664	15,702
65 and over <sup>(3)</sup> (m)	4,727	5,288	6,174	7,541	8,036	9,561	10,301	10,421	10,540	10,667	10,973	11,287	11,612	11,942	12,270
Under 20 <sup>(3)</sup> %	29.9	31.9	32.8	30.4	27.5	25.4	24.7	24.6	24.5	24.5	24.4	24.4	24.4	24.4	24.3
65 and over <sup>(3)</sup> %	11.3	11.5	12.1	14.0	14.1	16.1	16.6	16.7	16.8	16.9	17.3	17.7	18.1	18.6	19.0

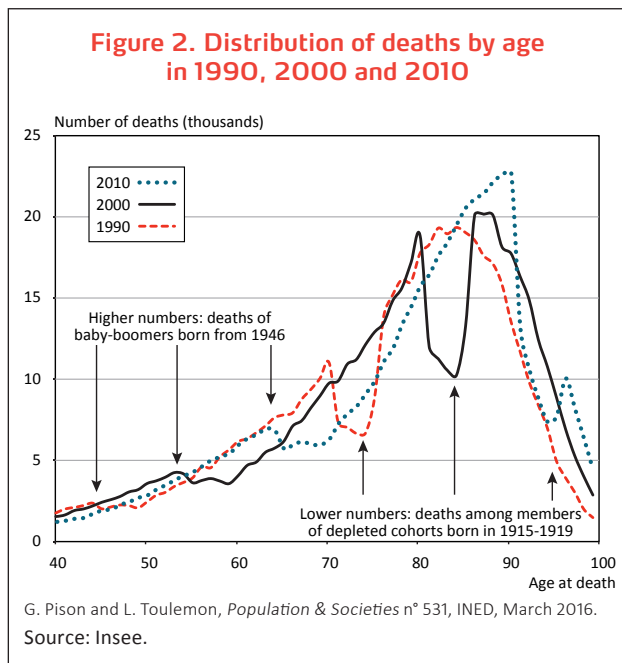
(a) . years – (e) children per woman – (m) in thousands – (p) provisional – (r) per 1,000 live births – (t) per 1,000 population.

(1) Population estimates for 2000 were adjusted to establish accounting consistency between the 1999 and 2006 censuses (see Vanessa Bellamy and Catherine Beaumel, 2016 [4]).

(2) Including same-sex marriages from 2013.

(3) At year-end.

Source: INSEE. *Division des enquêtes et études démographiques* ([www.insee.fr](http://www.insee.fr)).



who were now reaching the ages where deaths are most frequent. The effect of the small WW1 cohorts peaked in the early 2000s, and the curve began slowly to change direction. It was then disrupted by the heatwave of 2003 which produced a spike of deaths in that year, followed by a sharp dip linked to the “harvesting effect”: persons in poor health who would have died in 2004 in the absence of a heatwave died one year earlier, in 2003. This produced a surplus of deaths in 2003 followed by a deficit in 2004. The uptrend then resumed, but more slowly, thanks to the measures taken after the heatwave to reduce mortality at advanced ages by protecting older adults more effectively against the effects of heatwaves or other health risks.

### Deaths will increase as the baby boomers reach old age

Another similar phenomenon is beginning now that the large baby-boom cohorts born between 1946 and 1973 are in turn reaching older ages where deaths are frequent. Mirroring the boom in births, the annual number of deaths is increasing, as shown by the successive bulges on Figure 2. This new trend will grow in strength over coming decades, swelling the annual number of deaths as these generations age and finally become extinct in the 2060s. The latest INSEE projections all forecast that deaths will increase to

almost 770,000 per year by around 2050 in the central scenario.[4] However, they also predict a continued increase in life expectancy, with an additional gain of 7.6 years between 2007 and 2060 under this scenario, from 80.9 years to 88.5 years for both sexes combined. Alongside this central scenario, the high and low scenarios are based on an increase in life expectancy that is 2.5 years lower and higher, respectively, than that of the central scenario. But neither of these variants contradicts the general trend of a sharp increase in deaths; they simply raise or lower by 30,000 the total of 770,000 annual deaths forecast by the central scenario for 2060.

Even under the unlikely scenario of a 10- or 20-year jump in life expectancy thanks to spectacular progress in the fight against biological ageing, the number of deaths would still increase when the baby boomers reach advanced ages; their deaths would simply be delayed by one or two decades.

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### Abstract

The population of France has grown by more than half over the last 70 years and has increased in age. While the number of deaths should logically have risen, two factors explain why it has remained practically constant throughout the period: the increase in life expectancy, and the entry into extreme old age of the depleted cohorts born during the First World War. Their disappearance and the ageing of the large baby boom cohorts will push up the number of deaths in the coming years.