

# COVID-19: How are deaths counted in France?<sup>1</sup>

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(24 April 2020)

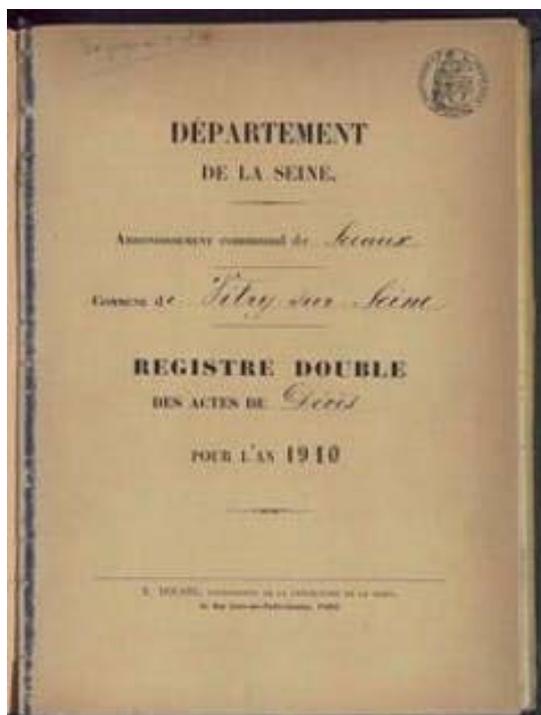
Since the start of the COVID-19 epidemic, the avalanche of information on numbers of deaths has left a contradictory impression: new figures are published every day, yet the actual death toll is probably much higher than these estimates suggest.

So how are deaths counted in France, and how reliable are the statistics?

Here we describe the method used under normal circumstances and explain how it has evolved in response not only to the massive COVID-19 crisis but also to other epidemics and disasters over the last two decades, such as the 2003 heatwave, the Paris terror attacks in 2015, or the recent deadly winter flu outbreaks.

## **Counting deaths in normal times: a well-proven but lengthy process**

In France, the systematic recording of all deaths began [several centuries ago](#) under the Ancien Régime, first in parish death registers and later in municipal registers of deaths kept by civil registrars.



Cover of the register of deaths of Vitry-sur-Seine for 1910. Provided by the authors.

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<sup>1</sup> Translated from the article '[Comment la France compte-t-elle ses morts ?](#)'

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Today, information from the death registers is sent to the French statistical office (INSEE) while the confidential medical certificates giving the causes of death are processed by the French National Institute of Health and Medical Research (INSERM). Analysis of these two data sources provides an array of indicators used to monitor mortality and causes of death in great detail.

It takes some time for INSEE and INSERM to obtain the death certificates from municipal registry offices and to process them correctly. Death numbers are published by INSEE each month for the preceding month, while cause-of-death statistics are compiled by a specialized INSERM department, [CépiDc](#). They take one or more years to produce, however, given the complexity of [information flows](#) (Figure 1).

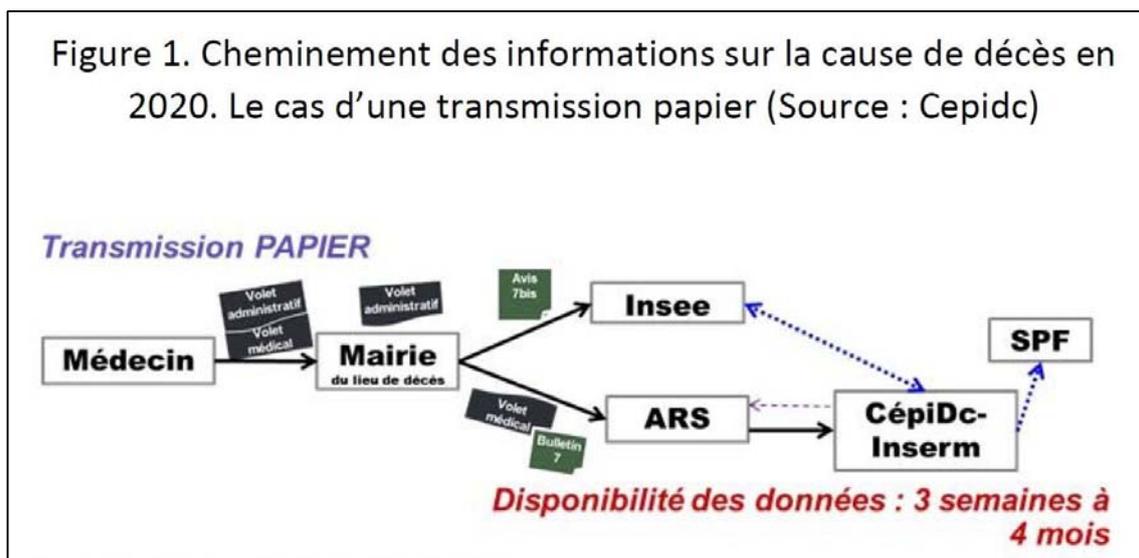


Figure 1. Information transmission for causes of death in 2020. Paper transmission (Source: CépiDc)

## The statistical challenge of the 2003 heatwave

The heatwave of early August 2003 resulted in [almost 15,000 additional deaths](#) in France in the space of 10 days, primarily among older adults. But it was [only much later](#) that the true death toll became apparent.

During the heatwave itself, it was not the statistical offices that sounded the alarm, but hospitals and [undertakers](#).

It became clear that the public statistical offices were not well-equipped to detect the impact of epidemics or disasters in real time. The system was adapted as a consequence so that initial figures could be released without waiting for monthly or annual reports. INSEE now communicates daily numbers of deaths to the French public health agency (Santé publique France) which releases a weekly report to [monitor seasonal influenza deaths](#).



The surge in deaths caused by the heatwave overwhelmed the funeral services in France, here at a cemetery in the Val de Marne *département* on 21 August 2003. Joel Robine/AFP

The system has become highly reactive now that a growing share of death certificates are transmitted electronically to INSEE from municipal registry offices ([88% in 2019](#)). Physicians have also started to send death certificates electronically (Figure 2), but the system is still being set in place. So far, only 18% of deaths in 2020 have been certified in this way, limiting the system’s capacity to monitor epidemics in real time.

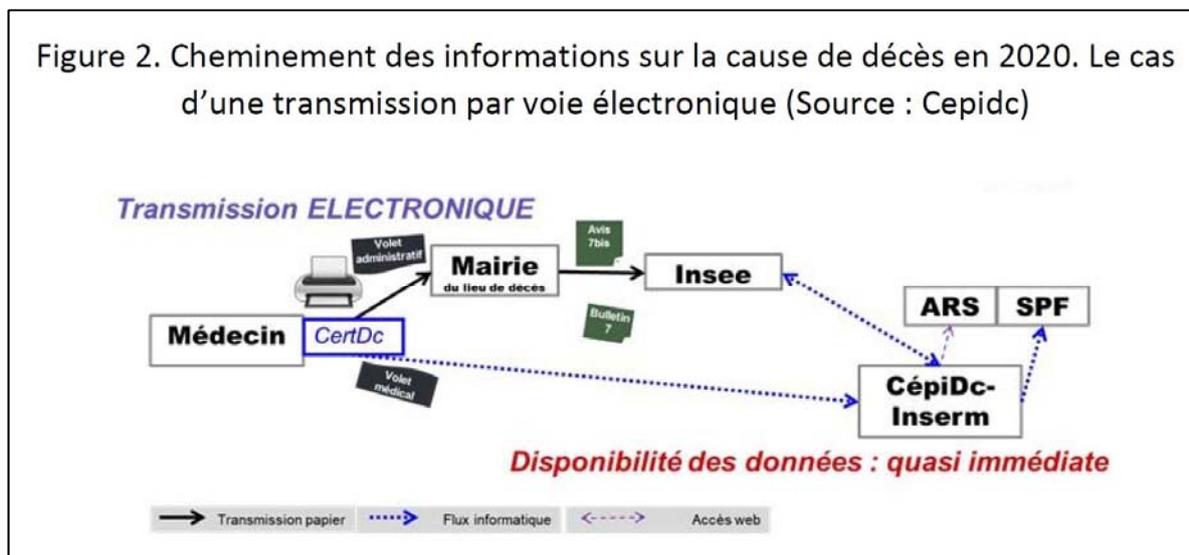


Figure 2. Information transmission for causes of death in 2020. Electronic transmission (Source: CépiDc)

## Influenza mortality: around 14,000 deaths in the winters of 2016–2017 and 2017–2018

This new setup has helped to improve the monitoring of winter flu epidemics. Flu-related excess mortality is estimated indirectly by comparing observed numbers of deaths each week with the ‘expected’ numbers, i.e. the mortality curves resulting from normal seasonal variations in deaths estimated using models (Figure 3).

There have been four severe flu epidemics since 2013, in the winters of 2014–2015, 2016–2017, 2017–2018, and 2018–2019, that show up as spikes on the curve. By comparison, the winter epidemics of 2013–2014, 2015–2016, and 2019–2020 were less severe and excess mortality was much lower.

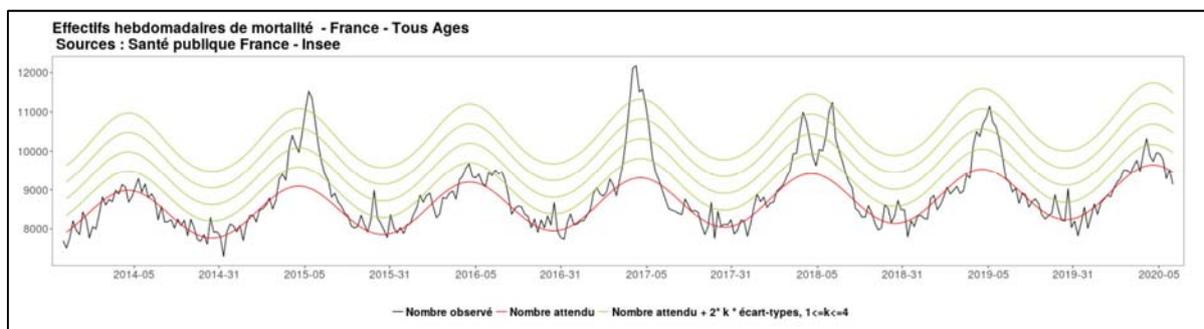


Figure 3. Expected and observed weekly numbers of deaths from September 2013 to early March 2020 (Sources: Santé publique France and INSEE)

Santé publique France can thus estimate overall excess mortality at the end of each flu epidemic. The published figures are sobering: there were [around 20,000 additional deaths](#) in the winters of 2016–2017 and 2017–2018, and 12,000 in the winter of 2018–2019.

By contrast, the most recent flu epidemic, that of 2019–2020, [has produced no notable excess mortality](#).

Note, however, that the excess deaths observed during the most severe flu epidemics are not all attributable to the flu virus itself, although it may have been a contributing factor. It is estimated that influenza accounts for around 70% of the excess mortality observed during the worst winter epidemics, i.e. around 14,000 deaths in 2016–2017 and 2017–2018, and around 8,000 in 2018–2019.

## How reliable are the daily figures?

After some adjustments, the system used to monitor seasonal flu deaths is now being applied to determine the [weekly death toll of the COVID-19 epidemic](#).

But as is the case for seasonal influenza, the true extent of COVID-19-related excess mortality cannot be accurately quantified until after the epidemic is over. As the health authorities need to issue the death count at the end of each day, they must rely on the two systems described above to obtain figures in real time.

While INSEE now publishes daily numbers of deaths by *département* compared with the numbers observed over the same period last year, this information, while extremely valuable for monitoring the epidemic, covers deaths from all causes (recall that causes of death are not analysed by INSEE but by INSERM) and is published with [a 10-day time lag](#) (seven days for a less accurate estimate based solely on death certificates transmitted electronically).

INSERM, for its part, cannot produce a daily count of COVID-19-related deaths as the share of electronic death certificates submitted by certifying physicians is still very small.

## **A third data source, covering hospital deaths only**

Santé publique France uses a third source to estimate the daily number of COVID-19-related deaths: an information system known as [SI-VIC](#) designed to enumerate victims of terrorist attacks and exceptional health situations. Set up in the wake of the Paris terror attacks in November 2015, the system records the numbers of deaths from COVID-19 communicated daily by each hospital in France. It excludes those occurring in private homes or in care homes, however. Slightly more than half of deaths occur in hospital ([53% in 2020](#)), almost a quarter at home (24%), and one in seven in care homes (13%). The remainder occur in a public place or at a location not specified on the death certificate.

In other words, the number of hospital deaths from COVID-19 underestimates the true level of mortality, but we do not know by how much.

According to the partial findings of the report published on 23 April, on top of the 13,547 hospital deaths in France, [8,309 COVID-19-related deaths have occurred in care homes](#) since the start of the epidemic, thus raising the total death toll by more than 60%.

## **A new international database**

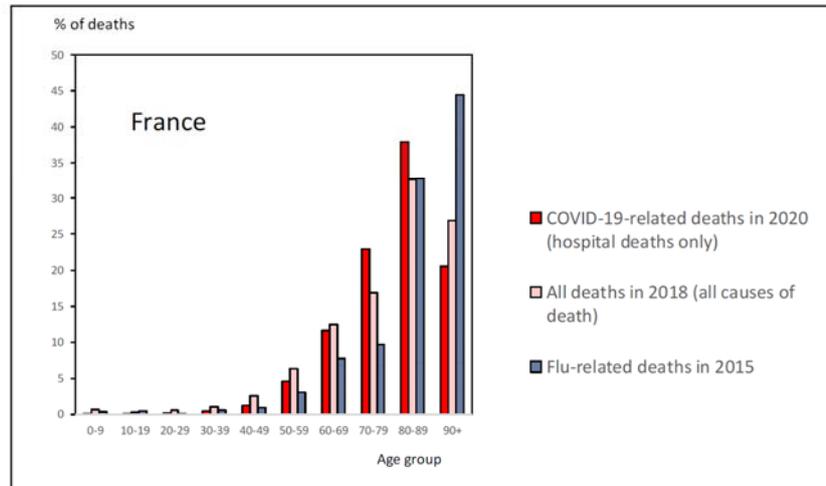
Even if it underestimates the true situation, the daily count of COVID-19-related deaths is useful for tracking the spread of the epidemic and detecting changes in the speed of progression.

But more detailed information is needed on the number of deaths by sex and age in order to answer some of the basic questions about COVID-19 mortality. Are there really more deaths among men than women? Do young people account for an increasing share of deaths? More generally, how does the risk of death vary by age and sex? Are similar variations observed in other countries? Are some countries more severely affected than others?

The French Institute for Demographic Studies (INED) has set up an online [international database](#) providing information of this kind for different countries. It is updated daily, and notes are provided on information sources and data quality for each country. The aim is to facilitate demographic research on COVID-19-related deaths by providing free access to basic data.

For example, we have used these data to compare the age distribution of three series of deaths in France: COVID-19-related hospital deaths in 2020, flu deaths in 2015, and deaths from all causes in 2018 (Figure 4).

Figure 4. Age distribution of deaths (%) France



Source: Authors' calculations based on data from *The demography of COVID-19-related deaths (2020)*, French Institute for Demographic Studies (INED) (distributor). Retrieved from <https://dc-covid.site.ined.fr/fr/> (23/4/2020).

Note: These are not mortality or case fatality rates, but relative numbers of deaths per 100 total deaths.

Interpretation: Based on total hospital deaths up to 23 April 2020, only 21% of deaths from COVID-19 in 2020 concerned victims aged 90 or over. This age group accounted for 27% of deaths from all causes in 2018 and 45% of flu deaths in 2015.

Figure 4. Age distribution of deaths (%). Comparison between deaths in France from COVID-19, from influenza in 2015, and from all causes in 2018. Authors' calculations using INED data. Provided by the authors.

The deficit of COVID-19-related hospital deaths is very visible at advanced ages, reflecting the absence of care home deaths from the counts.

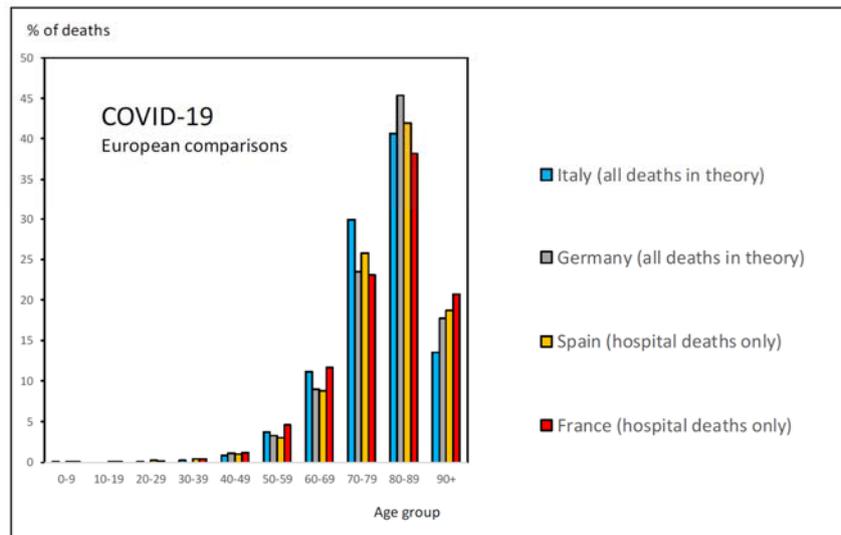
Based on total hospital deaths up to 23 April 2020, only 21% of deaths from COVID-19 in 2020 concerned victims aged 90 or over, versus 45% of flu deaths in 2015 and 27% of deaths from all causes in 2018.

## Deaths in Italy are also probably underestimated

The age distribution of COVID-19 deaths can be compared across several countries (Figure 5). Germany and Italy [claim to have counted all deaths](#), whereas Spain and France report hospital deaths only.

Yet the age distribution observed in Italy is much closer to the French or Spanish profile than that of Germany, which suggests that death counts among the oldest people in Italy are not exhaustive.

Figure 5. Age distribution of COVID-19-related deaths in 2020 (%)



Source: Authors' calculations based on data from *The demography of COVID-19-related deaths (2020)*, French Institute for Demographic Studies (INED) (distributor). Retrieved from <https://dc-covid.site.ined.fr/fr/> (23/4/2020).

Note: These are not mortality or case fatality rates, but relative numbers of deaths per 100 total deaths. The rates are probably very high among the over-90s. But this age group represents a very small share of the total population – 1.4% in France and between 1.2% and 1.4% in the other countries (source: United Nations, WPP 2019) – so it accounts for a small proportion of total deaths.

Interpretation: According to the cumulative death counts up to 23 April 2020, the over-90 age group accounted for 13% of COVID-19-related deaths in Italy, 18% in Germany, 19% in Spain, and 21% in France.

Figure 5. Age distribution of COVID-19-related deaths in 2020 (%). Comparison between 4 countries (Italy, Germany, Spain, and France). Authors' calculations using INED data: <https://dc-covid.site.ined.fr/>

At the height of an epidemic or disaster, it takes several days for information to be transmitted and analysed, even if processing is accelerated, and some deaths are inevitably missed. Several weeks or months are needed to obtain an accurate count of all deaths and to determine the most severely affected population categories.

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*This article was updated to take account of data available on 14 April. It was published in conjunction with the opening of a website on the demography of COVID-19-related deaths set up by the French Institute for Demographic Studies, [dc-covid.site.ined.fr/](https://dc-covid.site.ined.fr/)*