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Trends and Risk Factors for Prisoner Suicide in France

Is the prison environment conducive to suicide? Is it more so now than it was in the past? In an article published in Population back in 1976, Jean-Claude Chesnais showed that the suicide rate in France was far higher for prison inmates than it was for the general population. Nearly 40 years on, Géraldine DUTHÉ, Angélique HAZARD and Annie KENSEY highlight the excess suicide rate among male prisoners today, drawing on administrative data provided by the French prison service, an agency of the Ministry of Justice. Although suicide rates for the general population have changed relatively little over time, they have risen continuously in prison, and suicides are now seven times more frequent among prisoners than among non-prisoners. The authors analyse prison suicides over the period 2006-2009, and identify the main risk factors linked to life behind bars.

Nearly half of all deaths in French prisons are suicides, and the associated mortality level is far higher than for the general population (Duthé et al., 2009; Aebi and Delgrande, 2010). This particular aspect of prison life and the heightened vulnerability of inmates to suicide were first brought to light many years ago, both in France (Chesnais, 1976; Tournier and Chemithe, 1979; Kensey, 1991; Bourgoin, 1993a) and in many other countries (Kariminia et al., 2007; Fazel et al., 2010). There has been a substantial overall rise in the prisoner suicide rate over recent decades, and in the mid-2000s it was higher in France than in any other Western European country⁽¹⁾ (Aubusson de Cavarlay, 2009; Duthé et al., 2009).

The factors linked to suicide in prison are quite different from those applicable to the general population, owing to the very particular conditions in which these deaths occur. Several studies have shown that the risk is

(1) Excluding Luxembourg, where rates fluctuate considerably from one year to the next, owing to the very low numbers involved (between 0 and 3 deaths per year in the mid-2000s).

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especially high at the time of incarceration, and that pre-trial detainees commit suicide more than sentenced prisoners.⁽²⁾ Persons convicted for violent or sexual offences are overrepresented among suicide victims, as are those serving lengthy sentences. Regarding conditions of detention, suicide is more frequent among inmates who are alone in their cells or placed in solitary confinement as a disciplinary measure. Among sociodemographic factors, there is no consensus on the effect of age. Furthermore, even though excess suicide among female prisoners with respect to women in the general population is far greater than that of men (Bourgoin, 1993a), prison suicides are still more frequent among men than women. In prison, suicide is less frequent among single inmates than among married ones, whereas the reverse is true in the general community (Durkheim, 1897). This is because prisoners with partners have to cope with the additional burden of separation and loss of contact.⁽³⁾ In countries where the relevant data are available, ethnic origin has also been found to have an effect, with the majority group having a higher risk. Last, mental and behavioural problems, more frequent among prisoners than in the general population (Fazel and Danesh, 2002; Mouquet, 2005; Falissard et al., 2006), are also strongly associated with suicide risk.⁽⁴⁾

Limited access to individual prisoner data, plus the fact that suicide is statistically infrequent, makes it difficult to conduct statistical studies. Most research has been based on aggregate comparisons matching the characteristics of inmates who have committed suicide against those of the general prison population, or has involved long observation periods, or comparisons with control groups. There have been very few exhaustive multivariate statistical studies at the individual level to assess the effects of each separate risk factor. To gain a clearer picture of prison suicide in France, we analysed data drawn from the national prisoner management system (GIDE) operated by the French prison service (Direction de l'administration pénitentiaire, DAP). These data concerned nearly 378,000 periods of detention between 1 January 2006 and 15 July 2009, during which time 378 suicides were recorded. Because we knew the precise dates on which events occurred during the observation period, we were able to explore differential risks by taking the period of risk exposure into account. We could also consider possible changes in prisoners' penal status or conditions of detention.

(2) Most studies are multi-factorial. Factors of prison suicides are outlined in Fazel et al. (2008). In chronological order, the studies we refer to here are: Dooley, 1990; Marcus and Alcabes, 1993; DuRand et al., 1995; Joukamaa, 1997; Frottier et al., 2002; Fruehwald et al., 2004; Shaw et al., 2004; Way et al., 2005; and O'Driscoll et al., 2007. For the situation in France, see Chesnais, 1976; Bourgoin, 1993a, 1993b; Guillonnet, 2002; and Hazard, 2008. For details relative to each factor, see Duthé et al., 2013.

(3) More than one in ten inmates break up with their partner in their first month of detention (Cassan et al., 2000).

(4) The link between mental health and suicide in prison has been highlighted in many studies: Marcus and Alcabes, 1993; Joukamaa, 1997; Towl and Crighton, 1998; Fruehwald et al., 2003; Shaw et al., 2004; Way et al., 2005; Fazel et al., 2008; Hawton and van Heeringen, 2009; and Fazel and Baillargeon, 2011.

How has prison suicide evolved over time in France? What factors increase suicide risk? In this article, we begin by looking at how prisoner suicides have changed since observations began in the mid-nineteenth century, flagging up differences with respect to suicide in the general population. In the second section, we focus on a more recent period, looking for associations between the characteristics of individual detainees and suicide risk. We then go on to discuss the contributing factors for suicide in the context of current prevention policies in French prisons.

I. Prison suicides from a historical perspective

Data and population

The data analysed in this section were collated from two sources: data series (by two- or five-year period) published by Jean-Claude Chesnais in 1976 for the period prior to 1945; and more recent annual data series published or made available to us by DAP. All these series refer to the prisoner population in metropolitan France (mainland France and Corsica). It should be pointed out that until the mid-2000s, virtually everyone serving a prison sentence was held in a penal institution, meaning that there was very little difference between the prisoner and prison inmate populations. However, since the introduction of home detention curfew (HDC), more familiarly known as electronic tagging, in 2004, the proportion of prisoners not in custody has risen from less than 2% on 1 January 2005 to 13% on 1 January 2013. It has therefore become important to distinguish between the two.⁽⁵⁾

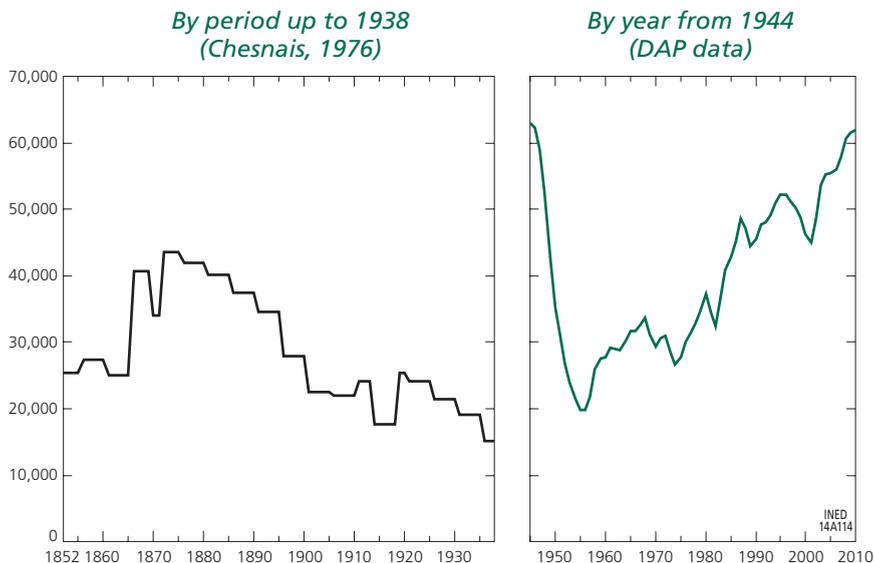
Changes in the prisoner population since the mid-nineteenth century

In the period 1852-1855, there were 25,467 detainees, on average, in French prisons. Between the late 1860s and mid-1870s, this number rose considerably, with nearly 44,000 inmates in 1872-1875. Apart from increases around the time of the Great War, there was an overall fall in numbers until the eve of World War II.⁽⁶⁾ In 1936-1938, there were slightly more than 15,000 prison inmates (Chesnais, 1976). No statistics are available for the war years, but 1945 was a record year, with more than 63,000 inmates, four times the prewar figure, as many suspected collaborators were imprisoned for a short time at the end of the war. The prison population dwindled rapidly thereafter until 1955, when the figure dipped below 20,000. Since then, despite annual fluctuations, numbers have increased substantially, and in 2010, it stood at nearly 62,000 (Figure 1; Appendix Table A.1).

(5) In this article, unless otherwise specified, the words "prisoner" and "imprisoned" refer to situations where the offender is either incarcerated or on home detention curfew.

(6) During this period, many convicts were sent to penal colonies in French Guiana and New Caledonia. They therefore dropped out of the prisoner population statistics for metropolitan France.

Figure 1. Mean annual prisoner population since the mid-nineteenth century in metropolitan France



Sources: Chesnais (1976), French Ministry of Justice, DAP.

With the sharp increase in the prison population in the second half of the twentieth century, prisons rapidly became overcrowded. In 1990, the occupancy rate⁽⁷⁾ reached 124 inmates per 100 places. In the early 2010s, the situation improved slightly as a result of various prison building programmes, but even so, the occupancy rate still stood at 113 inmates per 100 places (DAP, 2012).

At the individual level, changes in criminal legislation have profoundly altered the make-up of the prisoner population (Fruehwald et al., 2002). These changes reflect the fact that society has grown less tolerant of certain offences. New criminal law provisions have been introduced, and sentences tend to be longer. For example, as a result of legislation passed in 1980, individuals can now be imprisoned for committing acts that did not formerly fall within the legal definition of rape; the introduction in 1984 of compulsory adversarial proceedings before a suspect can be remanded in custody has reduced the proportion of pre-trial detainees; the extension in 1989 of the statute of limitation for under-age victims of sexual assault has increased the number of convictions for this type of offence; the broadening of the legal definition of deliberate acts of violence in the 2000s means that more people are now imprisoned for violent crimes; etc.

The demographic profile of prisoners has also shifted somewhat. In 1852, at the start of the period under consideration, women made up 17% of the

(7) The occupancy rate, or prison density, measures the proportion of people in prison in relation to the number of operational places in each prison at a given point in time. When this indicator rises above 100%, it means that there are fewer places than inmates, corresponding to prison overcrowding.

prison population.⁽⁸⁾ At the end of World War II, the proportion was very similar (18% in 1946) but it fell rapidly thereafter, and since 1958, it has remained below 5% (Duthé et al., 2011). Although the mean age of the prison population has risen – it currently stands at around 34 years – age standardization (possible on data for the past 30 years) has no effect on prisoner suicide trends (Duthé et al., 2010).

Regarding the physical health of French prisoners, the system has markedly improved since 1994, as the Health Ministry is now responsible for their healthcare, and they are treated in public hospitals. Nonetheless, as in other countries (Ashraf, 1999; Fazel and Baillargeon, 2011), needs remain high and are still not fully met (Coldefy et al., 2002; Falissard et al., 2006; Coldefy and Exertier, 2007).

Regarding their mental health, it is difficult to establish how it has changed (as is also the case for the general population). Prior to 1838, people with mental disorders were locked up in prisons whenever their behaviour disturbed the social order. In that year, however, new legislation was passed on care for the mentally ill, leading to the opening of asylums, later replaced by psychiatric hospitals (Mamelet, 1978, cited by Coldefy, 2007). However, these hospitals shut patients away from society, rendering them vulnerable and exposing them to negligence and even abuse. During World War II, poor standards of care and hygiene, combined with severe food restrictions, resulted in dramatic excess mortality (45,000 deaths) in these institutions. This huge death toll (Chapireau, 2007; von Bueltzingsloewen, 2007), still-fresh memories of the horror of the concentration camps, and the advent in the 1950s of antipsychotic drugs that brought some disorders under control, led to attempts to deinstitutionalize psychiatric patients. These included the development of voluntary admissions and outpatient care, followed by sectorization in the 1970s (Coldefy, 2007). This move towards greater humanity in the psychiatric sector was reflected in changing priorities and resources, one example being a reduction in hospital beds. This is one of the two explanations put forward for the large numbers of mentally ill people in prison, the other – related – reason being the way that criminal responsibility is assessed (a person with a psychological disorder can be deemed responsible even if his or her judgment is “impaired”). However, while it may partly explain the rise in prisoner suicides, the link that is all too often drawn between prison and mental health has never been statistically established, and no study has ever borne it out.

A rising prisoner suicide rate since the mid-nineteenth century

The annual number of prisoner suicides includes all deaths that occur following an act of suicide committed by an individual registered as a prisoner at the time of that act. This number can then be divided by the mean prison

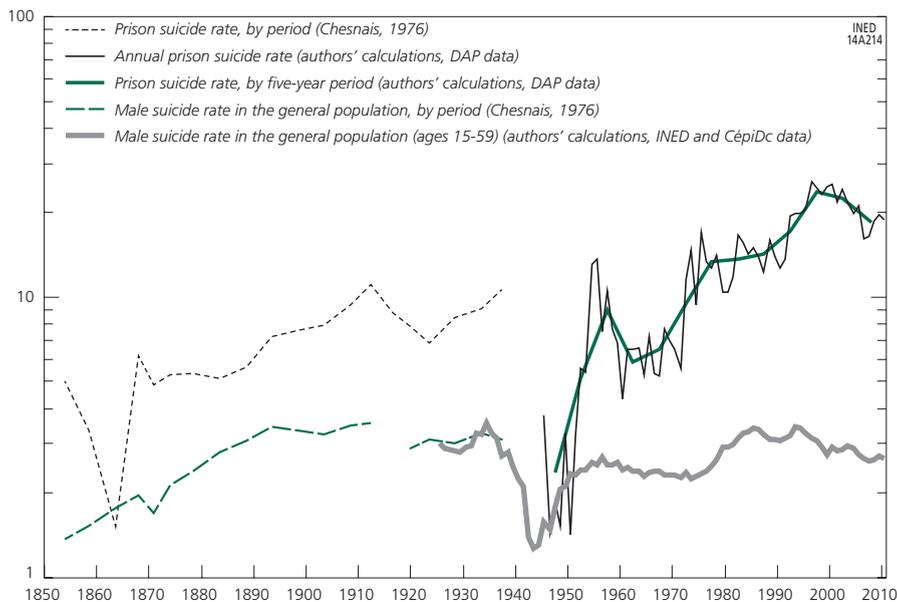
(8) According to the general records of the criminal justice services in France for 1852, available on the Gallica website of the BNF (<http://gallica.bnf.fr/>).

population for that year (or the period under consideration) to obtain a crude suicide rate. This rate has been available since the mid-nineteenth century for metropolitan France, with the exception of the period 1939-1944. Until 1938, it was calculated for several years at a time, masking major annual variations; annual statistics (which can also be used to calculate five-year rates) are only available from 1945.⁽⁹⁾

The prisoner suicide rate has undergone major fluctuations since the mid-nineteenth century. The lowest figure was recorded in 1946 (1.4 suicides per 10,000 prisoners) and the highest in 1996 (26 per 10,000). In addition to these annual fluctuations, there have been both troughs (1855-1865 and immediately after WWII) and peaks (1905-1915, the mid-1950s, and between the late 1990s and early 2000s). Looking beyond these fluctuations, however, there has been a clear upward trend in prisoner suicide rates over time, rising from 5 per 10,000 in 1852-1855 to 18.5 per 10,000 in 2005-2010 (Figure 2).

At present, more than nine detainees in ten are men aged 15-60 years, and the prison suicide rate can therefore be compared with the crude suicide

Figure 2. Suicide rates among prison inmates and the general population in metropolitan France since the mid-nineteenth century (log scale)



Sources: Chesnais, 1976; Ministry of Justice/DAP; INED* (1925-1999); CépiDc (2000-2010).

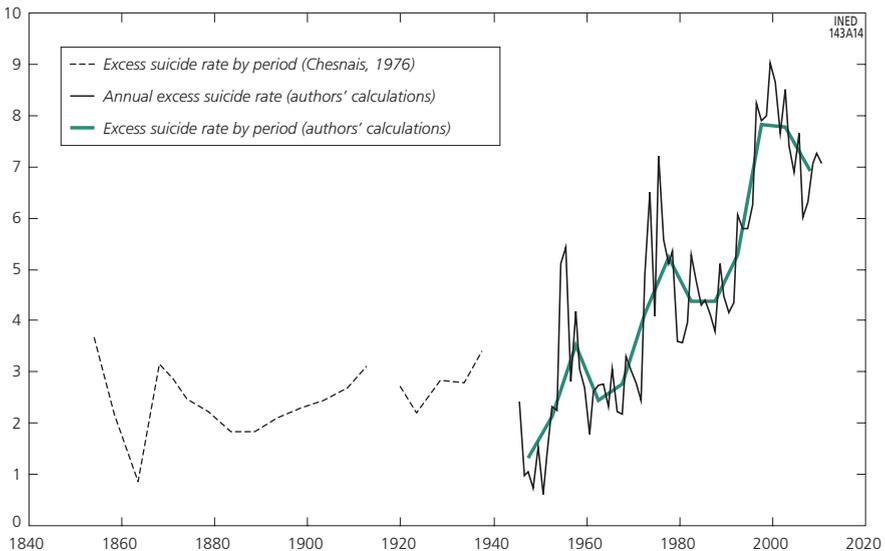
* Database on the causes of death (medical definitions held constant) in France since 1925 developed by France Meslé and Jacques Vallin, available on the INED website at the following address: www.ined.fr/en/everything_about_population/data/online-databases/death-causes_since_1925/ It is based on the reconstruction of death statistics from the detailed list of the International Classification of Diseases, Ninth Revision (for a description of the method, see Vallin and Meslé, 1988).

(9) With the exception of the most recent period, which is for six years.

mortality rate observed among men aged 15-59 years in the general population of metropolitan France (2.7 per 10,000 in 2010).⁽¹⁰⁾ Apart from the early 1860s and the immediate postwar period, the suicide rate has always been higher in prison than in the community. It is worth noting that the trends for the general population are not necessarily the same as those observed for prisoners (Figure 2). For instance, the level of suicides among non-prisoners increased at the end of the postwar boom and during the ensuing recession (Chesnais and Vallin, 1981). However, this economic link seems to have become more tenuous since then, as the 2008 financial crisis had little apparent effect on suicide levels in France (Laanani et al., 2013).

We can track changes in the excess suicide rates for prisoners compared with non-prisoners by calculating the ratio between the rates for the two populations (Figure 3). This ratio oscillated below 4 before World War II (i.e. four times more suicides in prison than in the community), but fluctuated between 6 and 9 in the early 2000s, and in the period 2005-2010, the suicide rate was 7 times higher for prisoners than it was for the general population. This ratio has its limitations. For example, the structure of the two populations by sex and age group is not exactly the same, and in both cases there is a

Figure 3. Ratio of prison suicide rates to rates observed in the general male population of metropolitan France since the mid-nineteenth century



Sources: Chesnais, 1976; Ministry of Justice/DAP; INED (1925-1999); CépiDc (2000-2010).

(10) It is not possible to isolate the 15-59 age group in cause-of-death statistics for the general population before 1925. The suicide rates reported in Figure 2 for periods before this date are those of the male population of all ages published by Jean-Claude Chesnais in 1976 (Appendix Table A.1). The two rates give very similar levels. In addition, for time series, age-standardized rates are usually given, but the trends of the crude and standardized rates are also very similar (Appendix Table A.3).

margin of error in the estimated numbers of suicides. In the general population, the difficulty of certifying that a violent death was intentional (i.e. that it was not an accident or homicide) means that suicide mortality is underestimated. This shortfall is currently estimated to be around 10% (Aouba et al., 2011). While this margin of error has not yet been specifically studied for the prison population, we can assume that data reliability has improved over time for both populations and that taking the margin of error into account would probably not undermine the conclusion of increasing excess suicide rate among prisoners with respect to nonprisoners.

Without the time-series data needed to analyse the precise reasons for the rise in prisoner suicides and the difference with respect to the general population, it is difficult to explain this trend. In terms of the prison environment, overcrowding undeniably results in a deterioration not just in inmates' living conditions, but also in their relationships with prison staff, social workers and healthcare professionals. In a study published in 1994, however, Nicolas Bourgoin found that prison overcrowding and suicide followed opposite trends, and this continues to be the case today (Duthé et al., 2009, 2010). This is because the outwardly unfavourable context is counterbalanced by a protective effect for individuals. The presence of a cellmate reduces the risk of suicide, either by lessening the prisoner's feeling of isolation or by making it materially more difficult to commit suicide. From a demographic point of view, changes in the prison population structure in terms of sex (increase in the proportion of men between 1940 and 1950) and age (increase in mean age over the past few decades) are relative, and can have had only a marginal effect on the ratios (Duthé et al., 2010, 2011). A causal link is sometimes postulated between suicide and the presence of increasing numbers of inmates with mental health problems, but as indicated earlier, it has yet to be proven. Nonetheless, by identifying risk factors specific to the prisoner population (nature of the offence, incarceration process, sentence length, conditions of detention, events occurring during imprisonment, etc.), we can certainly inform the debate.

II. Risk factors for prisoner suicide over a recent period

Data, population and method

Under an agreement between INED and DAP ensuring compliance with ethical rules of confidentiality and individual data protection, DAP supplied us with data from GIDE, the national prisoner management database. GIDE is a computer application containing information on prisoners in the current year, as well as in the three previous full calendar years. The database was consulted on 15 July 2009, providing us with information about prison terms in France for the period beginning on 1 January 2006, including terms that had commenced prior to that date. During this observation period, there were

377,688 prison terms, 378 of which ended in suicide. Although the unit of observation was the prison term, for simplicity's sake, we treated it as the prisoner (we return to this point in the discussion).

Based on the factors identified in the studies described in the introduction, we used the information we had been given to build a database of prisoner characteristics likely to be associated with the risk of suicide. As well as demographic information (sex, date of birth, nationality) and penal status (date of imprisonment, date and reason for release, nature of criminal proceedings, type of offence(s), date(s) of conviction, sentence(s) pronounced), we looked at the conditions of detention (custody, type of prison, presence of a cellmate) and any events that occurred during the observation period (hospital admissions, breaches of prison discipline, disciplinary measures, including solitary confinement, suspension of visiting rights). As the number of suicides under analysis was relatively low with respect to the study population (approximately 1 suicide per 1,000 prison terms, whatever their length), we were studying a statistically rare event. This meant that missing or inaccurate data might skew the results and give rise to errors of interpretation. We therefore removed several variables from our analysis (French language proficiency, occupational and marital status, place of residence). This information, provided by the individual while being registered as a prisoner by the clerk of the court, may be inaccurate and is not always correctly recorded. Moreover, when detainees are transferred, this information may be updated, but without any record of the change.

We began by modelling the suicide risk using logistic regression, taking account of all the variables that were available and usable. We then ran comparisons with other models that are supposedly more suitable for observing a statistically rare event (Poisson regression and negative binomial regression; cf. Orro and Senghor, 2010), but failed to find any difference. The results of this initial analysis have already been published elsewhere (Duthé et al., 2010). The nature of the data available to us, notably the dates of prison entry and release, meant that we could also consider the length of exposure to risk. We therefore constructed a duration model and calculated the risk of committing suicide for prison terms that might be left-censored (if an individual entered prison prior to 1 January 2006) and/or right-censored (if a term had not ended by 15 July 2009).

The independent variables we selected⁽¹¹⁾ were both sociodemographic (sex, age at imprisonment, nationality) and judicial (nature of the main

(11) Owing to missing data for some of the terms, we had to exclude two characteristics of interest, namely type of prison and presence of a cellmate. We only had information concerning the situation at the end of the observation period for these two characteristics, which are both associated with suicide risk: the latter is greater for individuals sent to a remand prison (or the remand section of a different type of prison) than for those sent to penitentiary centres for convicted offenders. The risk is also higher for inmates who are alone in their cells (Duthé et al., 2010).

offence,⁽¹²⁾ penal status, which could change across the period depending on the date of any final conviction and the length of any ensuing prison sentence). They also concerned the type of detention (custodial or not) and possible disciplinary measures (duration of solitary confinement, based on start and finish dates within the observation period). We added possible hospital admissions (followed by a return to the cell) during the period of observation, as well as visits from friends or relatives. For the purpose of this analysis, we excluded any prison terms with missing or incoherent information, such as cases where the individual remained in prison for more than five years without any conviction recorded in the database (fewer than 0.1% of terms), where age at imprisonment was not known (0.6%) or where there was no information about the nature of the offence (2.6%). The analysis therefore concerned 363,525 prison terms and 377 suicides.

To describe the study population, we provide both the mean duration of prison terms and the actual durations of stay observed in the present study. This is because differences in length of prison term by individual characteristics result in differences in observed lengths of stay during this period, and affect the number of person-years observed for the different prisoner profiles used to calculate a precise prison suicide rate. We then present the survival function linked to the prisoner suicide risk. We end by studying differences in suicide mortality levels by individual profiles and prison terms, before conducting a multivariate analysis.

For the multivariate analysis, we use the Cox proportional hazards model, which examines how the hazard of an event occurring varies in response to different variables. It models the hazard as follows:

$$h(t, z) = h_0(t) \cdot \exp(\beta \cdot z)$$

where z represents the individual (here, the prison term) according to each of the selected variables (z_1, z_2, z_3, \dots), and $h_0(t)$ is the hazard of the event happening to the reference individual when all the variables are null ($z = 0$) at duration t . Although this model cannot describe how the hazards associated with the different variables may change over time, it does measure the relationship between them, which is assumed to remain constant over time:

$$\frac{h(t, z)}{h_0(t)} = \exp(\beta \cdot z)$$

It therefore relies on the proportional hazards assumption, which we tested using Schoenfeld residuals (Hosmer et al., 2008).

(12) We divided the offences into six categories of decreasing gravity: (1) murder; (2) rape; (3) other sexual offence; (4) deliberate act of violence; (5) other offence (aggravated or simple theft); (6) drug or other offence. Where more than one offence had been committed, we retained the most serious one.

Duration of prison terms

Most stays were relatively short. Half of those that ended between 1 January 2006 and 15 July 2009 had lasted less than 0.34 years (i.e. four months), and their mean duration was 0.72 years (i.e. slightly less than nine months). The mean duration of all the stays observed during this period was 0.61 years (i.e. slightly more than seven months), see Table 1.

The duration of prison terms varied according to the prisoners' characteristics. It was generally shorter for women, individuals who were under 18 when they were imprisoned, prisoners who were not in custody, pre-trial detainees, persons sentenced to less than one year in prison, and persons convicted of offences other than murder, rape, other sexual offences, or violence. On average, offenders convicted of murder, rape or other sexual offences remained in detention for 4.1, 3.6 and 1 year, respectively.

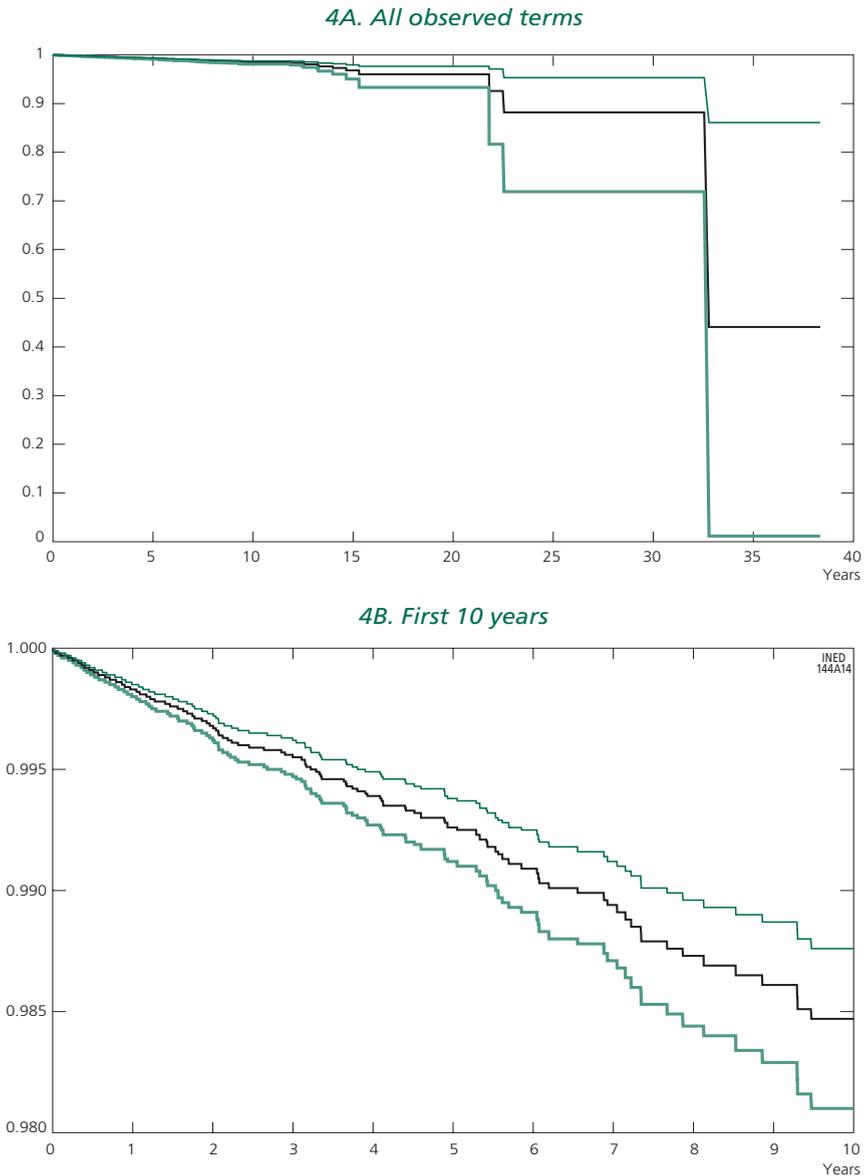
Table 1. Duration of prison terms (in years) between 01/01/2006 and 15/07/2009, by selected variables

	Median length of term ^(a)	Mean length of term ^(a)	Mean observed term ^(b)
Overall	0.34	0.72 (0.72-0.73)	0.61 (0.61-0.61)
Male	0.34	0.73 (0.72-0.73)	0.61 (0.61-0.62)
Female	0.28	0.59 (0.57-0.61)	0.52 (0.51-0.53)
Under 18 at time of incarceration	0.15	0.36 (0.34-0.37)	0.32 (0.31-0.33)
Aged 18-30 at time of incarceration	0.37	0.68 (0.68-0.69)	0.59 (0.59-0.60)
Aged over 30 at time of incarceration	0.31	0.79 (0.78-0.80)	0.65 (0.64-0.65)
French	0.34	0.73 (0.72-0.73)	0.61 (0.61-0.62)
Foreigner	0.32	0.70 (0.69-0.71)	0.59 (0.59-0.60)
In custody	0.35	0.75 (0.74-0.76)	0.63 (0.63-0.63)
Not in custody	0.25	0.39 (0.39-0.40)	0.35 (0.34-0.35)
Pre-trial detainee ^(c)	0.24	0.33 (0.33-0.33)	0.31 (0.30-0.31)
Convicted prisoner ^(c)	0.37	0.81 (0.81-0.82)	0.60 (0.60-0.61)
Sentenced to less than 1 year ^(c)	0.20	0.30 (0.30-0.30)	0.27 (0.27-0.27)
Sentenced to 1-10 years ^(c)	0.99	1.79 (1.78-1.80)	1.11 (1.11-1.12)
Sentenced to more than 10 years ^(c)	5.59	9.24 (9.14-9.35)	2.59 (2.57-2.61)
Imprisoned for murder	2.39	4.07 (3.93-4.22)	1.94 (1.92-1.97)
Imprisoned for rape	2.09	3.63 (3.55-3.71)	1.75 (1.73-1.77)
Imprisoned for other sexual offence	0.59	1.03 (1.00-1.05)	0.78 (0.77-0.79)
Imprisoned for violence	0.38	0.69 (0.68-0.69)	0.62 (0.62-0.63)
Imprisoned for another offence	0.29	0.53 (0.53-0.53)	0.47 (0.47-0.47)
(a) Calculated for terms that ended between 1 January 2006 and 15 July 2009.			
(b) Between 1 January 2006 and 15 July 2009.			
(c) Column (a): status at the end of the term; column (b): variable status depending on the date of sentencing.			
Note: The 95% confidence intervals are shown in parentheses.			
Source: Database derived from GIDE (Ministry of Justice/DAP).			

Suicide is a statistically rare event

The survival function associated with the duration model represents the cumulative probability of not committing suicide over time (since imprisonment) (Figure 4). This probability is initially relatively high in the early years: after 10 years of imprisonment, it stood at 0.9847 (95% CI, 0.9810 – 0.9876). Prisoner

Figure 4. Survival function (estimate and 95% confidence interval) linked to the risk of prisoner suicide since the start of the prison term (in years)



Source: Database derived from GIDE (Ministry of Justice/DAP).

suicide is a statistically rare event, and beyond 15 years of detention, the confidence interval widens and there are fewer and fewer terms, making it hard to achieve an accurate estimate of the suicide risk.

Prisoner suicide mortality rate

Between January 2006 and July 2009, the suicide mortality rate was 17 suicides per 10,000 individuals imprisoned over a year (95% CI, 15.4 – 18.8) (Table 2). The crude rate calculated for the mean prison population over this

Table 2. Person-years, number of suicides and suicide mortality rates (per 10,000) for all prison terms observed in France between 01/01/2006 and 15/07/2009, as a function of selected variables

	Person-years	Number of suicides	Suicide mortality rate
Overall	221,348.3	377	17.0 (15.4-18.8)
Male	213,256.2	366	17.2 (15.5-19.0)
Female	8,092.1	11	13.6 (7.5-24.5)
Under 18 at time of incarceration	3,953.9	4	10.1 (3.8-27.0)
Aged 18-30 at time of incarceration	138,994.0	203	14.6 (12.7-16.8)
Aged over 30 at time of incarceration	78,400.5	170	21.7 (18.7-25.2)
French	178,563.7	307	17.2 (15.4-19.2)
Foreigner	42,784.6	70	16.4 (12.9-20.7)
In custody	211,418.7	368	17.4 (15.7-19.3)
Not in custody	9,929.6	9	9.1 (4.7-17.4)
In ordinary cell	219,651.1	347	15.8 (14.2-17.6)
In disciplinary cell	1,697.2	30	176.8 (123.6-252.8)
No hospitalization during the period	170,729.5	246	14.4 (12.7-16.3)
Hospitalization during the period	50,618.9	131	25.9 (21.8-30.7)
No family visit during the period	134,426.2	293	21.8 (19.4-24.4)
At least one visit during the period	86,922.2	84	9.7 (7.8-12.0)
Pre-trial detainee	44,485.1	151	33.9 (28.9-39.8)
Convicted prisoner	176,863.2	226	12.8 (11.2-14.6)
Sentenced to less than 1 year	53,633.3	69	12.9 (10.2-16.3)
Sentenced to 1-10 years	93,474.0	97	10.4 (8.5-12.7)
Sentenced to more than 10 years	29,755.9	60	20.2 (15.7-26.0)
Imprisoned for murder	17,875.2	85	47.6 (38.4-58.8)
Imprisoned for rape	28,292.2	77	27.2 (21.8-34.0)
Imprisoned for other sexual offence	10,023.0	24	23.9 (16.1-35.7)
Imprisoned for violence	49,491.4	80	16.2 (13.0-20.1)
Imprisoned for another offence	115,666.6	111	9.6 (8.0-11.6)
Note: The 95% confidence intervals are shown in parentheses.			
Source: Database derived from GIDE (Ministry of Justice/DAP).			

same period is 17.4. This crude rate therefore gives a slight overestimation, but the order of magnitude remains the same.

In terms of prisoners' sociodemographic characteristics, although there is a lower mortality rate for women (13.6) than for men (17.2), the difference is not significant, mainly owing to the low numbers of female prisoners. The same is true for individuals imprisoned below age 18 (10.1 per 10,000). The rate is slightly lower for foreign nationals (16.4) than for French detainees (17.2), but again this difference is not significant. By contrast, the rate for adults imprisoned at age 30 or over is significantly higher than for adults imprisoned at a younger age (21.7 versus 14.6).

Regarding conditions of detention, prisoners who were not in custody had a suicide mortality rate of just 9.1 per 10,000, far lower than for prison inmates. However, there is a wide confidence interval so this difference is not significant. By contrast, even when the confidence interval is taken into account, we observe an extremely high suicide rate when prisoners are placed in solitary confinement (176.8 per 10,000; 95% CI, 123.6 – 252.8). Persons admitted to hospital at least once during the period of observation also had a higher rate (25.9 versus 14.4), as did inmates who did not receive any visits from family or friends (21.8 versus 9.7).

In terms of penal situations, the suicide rate for pre-trial detainees was nearly three times higher than it was for convicted prisoners (33.9 per 10,000 versus 12.8), and among the latter, those sentenced to prison terms of more than 10 years had a higher rate than offenders serving shorter sentences (20.2). The suicide rate varied according to the nature of the main offence. It was highest for offenders convicted of murder (47.6), followed by rape (27.2), other sexual offences (23.9), violence (16.2) and other offences (9.6).

In short, the suicide rate was particularly high for individuals placed in solitary confinement, those jailed for serious offences, pre-trial detainees, offenders serving lengthy terms, prisoners who had recently spent time in hospital, and those who were relatively old when they went to prison. By contrast, inmates under 18, prisoners who were not in custody, and those who received visits from friends or relatives had relatively low rates (around 10 per 10,000). In the following section, we provide the results of the multivariate analysis, which allowed us to check whether these associations persisted when all the variables were simultaneously taken into account.

Are sociodemographic variables barely significant?

In this and following sections, we interpret the results of the multivariate analysis set out in Table 3. All other things being equal, and assuming that the hazard ratio remains constant across time, the risks do not differ significantly by sex, age at imprisonment or nationality. Although the hazard ratios reveal lower risks for women and for under-18s, the confidence intervals are too wide to confirm a statistical link. This lack of significance probably stems from the

low numbers of prisoners in these two categories. Age at imprisonment (30 or over) seemed significant in the bivariate analysis, but is only significant at $p = 0.71$ here, and the proportional hazards hypothesis is not confirmed. However, when we restrict the analysis to adult males in custody, we find a significant effect of age at imprisonment, with a higher risk for older men (Duthé et al., 2013). In this respect, our observations differ from findings in other countries, particularly the United Kingdom, where it is the youngest adults who appear to be the most vulnerable (Humber et al., 2011). In the United States, by contrast, results on the effect of age are not convergent (Way et al., 2005). Given these variations from one context to another and from one study to another, age is not clearly recognized as a risk factor (Fazel et al.,

Table 3. Hazard ratio for suicide (Cox model) for all prison terms observed in France between 01/01/2006 and 15/07/2009, as a function of selected variables

	Hazard ratio	P>z
Male (<i>Ref.</i>)	1	
Female	0.6 (0.3-1.2)	0.194
Age under 18 at time of incarceration	0.4 (0.2-1.2)	0.110
Age 18-30 at time of incarceration (<i>Ref.</i>)	1	
Age over 30 at time of incarceration	1.2 (1-1.5)	0.071(np)
French (<i>Ref.</i>)		
Foreigner	0.9 (0.7-1.1)	0.345
In custody (<i>Ref.</i>)	1	
Not in custody	0.7 (0.3-1.3)	0.232
In ordinary cell (<i>Ref.</i>)	1	
In disciplinary cell	15.4 (10.5-22.6)	0.000
No hospitalization during the period (<i>Ref.</i>)	1	
Hospitalization during the period	1.7 (1.3-2.1)	0.000
No family visit during the period (<i>Ref.</i>)	1	
At least one visit during the period	0.4 (0.3-0.5)	0.000
Pre-trial detainee	1.9 (1.4-2.6)	0.000
Sentenced to less than 1 year (<i>Ref.</i>)	1	
Sentenced to 1-10 years	0.9 (0.6-1.3)	0.656
Sentenced to more than 10 years	1.2 (0.7-2.1)	0.557
Imprisoned for murder	7.3 (5.2-10.2)	0.000
Imprisoned for rape	4.2 (3.0-5.9)	0.000
Imprisoned for other sexual offence	2.7 (1.7-4.2)	0.000
Imprisoned for violence	1.9 (1.4-2.5)	0.000
Imprisoned for another offence (<i>Ref.</i>)	1	
(np) does not support the hypothesis of proportionality. Note: The 95% confidence intervals are shown in parentheses. Source: Database derived from GIDE (Ministry of Justice/DAP).		

2008). It is worth pointing out that, unlike previous studies, we analyse the effect of age at imprisonment and not age at suicide. This is the case because when we constructed our duration model, we were interested in the time that had elapsed since imprisonment, rather than age at suicide. Furthermore, given the lack of sociodemographic data (e.g., marital status, number of children) for the reasons set out earlier, it is difficult for us to conclude that sociodemographic variables have only a minor influence on prisoner suicide.

Hospital admissions and prisoner health status

Data on prisoners' health are held by the French Ministry of Health and were not forthcoming for this study. Moreover, the prison service does not systematically record suicide attempts, unless they give rise to incidents within the prison. The only information we have concerns the transfer of inmates to healthcare facilities during the observation period, which we treat as a proxy measure of their health status. Confirming the bivariate analysis, the suicide risk is significantly higher (1.7) for persons who had previously been admitted to hospital (then sent back to prison) than for other detainees. There is an extremely close link between suicide and mental and behavioural disorders, such as problems of addiction and suicidal behaviour.⁽¹³⁾ Some of the reasons for these hospital admissions, for which data are not available, may have been linked to mental health problems.

Solitary confinement and family visits

Regarding conditions of detention, the hazard ratio is lower for prisoners who were not in custody, but the gap is not significant, in contrast to the bivariate analysis, which showed up a clear difference. The small number of prisoners in this group probably explains this lack of significance. By contrast, despite the low numbers, spells of solitary confinement are associated with a far higher risk than time spent in an ordinary cell (hazard ratio above 15). Inmates are placed in solitary confinement as a disciplinary measure, following a serious breach of prison rules (causing a disturbance, behaving violently towards a prison officer or a fellow inmate, etc.). Individuals who have obvious difficulty adapting to the prison environment are therefore those who end up in solitary confinement (Liebling, 1995). These same persons may also be more liable to exhibit mental or behavioural disorders. The particularly high hazard ratio confirms that physical isolation renders prisoners especially vulnerable to suicide.

Beyond physical isolation, our study also reveals the importance of social relations between inmates and their family and friends, as receiving at least one visit reduces suicide risk (0.4). This result confirms the role of social support highlighted in more qualitative studies, notably in the United Kingdom among young (Liebling, 1993) and female (Marzano et al., 2011) prisoners.

(13) See list of references in Footnote 4.

Moreover, individuals with mental or behavioural disorders are more socially isolated than their fellow prisoners, which can reinforce the link between an absence of visits and the risk of suicide.

The main offence resulting in conviction

Like the bivariate model, the multivariate model features a steep and significant risk gradient for the nature of the main offence resulting in conviction. Compared with the reference offences, the hazard ratios are 7.3 for murder, 4.2 for rape, 2.7 for other sexual offences, and 1.9 for violence. Several factors can explain the link between suicide and the gravity of the main offence: the offence itself; remorse about the act that was committed or indeed a feeling of injustice at being imprisoned; pre-trial stress and uncertainty surrounding a possible conviction or the guilty verdict and a heavy attendant prison sentence. The actual length of the sentence is therefore a secondary factor, which may explain why we failed to find an impact of sentence length after controlling for the nature of the offence, contrary to what we had observed in the bivariate analysis.

Regarding the key role of social relations, some offences, especially rape, can result in the prison inmate being ostracized (Harvey and Liebling, 2001). We also know that in the vast majority of cases of acts of violence against others, the victim and perpetrator know each other. Many violent assaults, notably murder and rape, are committed against close acquaintances and even family members (Mucchielli, 2002; Bajos and Bozon, 2008), making loss of contact with friends and relatives even more likely.

Pre-trial detention

In terms of penal status, although sentence length ceases to be significant in the multivariate model, suicide is twice as common among pre-trial detainees as it is among convicted offenders. Unless they are immediately convicted, most people first experience prison as pre-trial detainees. This remand period, which is generally custodial, can be a violent shock for people moving directly from the community into prison (Terra, 2003; WHO, 2007). They are cut off from friends and family, their freedom is restricted, they are forced to adapt to a harsh new environment, and many of them feel very pessimistic about the future. As already mentioned in relation to serious offences, uncertainty surrounding the verdict and the ensuing sentence is a source of stress for all pre-trial detainees.

Conclusion

In the present study, we did not have any information about prisoners' health status, except for their hospital admissions during the observation period. For prison terms that had commenced prior to 1 January 2006, we had

no knowledge of events that occurred before the start of the observation period. Nor did we have any details about prisoners' previous lives (criminal record, traumatic events, etc.) that might have provided further insight on the causes of suicide (Liebling, 1995). For instance, suicidal behaviour may be displayed prior to imprisonment, not least by offenders who have committed crimes against friends or family members (Bourgoin, 1993c). Moreover, our unit of analysis was the prison term and not the individual, so we had no way of determining which individuals spent time in prison more than once during our observation period. Repeat offenders may feel the shock of imprisonment less, but the sentences (awaited or pronounced) may be heavier. That being said, most repeat offenders are young adults jailed for more minor offences (Kensey and Benaouda, 2011), who are less vulnerable to suicide. Lastly, we were unable to examine the impact of contextual features such as the characteristics of individual penal institutions (overcrowding, prison officer training, healthcare provision, etc.), as numbers were too small to conduct a multilevel analysis. Nor were we able to include upcoming events such as release, which can be a source of considerable stress (Terra, 2003).

In the first part of this article, we demonstrated the increasingly specific nature of prisoner suicide compared with suicide among the general population. The impossibility of establishing clear correlations with socioeconomic status made it harder to draw comparisons with risk factors in the community. However, the results set out in the second part highlight the importance of penal status, in particular the nature of the offences committed and the conditions of detention for pre-trial detainees and convicted offenders. These are variables specific to the prisoners themselves. A recent and more qualitative study of the last letters written by prisoners who go on to commit suicide underscored the diversity of situations and the tensions that lead to suicide (Pan Ké Shon, 2013).

The latest action plan for preventing and combating prisoner suicide includes new measures designed to reduce the feeling of isolation experienced by inmates held in solitary confinement, by giving them access to a telephone or radio, for example (Terra 2003, Albrand 2009). The sudden transition from freedom to prison is a traumatic event, and imprisonment causes upheaval in every aspect of prisoners' lives, entailing not just a loss of freedom, but also loss of contact with friends and family, and loss of future prospects. The strong tension experienced by prisoners reaches its paroxysm in solitary confinement. The suicide rate there is nearly 2%, after controlling for duration of stay. Prisoners awaiting trial also call for particular vigilance. Last, beyond the conditions of detention, the nature of the offence must also be taken into account in initiatives aimed at preventing prison suicide.

The past few years have been marked by the development of conditional release, with offenders now spending less time in custody. In research on prisoner suicide, it will be increasingly important to distinguish between prison

inmates and prisoners who are not held in a penal institution. From this perspective, it would be well worth extending the analysis of suicide to all those under the responsibility of the prison service. More than two-thirds of these people are monitored in the community by its rehabilitation and probation services, and not all of them will have spent time behind bars. However, the methodology has yet to be established, and no records are kept of individuals who commit suicide while under supervision in the community.

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APPENDICES

Table A.1. Changes by period in the mean prisoner population, prisoner suicide rate and suicide rate for the general male population (per 10,000) from the mid-nineteenth century to the eve of the Second World War in metropolitan France

Period	Mean prisoner population (1)	Prisoner suicide rate (2)	Suicide rate for the general male population (3)	Prisoner excess suicide rate (2)/(3)
1852-1855	25,467	5.0	1.4	3.7
1856-1860	27,426	3.3	1.5	2.2
1861-1865	25,023	1.5	1.8	0.9
1866-1869	40,644	6.2	2.0	3.2
1870-1871	34,091	4.9	1.7	2.9
1872-1875	43,579	5.3	2.1	2.5
1876-1880	41,996	5.3	2.4	2.2
1881-1885	40,141	5.1	2.8	1.8
1886-1890	37,402	5.6	3.1	1.8
1891-1895	34,589	7.3	3.5	2.1
1896-1900	28,008	7.6	3.3	2.3
1901-1905	22,520	7.9	3.2	2.5
1906-1910	22,003	9.4	3.5	2.7
1911-1913	24,195	11.1	3.6	3.1
1914-1918	17,614	8.9	-	-
1919-1920	25,481	7.9	2.9	2.7
1921-1925	24,152	6.9	3.1	2.2
1926-1930	21,505	8.5	3.0	2.8
1931-1935	19,121	9.1	3.3	2.8
1936-1938	15,073	10.6	3.1	3.4

Source: Chesnais, 1976.

Table A.2. Mean prisoner population, and suicide rates among prisoners and men aged 15-59 years in the general population (per 10,000) in metropolitan France, 1945-2010

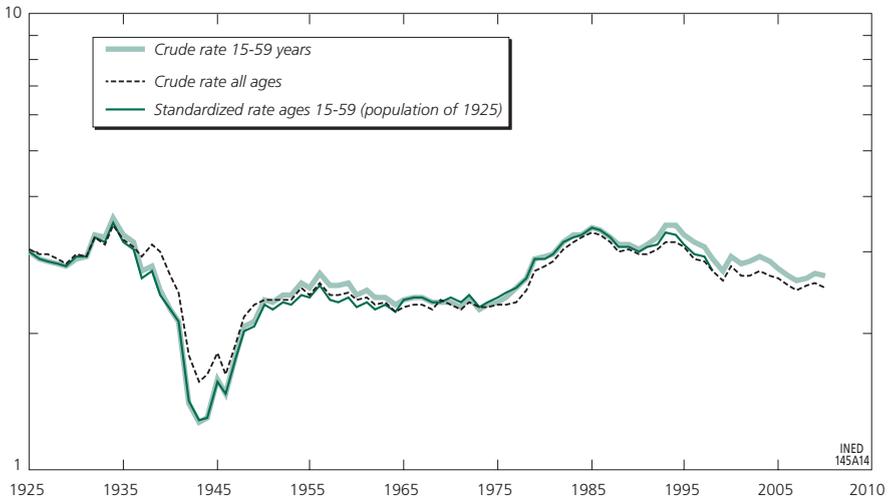
Year	Mean prisoner population (1)	Prisoner suicide rate (2)	Suicide rate in the general population Men aged 15-59 (3)	Prisoner excess suicide rate (2)/(3)
1945	63,051	3.8	1.6	2.4
1946	62,210	1.4	1.5	1.0
1947	59,070	1.9	1.8	1.0
1948	52,552	1.5	2.1	0.7
1949	42,543	3.3	2.1	1.6
1950	35,257	1.4	2.4	0.6
1951	31,072	3.2	2.3	1.4
1952	26,802	5.6	2.4	2.3
1953	23,941	5.4	2.4	2.2
1954	21,374	13.1	2.6	5.1
1955	19,813	13.6	2.5	5.4
1956	19,886	7.5	2.7	2.8
1957	21,796	10.6	2.5	4.2
1958	25,873	7.7	2.5	3.1
1959	27,591	6.9	2.6	2.7
1960	27,736	4.3	2.4	1.8
1961	29,205	6.5	2.5	2.6
1962	29,069	6.5	2.4	2.7
1963	28,781	6.6	2.4	2.8
1964	30,201	5.3	2.3	2.3
1965	31,751	7.2	2.4	3.1
1966	31,710	5.4	2.4	2.2
1967	32,623	5.2	2.4	2.2
1968	33,755	7.7	2.3	3.3
1969	31,227	7.0	2.3	3.0
1970	29,288	6.5	2.3	2.8
1971	30,609	5.6	2.3	2.4
1972	30,987	11.6	2.4	4.9
1973	28,703	14.6	2.3	6.5
1974	26,570	9.4	2.3	4.1
1975	27,757	16.9	2.3	7.2
1976	29,996.5	13.3	2.4	5.6
1977	31,385	12.7	2.5	5.1
1978	32,787	14.0	2.6	5.3
1979	34,485	10.4	2.9	3.6
1980	37,306	10.5	2.9	3.6
1981	34,648.5	11.8	3.0	4.0
1982	32,459.5	16.6	3.1	5.3
1983	36,606.5	15.6	3.3	4.8
1984	40,785.5	14.2	3.3	4.3
1985	42,777	15.0	3.4	4.4

Table A.2 (cont'd). Mean prisoner population, and suicide rates among prisoners and men aged 15-59 years in the general population (per 10,000) in metropolitan France, 1945-2010

Year	Mean prisoner population (1)	Prisoner suicide rate (2)	Suicide rate in the general population Men aged 15-59 (3)	Prisoner excess suicide rate (2)/(3)
1986	45,155.5	14.0	3.4	4.1
1987	48,511	12.4	3.3	3.8
1988	47,154.5	15.9	3.1	5.1
1989	44,447	13.9	3.1	4.5
1990	45,536.5	12.7	3.1	4.2
1991	47,636.5	13.6	3.1	4.4
1992	48,138.5	19.5	3.2	6.1
1993	49,202	19.9	3.4	5.8
1994	50,931.5	19.8	3.4	5.8
1995	52,140.5	20.5	3.3	6.3
1996	52,149	25.9	3.1	8.2
1997	51,192	24.4	3.1	7.9
1998	50,208	23.3	2.9	8.0
1999	48,860.5	24.8	2.7	9.0
2000	46,333.5	25.3	2.9	8.6
2001	44,968.5	21.8	2.8	7.7
2002	48,573	24.3	2.9	8.5
2003	53,591	21.8	2.9	7.4
2004	55,328.5	19.9	2.9	6.9
2005	55,467.5	21.1	2.8	7.7
2006	55,963.5	16.1	2.7	6.0
2007	57,881	16.4	2.6	6.3
2008	60,572	18.7	2.6	7.1
2009	61,553	19.7	2.7	7.3
2010	61,949	18.9	2.7	7.1

Sources: (1) and (2) French Ministry of Justice/DAP; (3) INED up to 1999, then CépiDc (authors' calculations).

Appendix A.3. Annual change in suicide rate per 10,000 in the general male population in metropolitan France since 1925, according to different indicators, per 10,000



Sources: INED up to 1999, then CépiDc (authors' own estimates).



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Géraldine DUTHÉ, Angélique HAZARD, Annie KENSEY • TRENDS AND RISK FACTORS FOR PRISONER SUICIDE IN FRANCE

France currently has a very high level of prisoner suicides. Between 2005 and 2010, the mean annual rate was 18.5 suicides per 10,000 prisoners seven times higher than for the general population. In this article, we begin by describing how suicide has changed since the mid-nineteenth century, highlighting the increasingly specific nature of suicide among prisoners versus non-prisoners. We then analyse the associations between individual characteristics and suicide risk, based on information from the French prison service's database on all prison terms served in France between 1 January 2006 and 15 July 2009. Over this period, nearly 378,000 terms were observed (corresponding to more than 221,000 person-years) and 378 suicides were identified. Our results confirm the vulnerability of pre-trial detainees, and show that isolation, be it physical or social, is a key component of suicide risk, along with the type of offence resulting in imprisonment. Improving the conditions of detention is one of the priorities of prevention policies now being implemented, but the nature of the offence must also be taken into account as a suicide risk factor.

Géraldine DUTHÉ, Angélique HAZARD, Annie KENSEY • SUICIDE DES PERSONNES ÉCROUÉES EN FRANCE : ÉVOLUTION ET FACTEURS DE RISQUE

Le niveau de suicide en prison est actuellement élevé en France : 18,5 suicides pour 10000 personnes écrouées pendant la période 2005-2010, soit sept fois plus qu'en population générale. Cet article présente l'évolution du suicide depuis le milieu du XIX^e siècle, mettant en avant une spécificité croissante du suicide en milieu carcéral par rapport à la population générale. L'analyse porte ensuite sur les associations qui existent entre les risques de suicide et les caractéristiques individuelles, à partir de la base de gestion de l'administration pénitentiaire qui regroupe l'ensemble des séjours sous écrou observés en France entre le 1^{er} janvier 2006 et le 15 juillet 2009. Sur cette période, près de 378 000 séjours ont été observés (correspondant à plus de 221 000 personnes-années) et 378 suicides ont été identifiés. Les résultats confirment la vulnérabilité des personnes en détention provisoire et montrent le rôle prépondérant de l'isolement, qu'il soit physique ou social, ainsi que celui de la nature de l'infraction qui a motivé la mise sous écrou. Si l'amélioration de l'environnement du détenu est un point mis en avant dans les nouvelles politiques de prévention, la nature de l'infraction, comme facteur de risque suicidaire, devrait également être prise en compte.

Géraldine DUTHÉ, Angélique HAZARD, Annie KENSEY • SUICIDIO DE PERSONAS ENCARCELADAS EN FRANCIA: EVOLUCIÓN Y FACTORES DE RIESGO

Actualmente, en Francia, la frecuencia del suicidio en prisión es elevada: 18,5 suicidios por 10000 personas encarceladas durante el periodo 2005-2010, es decir, siete veces más que en la población general. Este artículo presenta la evolución del suicidio desde mediados del siglo XIX, y subraya una especificidad creciente del suicidio en prisión respecto al observado en la población general. Se estudian a continuación asociaciones entre el riesgo de suicidio y características individuales, a partir de los datos de la base de gestión de la administración penitenciaria que reúne todas las estancias en prisión observadas en Francia entre el 1^o de enero de 2006 y el 15 de Julio de 2009. Durante este periodo, fueron observadas cerca de 378 000 estancias (correspondiendo a más de 221 000 personas-año) durante las cuales se produjeron 378 suicidios. Los resultados confirman la vulnerabilidad de las personas en detención provisional y muestran el papel preponderante del aislamiento, físico o social, así como el de la naturaleza de la infracción que ha provocado el encarcelamiento. Si las nuevas políticas de prevención se proponen mejorar el entorno del detenido, también debería tomarse en cuenta la naturaleza de la infracción como factor de riesgo.

Mots-clés : Mortalité, suicide, prison, France, sursuicidité, risques, modèle de durée.

Keywords: Mortality, suicide, prison, France, excess suicide mortality, hazard, duration model.

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