Suicide in French Polynesia: a retrospective analysis based on medicolegal documents and interview with family

Stephane Amadéo[1,2,3,14] (iD), Moerani Rereao[1,2], Germaine Vanquin David[2], NgocLam Nguyen[4], Monique Séguin[5,6], Guy Beauchamp[6], Patrick Favro[7], Heimana Trouche[8], Aurélia Malogne[1,2], Benjamin Goodfellow[9], Erick Gokalsing[3,10], Michel Spodenkiewicz[3,11], Aminata Sy[12,13], Yvana Bocage-Barthélémy[1], Johan Sebti[1], Annie Tuheiava[2], Louis Jehel[3,14] and Diego De Leo[15]

Abstract

Objective: To analyse the epidemiological data on suicide in French Polynesia (FP).
Methods: Data on suicides were collected from the Public Health Direction, Judicial Police Investigations Court of Justice records, the Centre d'Opérations et de Renseignements de la Gendarmerie, patient records for those hospitalized in psychiatry and from psychological autopsies.

[1]Hospital Centre of French Polynesia (CHPF), Tahiti, French Polynesia
[2]Suicide Prevention Centre and Association SOS Suicide, Tahiti, French Polynesia
[3]MOODS Team Inserm Unity U1018, CESP, Paris, France
[4]Public Health Direction, Tahiti, French Polynesia
[5]Groupe McGill d'Étude sur le Suicide, Montreal, Canada
[6]Réseau québécois sur le suicide, les troubles de l'humeur et les troubles associés, Montreal, Canada
[7]EASTCO Research Laboratory, University of French Polynesia, Tahiti, French Polynesia
[8]Social Prevoyance Bank (CPS), Tahiti, French Polynesia
[9]Hospital Center Specialyzed (CHS), Nouméa, New Caledonia
[10]CUMP/VigilanS Indian Ocean, Public Mental Health Hospital, La Réunion, France

[11]Department of Mental Health, CIC-EC 1410, University Hospital Centre (CHU) of la Réunion, Saint-Pierre, France
[12]WHO Collaborative Center – EPSM LILLE Métropole, Lille, France
[13]Inserm Unity UMR 1123 – ECEVE, Paris, France
[14]Hospital University Centre (CHU), Fort de France, Martinique, FWI, France
[15]Australian Institute of Suicide Research and Prevention, World Health Organization Collaborating Centre for Research in Suicide Prevention and Training, Griffith University, Mt Gravatt, Australia

Corresponding author:
Stéphane Amadéo, University Hospital Centre of Martinique, 97261 Fort de France, French West Indies.
Email: stephaneamadeo@me.com

Results: The dataset consisted of 316 suicide cases in FP over 25 years (1992–2016). In FP, suicide was more frequent in men (sex ratio 3.2:1), young people (mean age, 34.4 years) and individuals with previously diagnosed psychiatric disorders (100 of 316; 31.6%) The most common method of suicide was hanging (276 of 316; 87.3%). A history of previous suicide attempts was found in 25 of 56 (44.6%) of suicide cases, when documented. The most common potential triggering factors for suicide were emotional problems. The suicide rates have remained stable during 1992–2016 (mean 10.6/100 000 inhabitants per year), with periods of economic crises increasing suicide rates.

Conclusions: These results provide valuable information to enable the effective targeting of suicide prevention strategies toward those at high risk. Economic crises had larger impacts in the French overseas territories than mainland France. Given the unprecedented economic impact of the Covid-19 pandemic in FP, there is an urgent need to implement suicide epidemiological surveillance and prevention programmes.

Introduction

The Western Pacific region experiences high mortality rates by suicide, but there has been little or no research in certain island communities while important efforts are being made in the larger countries of the Asia-Pacific region to improve the epidemiological monitoring of suicidal behaviour and promote prevention.[1] Official data give only yearly suicide mortality rates by sex and sometimes by age. These data do not make it possible to identify risk and protective factors for suicide in order to implement prevention strategies adapted to the local socio-cultural and geographic contexts.

This is particularly the case for French Polynesia (FP), one of the eight French overseas territories, the others being New Caledonia, Martinique, Guadeloupe, French Guiana, Réunion, Mayotte, Saint Pierre and Miquelon. They all have a strong cultural identity, and are all islands, except for French Guiana. FP includes more than 113 islands, spread over an area larger than Europe. For the 275 918 inhabitants of the 2017 census, the standardized suicide rates have fluctuated significantly over the years but have remained relatively stable over the period 1992–2016 (Source: Public Health Direction of French Polynesia).

In FP and in the WHO Western Pacific Region, a programme called World Health Organization (WHO)/Suicide Trends in At-Risk Territories (START) was launched in 2007 to improve the quality of suicide data and initiate suicide prevention programmes.[2] The WHO/START study had four components: (i) a monitoring system to collect systematic information on fatal and non-fatal suicidal behaviours; (ii) a randomized study of brief intervention (psychoeducation on suicide) and contact (through 9 phone calls) for non-fatal suicidal behaviours and controls over an 18-month period; (iii) a study of suicide cases by psychological autopsy; and (iv) the follow-up of medically serious suicide attempts. The results of the first two

components were described elsewhere.[3,4] This current article presents the results of the third component of the WHO/START study, which are suicide data in FP collected during the preparation of psychological autopsies. This component is very important because it offers the best method to identify risk factors among people who died by suicide in FP and verify if they are similar to those identified in other countries. This current study collected clinical data related to suicides that occurred in FP between 1992 and 2016.

Subjects and methods

Data sources on suicide mortality

After agreement from the Ethics Committee of the Public Health Department of French Polynesia (opinion no. 29 of 11.01.2007), as part of the WHO/START study between 2008 and 2016, retrospective clinical data were collected at the FP Court of Justice of Papeete and Gendarmerie Nationale with the consent of the Prosecutor of the Republic. Different sources of data were included to provide information on risk factors associated with the outcome of suicide cases. First, the archived records of all suicide cases followed by the Hospital Centre of French Polynesia (CHPF, the only hospital structure with a psychiatric department) between 2008 and 2016 were retrieved as soon as the research group were informed of a case of suicide. The information was retrieved from the medical records and interviews with the relatives made qualitative analyses possible. Then, research was undertaken on the Centre for Epidemiology on Medical Causes of Death (CépiDc) website, which is the national database of causes of mortality, in order to have crude suicide rates in Mainland France and in the French overseas territories. These territories have notable differences but also similarities: demographics

(multiethnicity and multiculturalism) and geographic (insularity). However, according to previous research, suicide rates were significantly higher in FP than in one overseas territory (Martinique) for the period 2005–2010.[5,6]

Quantitative data on suicide mortality

The Direction of Public Health in FP was contacted to collect the official suicide death figures between 1992 and 2016. The information provided was usually limited to the numbers and the standardized rates of suicide by sex, without information on the method of suicide or the age of the subject (with the exception of *ad hoc* studies for limited periods). The causes of death in the medical death certificates were coded according to the International Classification of Diseases (ICD) of the WHO in ICD-9 (1984–1998) and ICD-10 (1999–2016). They were coded according to WHO rules by the Direction of Public Health in FP from 1992 to 2004, then by CépiDc-Inserm, France. The database on the cause of death according to the CépiDc for mainland France and the French overseas departments was used as a means of comparison. This database also shows the numbers and crude suicide rates by sex. These data have been available since 2000, with the exception of figures for French Guiana, available since 2001 only, and from two territories (Mayotte, and St Pierre and Miquelon). The Overseas Pacific Territories are not included in this database, so suicide data were gathered for New Caledonia thanks to the team that conducted the psychological autopsy of the WHO/START study.[7]

Qualitative data on suicide

Information was collected from Judicial Police Investigations (JPI) records, which are systematically ordered in FP Prosecutor in the event of suicide and violent death. In order to carry out this investigation,

researchers attended the FP Court of Justice and consulted the reports drawn up by the gendarmes between 2008 and 2011 and between 2015 and 2016, in order to consult the JPI records of all individuals that died of suicide in FP during that period. The contact numbers or addresses of the relatives of the people that had died of suicide and other relevant information were retrieved. The police records are a rich source of information, with an average of eight people (family, friends, witnesses, neighbours) interviewed by the gendarmes for each case. The information collected was recorded on an information sheet by the interviewer and included socio-demographic data (identity; age; sex; dates of birth and death; profession; marital and professional status; identity of people interviewed during the forensic investigation) and investigation data (facts preceding the death reported by the interviewed people; details of suicide method; history of suicidal behaviour; communication of suicidal intent [verbal or non-verbal, such as previous suicide attempts]; medical history, including possible contact with health services; history of psychic disorders; use of addictive substances; critical life experiences; and changes in the behaviour of the deceased). The research team was able to conduct qualitative interviews with relatives of suicide victims for only five cases. Most recent psychological autopsy studies underline the need to have multiple sources of information and a control group.[8–12] The results of this current study were compared with a control group that comprised a representative sample of the general population in the form of the 968 cases of the Mental Health in General Population (MHGP) survey with information terms of suicidality (suicide ideas and attempts), psychiatric diagnoses (by MINI questionnaire with detailed categories), sex and sex disorders, age, marital status and socioprofessional category.

At the same time, research was undertaken on the records of all suicides by patients followed by the CHPF. These records provide substantial information about medical data, psychiatric diagnoses, but also follow-up, with the dates of the very last consultation before the fatal suicide attempt, and the treatments provided before.

Statistical analyses

The data were entered using the Epi-info software and analysed with the open source R software version 3.5.1.[14] Data are presented as n of subjects (%) or mean. Categorical data were analysed using χ^2-test and the Fisher's exact test in case of numbers < 5. Student's t-test was used for continuous variables. Two sample t-test was used to compare the baseline data between two groups (general population versus suicide population, males versus females). To compare groups by sociodemographic categories (i.e. sex, age, ethnicity), odds ratios (OR) with their respective 95% confidence intervals (95% CI) were calculated. A P-value < 0.05 was considered statistically significant.

Results

Overall for the period 1992 to 2016, out of 767 suicide cases with the basic data provided by the Department of Public Health for all cases of suicide (numbers per year and sex), a sample of 316 suicide cases was drawn from the following sources: (i) 276 cases from JPI Court of Justice records (the most exhaustive source of information about suicidal acting out) and the Centre d'Opérations et de Renseignements de la Gendarmerie; (ii) 35 suicides of patients hospitalized in psychiatry, which was the most complete for information about psychiatric disorders; (iii) five cases of psychological autopsies with full interviews with relatives providing all the information needed for a diagnosis with the SCID

questionnaire,[15] and personal life events and histories.

Standardized suicide rates per year over the 25 years of the 1992–2016 period (Figure 1) were relatively stable and the rate for 2016 (8.3 suicides per 100 000 inhabitants) was close to that of 1992 (7.1 per 100 000 inhabitants), fluctuating between 6.5 and 13.8, the mean being 10.6 per 100 000 inhabitants. Standardized suicide rates were 10.56 per 100 000 in the period 1992–1998, 9.7 per 100 000 in the period 1999–2004, 11.3 per 100 000 in 2005–2010 and 9.2 per 100 000 for the period 2011–2016 (FP Public Health Bureau). However, for two specific years (2008 and 2012), suicides were underreported by about 20%, according to the JPI Court of Justice compared with official data from the local Health authorities. There were five peaks during the 2000–2016 period.

During the last period of the study (2015–2016) important changes occurred in the age rates of suicide in FP (Figure 2). The mean age of suicide in FP was 34.4 years between 2000 and 2014. Data have been published only for the 2005–2010 period and showed higher suicide rates in young people (15–24 years), in males (29.5/100 000) and females (21.8/ 100 000) and suicide was the first cause of death in this age class.[6] These rates decreased in 2015 in young people (10.6/ 100 000) but increased in older people (10.0/100 000 for those aged 46–65 years old; and 17.0/100 000 for those > 65 years). In 2016, rates became the highest for the age group 26–35 years (17.0/ 100 000), remained stable in those aged 46–65 years old and decreased in those > 65 years (becoming close to nil).

For comparisons between French overseas territories and mainland France, crude suicide rates were used because standardized rates for Overseas were not available. This comparison (based on data from CépiDc) shows, depending on the year, intersecting and reversing curves, with sometimes synchronous peaks and trends that can be interpreted according to the economic, cultural and social contexts of these territories. Figure 3 shows the crude suicide rates from 2000 to 2016 in FP,

Figure 1. Age-standardized suicide rates in French Polynesia between 1992 and 2016 stratified according to sex. The colour version of this figure is available at: http://imr.sagepub.com.
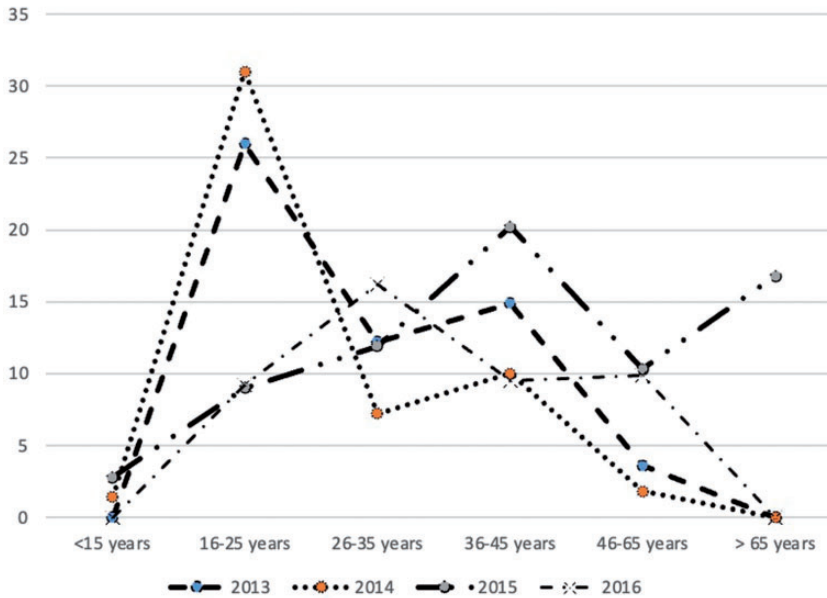
Figure 2. Suicide rates in French Polynesia between 2013 and 2016 stratified according to age group (Source: Public Health Direction). The colour version of this figure is available at: http://imr.sagepub.com.
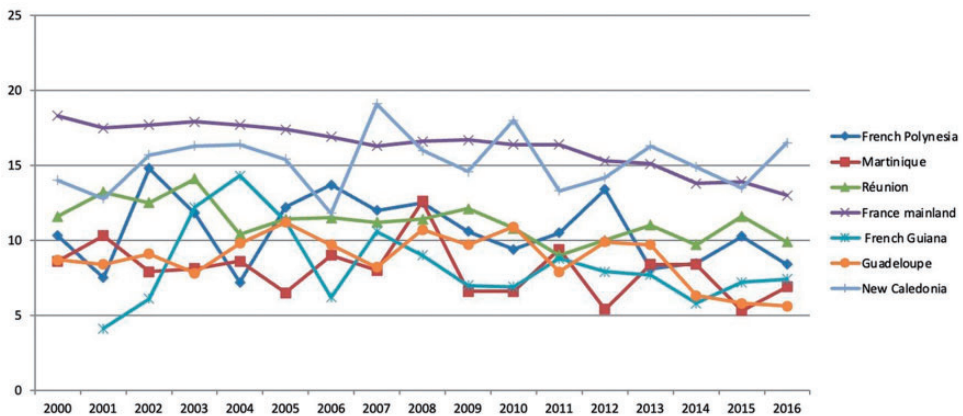

Figure 3. Crude suicide rates in French Polynesia, mainland France and the French overseas territories between 2000 and 2016. The colour version of this figure is available at: http://imr.sagepub.com.

French overseas territories and mainland France. When mainland France was compared with FP, there were differences in the trends in the suicide rates. In mainland France, there has been a continuous decrease in suicide rates over the period 2000–2016. This decrease was also observed with the standardized suicide rates for both sexes in the WHO database: rates go from 16.9/100 000 in 2000 to 14.8/100 000 in 2010, to 12.5/100 000 in 2015 and to 12.1/100 000 in 2016.[16] In France, the sex ratio is

the same as that in FP, close to 3; that is to say that, overall, three-times more men than women die by suicide. Mainland France had much higher crude suicide rates but they approximated with those of the French overseas territories over time. Comparisons of crude suicide rates show lower mean rates in FP (10.6/100 000) than in mainland France (15.2/100 000), Réunion (11.3/100 000) and New Caledonia (15.2/100 000), but higher than in Martinique (8.0/100 000), Guadeloupe (8.8/100 000) and French Guiana (8.3/100 000). The suicide rates of FP were reversed compared with those of Martinique and Guadeloupe between 2001 and 2004 but were similar in 2008, with the peak probably linked to the economic crisis in the same year (2008), which is not observed in the other French overseas territories or in mainland France. The trends for FP, Martinique and Guadeloupe were reversed in 2012. French Guiana had lower rates than the rest of the French overseas territories, but it must be borne in mind that underreporting could be frequent according to local researchers.

Table 1 presents the sociodemographic characteristics by sex of people that died by suicide ($n = 316$) during the 1992–2016 period compared with a representative sample ($n = 968$) of the general population of FP from the MHGP survey.[13] In the general population, the sex ratio was 1:1, but in the suicide population, there was a clear male predominance, with 241 males (76%) versus 75 females (24%) (sex ratio = 3.2:1). The results showed that males die by suicide significantly more frequently than females (χ^2 (1) = 135.22, $P < 0.0001$). The mean age of the suicide population was 34.4 years. In the suicide population, people were significantly younger (odds ratio [OR] = 3.12) and there were significantly fewer widow(er)s than singles (OR = 0.27) than in the general population. In this current study, the majority of subjects were of

Polynesian origin (63%) compared with 76% in the general population of the MHGP survey. The study investigated if there were risk factors (such as age, marital and professional status, pre-existence of psychiatric diseases) for suicide according to the sex. Males were significantly younger than females in the suicide population (OR = 0.11). The largest group of those that died by suicide were married or cohabiting (127 of 316; 40.2%), 19.3% (61 of 316) were single (with more males [20.7%, 50 of 241] than females [14.7%, 11 of 75]), 0.9% (three of 316) were separated or divorced, 2.5% (eight of 316) were widowed and 37.0% (117 of 316) were of unknown marital status. Only 6.3% (20 of 316) of subjects were employed at the time of their suicide, which was much lower than in the general population (465 of 968; 48.0%). There was a higher proportion of employed males (16 of 241; 6.6%) than females (four of 75; 5.3%). Other than the group of subjects (224 of 316; 70.9%) for whom there was no information, most subjects were retired (54 of 316; 17.1%). When a job was known, the category of farmers was the most represented (10 of 316; 3.2%; males only), which was slightly higher than the general population (29 of 968; 3.0%).

Table 2 shows that hanging was the most common method of suicide (276 of 316; 87.3%) with similar frequencies in males and females. This was followed by medications and drugs (12 of 316; 3.8%), which was used by seven of 241 (2.9%) males and five of 75 (6.7%) females. For each individual, there were several possible triggers for suicide. The potential triggers for suicide (several answers were possible) were mainly problems with their partner (60 of 198 [30.3%]; 48 of 155 in males [31.0%] versus 12 of 43 in females [27.9%]), then addiction (29 of 198 [14.6%]; mainly in males [27 of 155; 17.4%] compared with females [two of 43; 4.7%], psychiatric

Table 1. Sociodemographic characteristics stratified by sex of people that died by suicide (n = 316) in French Polynesia (FP) during the 1992–2016 period compared with a representative sample (n = 968) of the FP general population from the Mental Health in General Population survey.[13]

Sociodemographic characteristics	FP general population n = 968	FP suicide population n = 316	OR	95% CI	Suicide population Males	Suicide population Females	OR	95% CI
Sex								
Male	478 (49)	241 (76)	3.29***	2.47, 4.39	241 (76)	–	–	
Female	490 (51)	75 (24)	1.00			75 (24)		
Age, years								
18–29	281 (29)	143 (45)	3.12***	1.91, 5.12	101 (42)	42 (56)	0.11*	0.01, 0.84
30–39	206 (21)	68 (22)	2.03*	1.20, 3.43	51 (21)	17 (23)	0.14*	0.02, 1.12
40–49	202 (21)	53 (17)	1.61 NS	0.94, 2.77	43 (18)	10 (13)	0.2 NS	0.02, 1.67
50–59	144 (15)	22 (7)	0.94 NS	0.50, 1.77	18 (7)	4 (5)	0.21 NS	0.02, 2.05
> 60	135 (14)	22 (7)	1.00		21 (9)	1 (1)	1.00	0.01, 0.84
Unknown	0 (0)	8 (3)			7 (3)	1 (1)		
Marital status								
Single	242 (25)	61 (19)	1.00		50 (21)	11 (15)	1.00	
Married, common-law marriage, cohabitation, civil union	629 (65)	127 (40)	0.81 NS	0.58, 1.13	102 (42)	25 (33)	2.1*	1.12, 3.93
Separated, divorced	58 (6)	3 (1)	0.58 NS	0.26, 1.28	2 (1)	1 (1)	0.97 NS	0.22, 4.24
Widow(er)	39 (4)	8 (3)	0.27*	0.08, 0.90	2 (1)	6 (8)	0.48 NS	0.04, 5.58
Unknown	0 (0)	117 (37)			85 (35)	32 (43)	[0.04-5.58]	
Subjects that had a job								
Yes	465 (48)	20 (6)	0.19***	0.11, 0.3	16 (7)	4 (5)	1.26 NS	0.39, 4.08
No			1.00					
Professional status								
Retired	254 (26)	54 (17)	4.21**	1.82, 9.73	42 (17)	12 (16)	0.58 NS	0.06, 5.31
Unemployed	328 (34)	15 (5)	0.9 NS	0.35, 2.31	10 (4)	5 (7)	0.33 NS	0.03, 3.54
Student	129 (13)	2 (1)	0.31 NS	0.06, 1.53	2 (1)	0 (0)		
Housewife/househusband	119 (12)	14 (4)	2.32 NS	0.88, 6.12	12 (5)	2 (3)	1 NS	0.07, 13.37
Others	138 (14)	7 (2)	1.00		6 (2)	1 (1)	1.00	

Table 1. Continued.

Sociodemographic characteristics	FP general population n = 968	FP suicide population n = 316	OR	95% CI	Suicide population Males	Suicide population Females	OR	95% CI
Unknown	0 (0)	224 (71)			169 (70)	55 (73)		
Occupation								
Farmer	29 (3)	10 (3)	9.79**	2.61, 36.71	10 (4)	0 (0)		
Skilled tradesman, retailer entrepreneur	97 (10)	4 (1)	1.00		1 (0)	3 (4)	1.00	
Manager, professional	97 (10)	5 (2)	1.22 NS	0.31, 4.84	4 (2)	1 (1)	12 NS	0.51, 280.11
Middle-ranking occupation	155 (16)	5 (2)	0.77 NS	0.20, 3.02	5 (2)	0 (0)		
Service/office employee category	358 (37)	21 (7)	1.45 NS	0.48, 4.44	17 (7)	4 (5)	12.75*	1.03, 157.15
Others	232 (24)	82 (26)			59 (24)	23 (31)	7.7*	0.76, 77.88
Unknown	0 (0)	189 (60)			145 (60)	44 (59)		
Origin (birthplace)								
Polynesians	731 (76)	199 (63)	0.83 NS	0.57, 1.22	150 (62)	49 (65)	1 NS	0.49, 2.03
Others	237 (24)	40 (13)	1.00		33 (14)	7 (9)	1.00	
Unknown	0 (0)	77 (24)	1.00		58 (24)	19 (25)	1.00	

Data presented as n of subjects (%); percentages might not total 100% due to rounding.
*$P < 0.05$; **$P < 0.01$ ***$P < 0.0001$; χ^2-test.
OR, odds ratio; CI, confidence interval; NS, not significant ($P \geq 0.05$).

Table 2. Fatal suicidal behaviours by method and characteristics of suicidal behaviours/acts in people that died by suicide ($n = 316$) in French Polynesia (FP) during the 1992–2016 period.

Characteristics	Total $n = 316$	Males $n = 241$	Females $n = 75$	OR	95% CI
	Suicide population				
Suicide method*					
Other methods (X71, X80–X84)	7 (2.2)	4 (1.7)	3 (4.0)	1.00	
Medications and drugs (X60–X64)	12 (3.8)	7 (2.9)	5 (6.7)	1.05 NS	0.16, 6.92
Pesticides and other chemicals (X66–X69)	2 (0.6)	2 (0.8)	0 (0.0)		
Hanging (X70)	276 (87.3)	211 (87.6)	65 (86.7)	2.43 NS	0.53, 11.14
Firearms (X72–X74)	4 (1.3)	4 (1.7)	0 (0.0)		
Cutting (X78–X79)	1 (0.3)	1 (0.4)	0 (0.0)		
Fire (X76)	4 (1.3)	4 (1.7)	0 (0.0)		
Unknown	10 (3.2)	8 (3.3)	2 (2.7)		
Total	316 (100.0)	241 (100.0)	75 (100.0)		
Potential triggers**				$\chi^2 (24) = 38.11, P = 0.034$	
Relationship problems (with partner)	60 (30.3)	48 (31.0)	12 (27.9)	0.5 NS	0.06, 4.39
Family problems (with parents)	22 (11.1)	13 (8.4)	9 (20.9)	0.18 NS	0.02, 1.72
Family problems (with children)	0 (0.0)	0 (0.0)	0 (0.0)		
Problems with social relationships	14 (7.1)	10 (6.5)	4 (9.3)	0.34 NS	0.03, 3.65
Illness/somatic handicap	10 (5.1)	8 (5.2)	2 (4.7)	0.5 NS	0.04, 6.68
Psychiatric disorders symptoms	28 (14.1)	22 (14.2)	6 (14.0)	0.39 NS	0.04, 3.69
Unemployment	3 (1.5)	2 (1.3)	1 (2.3)	0.25 NS	0.01, 5.99
Addictive disorders (alcohol, drugs)	29 (14.6)	27 (17.4)	2 (4.7)	1.69 NS	0.14, 21.15
Legal problems	4 (2.0)	4 (2.6)	0 (0.0)		
Financial problems	7 (3.5)	7 (4.5)	0 (0.0)	1.00	
Physical abuse	1 (0.5)	1 (0.6)	0 (0.0)		
Psychological abuse	0 (0.0)	0 (0.0)	0 (0.0)		
Sexual assault	1 (0.5)	0 (0.0)	1 (2.3)		
Other	19 (9.6)	13 (8.4)	6 (14.0)		
Total	198 (100.0)	155 (100.0)	43 (100.0)		
Communication of suicidal intent					
Intent to commit suicide	52 (16.5)	42 (17.4)	10 (13.3)	1.05 NS	0.11, 10.44
Intent to not commit suicide	5 (1.6)	4 (1.7)	1 (1.3)	1.00	
Unknown	259 (82.0)	195 (80.9)	64 (85.3)		
Total	316 (100.0)	241 (100.0)	75 (100.0)		

Data presented as n of subjects (%).
*$P < 0.05$; **$P < 0.01$; χ^2-test.
OR, odds ratio; CI, confidence interval; NS, not significant ($P \geq 0.05$).

disorders (28 of 198 [14.1%]; 22 of 155 in males [14.2%] compared with six of 43 in females [14.0%]), problems with parents (22 of 198 [11.1%]; 13 of 155 in males [8.4%] and in nine of 43 in females [20.9%]), social relationships (14 of 198 [7.1%]), somatic illness (10 of 198 [5.1%]), financial problems (seven of 198; 3.5%), legal problems (four of 198; 2.0%), unemployment issues (three of 198; 1.5%) and physical and sexual abuse (one of 198 each; 0.5% each). Other triggers were not specified (19 of 198; 9.6%) and psychological abuse none reported. Planning to commit suicide was only

documented in 57 of 316 individuals, with 52 (16.5%) communicating their intent to commit suicide to another person. As suggested by the analyses, the potential triggers were significantly different according to the sex (χ^2 (24) = 38.11, P = 0.034). As shown in Table 2, most of males were confronted with problems with their partners, whereas most of females had to deal with family matters. The ORs were not significant.

Table 3 shows the diagnoses of psychiatric disorders that were present at the time of suicide. At least one mental health disorder was identified in 100 of 316 (31.6%) of cases at the time of suicide compared with 42.8% in the general population of the MHGP survey (over a lifetime period).[13] Mood disorder was the most common diagnosis (45 of 316; 14.2%), followed by alcohol and drug addiction (23 of 316; 7.3%). Psychotic disorders were diagnosed in 5.4% (17 of 316) of the cases (more in males [14 of 241; 5.8%] than females [three of 75; 4.0%]) and personality disorders in 2.5% (eight of 316). A history of a diagnosed

psychiatric disorder before suicide was found in 100 of 316 (31.6%) cases (80 of 241 males [33.2%] compared with 20 of 75 females [26.7%]). In the subgroup of patients followed by the CHPF (35 subjects; 24 men and nine women; data not shown in the table), the most frequent diagnoses were psychotic disorders (14 of 35; 40.0%) and mood disorders (11 of 35; 31.4%). In the total sample, a history of a previous suicide attempt was found in 25 of 56 (44.6%) cases where the information was available. The ORs were not significant.

Discussion

Some international events such as economic or political crises might have influenced the suicide rates in FP, as reported in the historical social study of reference[17] and then subsequent studies.[18,19] However, the impact of these crises was clearly not the same in all of the French overseas territories, differences which might been influenced by sociocultural contexts or local

Table 3. Psychiatric disorders in people that died by suicide (n = 316) in French Polynesia (FP) during the 1992–2016 period.

Psychiatric disorder at time of suicide	Suicide population			OR	95% CI
	Total n = 316	Males n = 241	Females n = 75		
Diagnoses					
Mood disorder (F30–F39)	45 (14.2)	31 (12.9)	14 (18.7)	0.47 NS	0.12, 1.94
Addictive disorders (F10–F19)	23 (7.3)	20 (8.3)	3 (4.0)	1.43 NS	0.25, 8.15
Anxiety disorders (F40–F41)	3 (0.9)	3 (1.2)	0 (0.0)		
Psychotic disorders (F20–F29)	17 (5.4)	14 (5.8)	3 (4.0)	1.00	
Personality disorders (F60)	8 (2.5)	8 (3.3)	0 (0.0)		
Other diagnoses	4 (1.3)	4 (1.7)	0 (0.0)		
Without diagnoses	5 (1.6)	5 (2.1)	0 (0.0)		
Unknown	211 (66.8)	156 (64.7)	55 (73.3)		
Total (at least one diagnosis)	100 (31.6)	80 (33.2)	20 (26.7)	1.7 NS	0.93, 3.11
History of suicide attempt					
Known	56 (17.7)	42 (17.4)	14 (18.7)	0.95 NS	0.32, 2.85
Yes (proportion of known)	25 (44.6)	19 (45.2)	6 (42.9)	1.00	

Data presented as n of subjects (%).
OR, odds ratio; CI, confidence interval; NS, not significant ($P \geq$ 0.05; χ^2-test).

suicide prevention programmes.[20] In FP, this current study identified four peaks in suicide rate that might have been linked to major economic or social crises: (i) the world economic crisis in 2002 (in the wake of the terrorist attacks of 11 September 2001 in the US that caused a drastic fall in the tourism economy in FP); and (ii) the financial crisis in 2008. During both of these crises there were many jobs lost in FP. The peak in the suicide rate in 2005 could correspond to a major local political change followed by a period of anxiety-provoking political instability. There was an unexpected victory for the pro-independence party in 2004, which was then followed by multiple changes of alliances with more than twelve successive governments until 2011. The peak in the suicide rate in 2012 could be explained by a suicide case widely reported by the media (copycat suicide or the Werther effect). On 8–9 June 2012, a man climbed up a roadside crane and stayed there for 24 hours, causing traffic to be blocked. All of the TV and radio channels were present on site, as well as a gendarmerie negotiator and a large crowd, which shouted abusive words at the man because of the traffic jam. It was said that this encouraged him to die by suicide. He finally jumped off the crane and crashed to his death by the side of the road. The decrease in suicide cases observed between 2008 and 2010 in FP coincides with the implementation of the WHO/START programme described above and the WHO/SUPRE programme,[21] which included raising awareness and sentinel training in the main islands of FP, funded by a prevention institute EPAP in French. The closure of this institute and the interruption of suicide prevention programmes in 2011 possibly coincided with a subsequent rise in suicide rates.[22] Another aspect to consider is the balance between suicide and homicide rates. The homicide rates observed in the CépiDc database were high in some overseas regions where suicide rates were low (such as in Martinique versus FP).[23] In some cultures, the underlying aggressiveness that is often observed in the suicidal state might be expressed more in hetero-aggressive rather than in the self-aggressive behaviours. It is possible that in some places low suicide rates are correlated with high homicide rates, a different expression of the common dimension of aggressiveness and impulsivity.[24] Clinically, from the original remarks made in the testimonies of subjects that died by suicide (from the police investigation and interviews with family/friends in this current study), there were close links between suicide and assault/homicide: "I preferred to go to kill myself rather than hit or kill my wife", "I wanted to drown my wife by thrusting her head into the water of the lagoon, to no longer hear her making me suffer".

Male sex was a risk factor for suicide in FP, in contrast to the sex ratio found in suicide attempts.[4] This higher risk of suicide among men suggests that more intense follow-up is required along with a prevention strategy targeting men, such as the 'Man Up' campaign developed in Australia.[25] The fact that lethal suicidal behaviour mainly concerns adults in FP suggests that there should be an increase in the funding of adult with psychiatric disorders.

The most common method of suicide in FP was hanging. This was also the most common method used for suicide in the Pacific Islands within the framework of the WHO/START study:[2] Fiji (78% of men, 72.5% women), Guam (75.4% men, 57.1% women) and Tonga (79% men, 50% women). Hanging as a method of suicide is very difficult to control at the social level and suicide prevention by reduction of access to lethal means of suicide is not possible in a public health perspective. But knowing that this method is mainly used in the case of fatal suicidal behaviours should mean that close attention is paid to

the prevention at the individual and clinical level (people with a hanging plan of suicide). Furthermore, in the majority of cases, the suicidal individual has communicated his/her suicidal intention. This shows that prevention could be made possible by raising awareness about the timely identification and treatment of suicidal people. Managing emotions is essential in this situation. Helping people to improve their emotional skills would contribute to reducing interpersonal conflicts (in couples and families) and to defusing crises, so as to prevent individuals from acting upon their suicidal plans. Therefore, ideally, programmes of emotional management should be implemented in suicide prevention strategies.

This current study had several limitations. Crude suicide rates were used for the comparisons between FP, mainland France and the French overseas territories as standardized rates were not available. Standardized rates are usually calculated when two or more populations are compared with each other or if the analysis wishes to take account of changes in a population. The so-called 'standardized rate' refers to the age-standardized rate. It is therefore a rate that takes account of the distribution of the population in terms of age. Using crude suicide rates for the comparisons in this study might have resulted in bias in the interpretation. The French mainland population includes more people in the older age groups than the FP population, which was younger as in the other French overseas territories.[26] Since the frequency of suicide varies with age (it increases with age in France, but not in FP), it may be questionable to compare crude suicide rates between populations with different age distributions. However, the differences between the crude and age-standardized suicide rates when known were very small between the populations of the difference French overseas territories, which were younger and closer to the mean for the world population.[23] For example, a difference in the order of 0.5–1% exists between the crude and age-standardized suicide rates in FP.[5] Therefore, comparisons between the French overseas territories can be made if these trends were within the margin of error. For mainland France, the difference between the crude rates and the age-standardized rates (0.5–4%) of the world population[16] or the European population (Eurostat) was larger, as indicated by the figures given in national reports.[27]

In conclusion, these current results suggest there is a need to better focus on suicide prevention strategies and implement specific interventions for people at high risk of suicide. The impact of economic crises was more marked in the French overseas territories compared with mainland France, where there was an ongoing decrease in suicide rates. Given the unprecedented economic impact of the Covid-19 global pandemic of 2020, there is an urgent need to set up epidemiological surveillance and a suicide prevention programme by health authorities in FP and the other French overseas territories, and more generally, in other island communities impacted by this crisis.

Declaration of conflicting interest

Funding

ORCID iD

Stephane Amadeo https://orcid.org/0000-0001-7820-6680

References

1. Pirkis J, Amadéo S, Beautrais A, et al. Suicide Prevention in the Western Pacific

Region. *Crisis* 2020; 41(Suppl 1): S80–S98. DOI:10.1027/0227-5910/a000670.

2. De Leo D, Milner A, Fleischmann A, et al. The WHO START study: suicidal behaviors across different areas of the world. *Crisis* 2013; 34: 156–163. DOI: 10.1027/0227-5910/a000193.

3. Amadéo S, Rereao M, Malogne A, et al. Testing Brief Intervention and Phone Contact among Subjects with Suicidal Behavior: A Randomized Controlled Trial in French Polynesia in the Frames of the World Health Organization/Suicide Trends in At-Risk Territories Study. *Ment Illn* 2015; 7: 5818. DOI: 10.4081/mi.2015.5818.

4. Amadéo S, Kolves K, Malogne A, et al. Non-fatal suicidal behaviours in French Polynesia: Results of the WHO/START study and its implications for prevention. *J Affect Disord* 2016; 189: 351–356. DOI: 10.1016/j.jad.2015.09.042.

5. Yen Kai Sun L. Caractéristiques épidémiologiques de la mortalité par suicide en Polynésie française, 2005–2010. *BISES* 2015; 15: 1–3 [Article in French].

6. Yen Kai Sun L, Ghosn W and Rey G. Les causes de décès en Polynésie française: analyse de la période 2005-2010 et tendances évolutives de 1984 à 2010. *Bull Epidemiol Hebd* 2016; 10: 183–195 [Article in French].

7. Goodfellow B, Kõlves K, Selefen AC, et al. The WHO-START Study in New Caledonia: a psychological autopsy case series. *J Affect Disord* 2019; 262: 366–372. DOI: 10.1016/j.jad.2019.11.020.

8. Niu L, Jia C, Ma Z et al. The validity of proxy-based data on loneliness in suicide research: a case-control psychological autopsy study in rural China. *BMC Psychiatry* 2018; 18: 116. DOI: 10.1186/s12888-018-1687.

9. Arensman E, Larkin C, McCarthy J, et al. Psychosocial, psychiatric and work-related risk factors associated with suicide in Ireland: optimised methodological approach of a case-control psychological autopsy study. *BMC Psychiatry* 2019; 19: 275. DOI: 10.1186/s12888-019-2249-6.

10. Cao R, Jia C, Ma Z, et al. Disability in Daily Living Activities, Family Dysfunction, and Late-Life Suicide in Rural China: A Case–Control Psychological Autopsy Study. *Front Psychiatry* 2019; 10: 827. DOI: 10.3389/fpsyt.2019.00827.

11. Rasouli N, Malakouti SK, Rezaeian M, et al. Risk Factors of Suicide Death Based on Psychological Autopsy Method; a Case-Control Study. *Arch Acad Emerg Med* 2019; 7: e50.

12. Niu L, Ma Z, Jia C, et al. Gender-specific risk for late-life suicide in rural China: a case-control psychological autopsy study. *Age Ageing* 2020; 49: 683–687. DOI: 10.1093/ageing/afaa036.

13. Goodfellow B, Defromont L, Calandreau, F, et al. Images of the 'Insane', the 'Mentally ill' and the 'Depressed' in Nouméa, New Caledonia. *Int J Ment Health* 2010; 39: 82–98.

14. The R Project for Statistical Computing. A language and environment for statistical computing. R Foundation for Statistical Computing, version 3.3.0 [Internet]. Vienna, Austria, 2013, http://www.R-project.org (2000, accessed July 2020).

15. Spitzer RL, Williams JBW and Gibbon M. *Structured Clinical Interview for DSM-III-R Patient Version (SCID-P)*. New York: Biometrics Research Department N.Y. State Psychiatric Institute.

16. World Health Organization. Global Health Observatory data repository. http://apps.who.int/gho/data/view.main.MHSUICIDEASDRv (2016, accessed July 2020).

17. Durkheim E. *Le suicide*. Paris: PUF, 2007.

18. Yip P. *Suicide in Asia: Causes and Prevention*. Hong Kong: Hong Kong University Press, 2008.

19. Baudelot C and Establet R. *Suicide, l'envers de notre monde*. Paris: Le Seuil, 2006.

20. Zhang J ,Wieczorek WF, Jiang C, et al. Studying suicide with psychological autopsy: social and cultural feasibilities of the methodology in China. *Suicide Life Threat Behav* 2002; 32: 370–379.

21. World Health Organization. Suicide Prevention SUPRE program. https://www.who.int/mental_health/prevention/suicide/supresuicideprevent/en/ (1999, accessed July 2020).

22. Tahiti Info magazine. 2012. https://www.tahiti-infos.com/Dissolution-de-l-EPAP_a11818.

html (original article publication date: 29 October 2010).

23. Centre d'épidémiologie sur les causes médicales de Décès (CépiDc), https://www.cepidc.inserm.fr/causes-medicales-de-deces/la-base-des-causes-medicales-de-deces (1999, accessed July 2020).

24. Linnoila VM and Virkkunen M. Aggression, suicidality, and serotonin. *J Clin Psychiatry* 1992; 53: 46–51.

25. Pirkis J, Spittal MJ, Keogh L, et al. Masculinity and suicidal thinking. *Soc Psychiatry Psychiatr Epidemiol* 2017; 52: 319–327. DOI: 10.1007/s00127-016-1324-2.

26. Institut national de la statistique et des études économiques (Insee), https://www.insee.fr/fr/information/2028040 (2017, accessed July 2020).

27. Observatoire National du Suicide, https://drees.solidarites-sante.gouv.fr/sites/default/files/2021-01/ons_2020.pdf (2013, accessed July 2020).