Individual and area-level factors correlated with death by suicide in older adults

André Ngamini Ngui [a,b,d,*], Helen-Maria Vasiliadis [b,c], Michel Préville [b,c]

[a] Centre de réadaptation en dépendance de Montréal — Institut Universitaire, Canada
[b] Hôpital Charles LeMoyne Research Centre, Longueuil, QC, Canada
[c] Department of Community Health Sciences, Université de Sherbrooke, QC, Canada
[d] Centre for Research and Intervention on Suicide and Euthanasia (CRISE), UQÀM, Montréal, QC, Canada

ABSTRACT

Objective. To determine the influence of individual and area-level characteristics associated with suicide in older adults.

Method. This study used two complementary data sources. The first used administrative data from the Quebec Coroner's office and included information on suicide deaths in older adults aged 65 years and over who died by suicide between 2000 and 2005 (n = 903 persons). The second data source, which was used to identify the control group, came from a longitudinal study on seniors' health that was conducted in Quebec between 2004 and 2005 (n = 2493 persons). Logistic regression analyses were used to test for associations between suicide and individual and area-level level characteristics.

Results. Suicide was associated with male gender, age, the presence of a physical and mental disorder and the use of health services. At the area-level level, suicide was associated with a higher population density, concentration of men, lower rates of education and higher rate of unemployment. Gender specific analyses also showed different patterns of associations on suicide risk.

Conclusions. Suicide in older adults is associated with area-level and individual characteristics. This suggests that policies targeting only one level of risk factors are less likely to significantly influence suicide among this population.

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Introduction

Numerous studies have shown that older adults have one of the highest rates of suicide worldwide (Lapierre et al., 2011; Mezuk et al., 2008). In Canada, it is estimated that 12 per 100,000 persons aged 65 years and over die by suicide each year (Heisel and Duberstein, 2005). The suicide rate among the older adult population in Quebec reached close to 18.5 per 100,000 persons in 1999 (Preville et al., 2005). Despite the fact that suicide prevention has been recognized as a priority in Quebec's Mental Health Action Plan 2005–2010 (MHAP), older adult suicide remains a neglected subject receiving little attention among studies in public health.

Previous studies on factors associated with suicide in older adults have focused on individual characteristics such as the presence of mental illness (Cattell, 2000; Huisman et al., 2010; Park et al., 2013), physical disorders (Picardi et al., 2013), functional impairment (Clark et al., 2011; Szanto et al., 2012), loneliness (Bonnewyn et al., 2014; Martin et al., 2013; Yadegarfard et al., 2013), low income (Légaré et al., 2013), substance and alcohol abuse (Conner et al., 2014; Shoval et al., 2014), bereavement (Ajdacic-Gross et al., 2008; Erlangsen et al., 2004; Harwood et al., 2006), and stressful life events such as loss of a partner (Cohen et al., 2010; Gong et al., 2011; Jahn et al., 2012; Rurup et al., 2011; Shiner et al., 1982).

Recently, social epidemiologists have contributed to the study of both contextual and *compositional* influences on suicide (Collings et al., 2009; Kunst et al., 2013; Ngamini Ngui et al., 2014; O'Reilly et al., 2008). Nevertheless Durkheim was the first to highlight the link between social ties, social integration and suicide (Easton and Renner, 2013; Janet Kuramoto et al., 2013). Durkheim's study gave future researchers a basis for the study of social and contextual factors in understanding suicide. In London for instance, Congdon proposed an index of anomic areas based on indicators of population turnover or instability to study suicide and parasuicide (Congdon, 1996). This was later referred to as the social fragmentation index and is used to measure lack of opportunities for social integration (Corcoran et al., 2007; Stjarne et al., 2004). Other social indicators associated with suicide rates have included unemployment rates (Martikainen et al., 2004), area-level

deprivation (O'Reilly et al., 2008; Rehkopf and Buka, 2006), highest concentration of males and divorce rates (Varnik et al., 2009), social fragmentation (Evans et al., 2004), and the proportion of single-occupant households (Kunce and Anderson, 2002).

Studies examining the joint effect of individual and area level characteristics on suicide risk in older adults are scarce. The aim of this study was to determine individual and area-level characteristics associated with suicide in older adults.

Method

This case–control study used two complementary sources of information, which included deaths of adults aged 65 years and over registered by the Quebec Coroner's office as suicide (ICD-10 codes X60-X84, Y87) (O.M.S., 2008) between January 15th, 2000 and December 15th, 2005 (n = 903). The controls were from the ESA (*Étude sur la Santé des Aînés*) survey, a longitudinal study on older adults' health, conducted in Quebec between 2004 and 2005 among a representative sample of 2493 adults aged 65 years and older who had given consent to access their medical file regarding medical service use and outpatient drug use from the RAMQ (Régie de l'Assurance Maladie du Québec) drug insurance plan (Preville et al., 2012). The linking of the data was authorized by the Commission for Access to Information (CAI) and the study was approved by the research ethics committee of the Hôpital Charles Lemoyne Research Centre.

Study variables

Variables were selected based on their association with suicide in other studies.

Individual characteristics

All attributes of the cohort members — age, sex, presence of at least one physical disorder (anemia, arthritis, asthma, diabetes, hypertension, cardiovascular disease, renal failure, liver disease, skin disorder, backache, headache) and at least one mental health disorder (schizophrenia, depression, mood and personality disorders, alcohol or drug dependence) reported in the previous year were ascertained from the RAMQ data using the international classification of disease (ICD) 9 & 10 (O.M.S., 2008). Health service utilization in the previous year was ascertained from data available in the RAMQ medical service database on hospitalizations (yes/no); an emergency department visit (yes/no) and outpatient visit (yes/no). The health service variables were dichotomized.

Area-level characteristics

In this study, area-level is defined by the *forward sortation area* (FSA). The FSA is the territory covered by the first three digits of the postal code. Quebec has 406 FSAs. The first three characters of the postal code of the place of death were available for the suicide cases and of the place of residence for the controls in the ESA study and were available making it possible to calculate the area-level characteristics using the data from the 2006 Canadian Census. Area-level data included population density, percentage of male, social fragmentation index, median household income, percentage of population aged 65 years and over, percentage of lone-parent families, and percentage of population without any diploma. The population density was obtained by dividing the population by the area of the FSA in km² and was used as a proxy for the urban–rural character. "Social fragmentation" is a term originating in Emile Durkheim's work. According to him, "societies", or social groups, vary in the extent to which they are cohesive or, conversely, fragmented, and therefore the extent to which they can provide balanced levels of integration and regulation for their members (Eyer, 1977). However, it is only in 1996 that Peter Congdon proposed an empirical measure of social fragmentation (Congdon, 1996) base on the Z-scores of the following variables: the number of privately rented households, single-person households, number of unmarried persons and number of persons that changed FSA during the previous year. Higher scores of the index indicated the highest degree of social fragmentation (Allardyce et al., 2005; Collings et al., 2009).

Statistical analysis

Multivariate logistic regression analysis was used to study suicide as a function of individual (age, sex, health service utilizations, mental and physical illnesses) and area-level characteristics (population density, percentage of men, level of social fragmentation, median household income, unemployment rate, proportion of lone parents family…). Because of the gender difference in suicide risk, particularly the highest risk of suicide among men compared to women (Bozzay et al., 2014; Dedic, 2014; Shojaei et al., 2014), gender specific analyses were also conducted. All variables were introduced together without sequential steps. All analyses were performed using SAS 9.4.

Results

Description of the study population and area-level characteristics

Hanging/strangulation/suffocation (32.56%) followed by firearms (16.94%) and poisoning (11.30%) were the three most prevalent methods of suicide. Table 1 presents the characteristics of the study population and the area-level characteristics. The combined sample consisted of 3396 older adults (aged between 65 and 99 years; mean 74.32 ± 5.94). Area-level characteristics in Quebec vary significantly on the characteristics assessed in the present study. For instance, the mean density of the population per FSA was 1958.93 persons with a standard deviation of 2737.22 and there were 23.92% ± 8.56 of persons without any diploma per FSA.

Multivariate analyses of individual and area-level predictors of senior suicide

Table 2 shows the individual and area-level characteristics associated with suicide in older adults. Compared to women, men were about 9 times more likely to die by suicide (95% CI = 7.09–11.19) and compared to those aged 69 years and less, those aged 70–79 years were less likely to die by suicide (OR = .74; 95% CI = .57–.95). The risk of suicide was also the highest among those who had used an emergency department (OR = 8.56; 95% CI = 6.71–10.91); had been hospitalized (OR = 1.29; 95% CI = 1.02–1.63); had received a diagnosis of a mental disorder (OR = 4.40; 95% CI = 2.85–6.79) and had been dispensed a psychoactive drug (OR = 3.81; 95% CI = 1.15–12.60). In contrast those who were more likely to consult as outpatients (OR = .38; 95% CI = .25–.59) and those who had a physical illness (OR = .54; 95% CI = .42–.71) were less likely to die by suicide.

Findings also suggest that seniors who live in a FSA with a higher population density, highest concentration of men, highest concentration of persons without any diploma and highest rate of unemployment were more likely to die by suicide. The gender specific analyses show no association between age group and suicide among men. In contrast, compared to women aged 69 years and less, those aged 65–69 years (OR = .45; 95% CI = .29–.69) and those aged 70 to 79 years (OR = .62; 95% CI = .38–.99) were less likely to die by suicide. Having visited an emergency department (women: OR = 6.09; 95% CI = 3.98–9.31; men: OR = 10.83; 95% CI = 7.99–14.69) and having a diagnosis of a mental disorder (women: OR = 5.23; 95% CI = 2.88–9.50; men: OR = 3.00; 95% CI = 1.69–5.55) were risk factors for suicide for men and women.

At the area-level, living in an area with a higher concentration of unemployed persons increased the risk of suicide among men (OR = 1.21; 95% CI = 1.11–1.31) but not in women. Areas with a high density were associated with suicide both for men and women. Women were more