

## A closer look at patterns and characteristics of suicide in Lebanon: A first nationwide report of cases from 2008 to 2018

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### ABSTRACT

**Background:** Suicide is a leading preventable cause of mortality worldwide. Suicide rates in Lebanon are unknown, as reported numbers are extrapolated and modeled over neighboring countries with poor quality of vital registration data.

**Methods:** Numbers of death by suicide were obtained from the Internal Security Forces records from January 2008 through December 2018. Records from 2011 through 2018 specified the gender of the individual, the means of the suicide, the date and place of suicide. As of March 2014, nationality of the individual was recorded. **Results:** The total recorded number of completed suicides over 11 years is 1366 with an annual rate ranging between 1.87 and 2.4 per 100,000 capita. The male to female ratio was 2:1. Death by firearms (41.4 %) was the most common means used, followed by hanging (26.5 %), jumping from a height (13.6 %), and poisoning (13.5 %). Males were more likely to use firearms while females were more likely to use hanging or jumping from a height ( $p < 0.001$ ), the latter being a common finding in non-Lebanese nationals (Ethiopian). Suicides were most common in Mount Lebanon and least common in Nabatieh governates, while their distribution across seasons was similar.

**Conclusion:** In Lebanon, like most of the Middle Eastern countries, suicide is a social and religious taboo. Our study shows a sizable prevalence of suicide rates, particularly after national efforts to improve awareness and reporting. Suicide means and vulnerable populations should be at the heart of targeted prevention strategies.

### 1. Introduction

Suicide has recently emerged as a leading preventable cause of mortality worldwide. (World Health Organization, 2014) Reduction in suicide mortality rates has also been identified as an indicator in the Sustainable Development Goals to be achieved by 2030. It is estimated that more than 800,000 people die from suicide yearly worldwide: approximately one death every 40 second. While per-capita-rate seems to be higher in high-income countries, it is estimated that 80 % of all global suicides occur in low and middle-income countries. Mental illnesses remain the most common precursors of suicide. (World Health

#### Organization, 2014)

The Eastern Mediterranean Region (EMR) represents 8% of the global population and the WHO estimates that it only accounted for 3.9 % of global suicides in 2016. Such discrepancy is likely due to the poor quality of vital registration data in these countries. (World Health Organization, 2014) This is the case of Lebanon where the age-standardized crude suicide rate for 2012 was 3.3 per 100,000 capita; a number deduced through statistical modeling. (Suicide rates, 2018)

The number of people residing in Lebanon has grown from 4,764,741 to 6,848,925 approximately from 2008 to 2018 (Lebanon, 2020) due to the influx of refugees from neighboring armed conflicts. Referring to the

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last ten years, Lebanon has witnessed an ongoing national security threat alongside a boiling economic crisis manifesting through unemployment rates, poverty and inflation. This situational build up negatively contributes to one's environmental surrounding and stressors and can impact the psychological wellbeing (Khaili, 2019). To date, studies on suicide in Lebanon have been limited to the prevalence of suicidal behaviors, notably ideations or attempts. (Karam et al., 2012; Mahfoud et al., 2011) Reports have yielded a wide range of estimates, in part due to methodological limitations inherent to measuring suicidal behaviors. In a nationally representative sample of Lebanese adolescents in 7<sup>th</sup>-9<sup>th</sup> grades, 16 % of students reported having considered attempting suicide in the 12 months prior to the survey. (Mahfoud et al., 2011) Another national household survey of Lebanese adults in 2002–2003 reported lower estimates with lifetime prevalence of suicide ideation, plan and attempt at 4.3 %, 1.7 %, and 2%, respectively. (Karam et al., 2012) In Lebanon, the National Mental Health Program (NMHP) was launched in 2014 by the Ministry of Public Health in partnership with the World Health Organization (WHO), UNICEF and International Medical Corps (IMC). The program is working on reforming the mental health system through the implementation of a 5-year strategy (moph., 2014). Among the objectives of the national strategy is enhanced monitoring and tracking of suicide attempts both in inpatient and outpatient settings, and the establishment of the national suicide prevention helpline in collaboration with the Lebanese non-profit organization EMBRACE which was implemented in 2017. The strategy has also contributed to de-stigmatizing suicide reporting. The NMHP is working with all the relevant partners to unify and collect national data describing suicide patterns in Lebanon, which is still absent today.

In Lebanon, completed suicide cases are reported to government agencies, and become subject of police investigations. This study, using official data obtained from the Internal Security Forces (ISF) General Assembly, aimed to determine suicide rates for the years 2008 through 2018, and to explore characteristics of such suicides including male-to-female ratios, seasonal and regional differences, and trends in the means used to complete suicide.

## 2. Methods

A record of suicide deaths in Lebanon was obtained from the ISF General Assembly by approval from the Ministry of Interior. This is based on centralized police records collected from ISF field officers in all 6 Lebanese governorates from January 2008 through December 2018. Records starting 2008 through 2010 included only a count of suicide deaths per month. For subsequent years, each suicide report included the gender of the individual, along with the means of suicide, date and place (governorate) of the suicide. Distinct nationality of decedents was only available as of March 2014. Both the Ministry of Interior and the Institutional Review Board at the American University of Beirut Medical Center gave consent to analyze and publish the results. Throughout the manuscript, the term suicide rate will refer to the aforementioned reported suicide rate declared to the ISF over a particular time. It is an estimate and not fully representative of the full picture of completed suicides nationally

First, records were de-identified, then data was entered and analyzed using the SPSS 25 statistical software package IBM (Armonk, NY). We further classified the means of suicide into violent and nonviolent. Violent means included: use of firearms, hanging, explosion (including terrorist suicidal acts), burning (self-immolation), using a knife (self-stabbing), electrocution and jumping from a height. Nonviolent means included gas asphyxiation and poisoning (ingestion of a lethal substance or drug overdose). Data was presented as counts and percentages. We used chi-square tests to examine the association between the categorical variables. Finally, we conducted a binary logistic regression model to examine potential predictors of using violent means. All tests of hypothesis were two-tailed with a type 1-error rate of 5%.

## 3. Results

Over the 11-year period from January 2008 through December 2018, a total of 1366 deaths by suicide were reported to the ISF, ranging between 102 (in 2011) and 157 (in 2018) cases per year. These counts correspond to suicide rates ranging between 1.87 per 100,000 capita (2013) and 2.4 per 100,000 capita (2008) (Table 1).

The remaining analyses relied on data gathered over the 8-year period spanning 2011 through 2018 and included a total of 1033 official reports of suicide deaths. Characteristics of these suicide deaths are summarized in Table 2. A total of 682 (66 %) suicides were completed by males, reflecting a male-to-female ratio of 2:1, which was generally consistent over the years. The majority of suicides ( $n = 892$ , 86.4 %) were completed with violent means, a trend which was also consistent over the years. Death by firearms (41.4 %) was the most common means reported, followed by hanging (26.5 %), jumping from a height (13.6 %), and poisoning (13.5 %). The considerable increase in suicide rates witnessed in 2014 compared to previous years (+23 %) was driven by the increase in violent means from 2013 to 2014 (+33 %) despite a relatively stable count of nonviolent means. There were regional differences in reported suicides rates among the governorates with Mount Lebanon having the highest record and Nabatiyeh the lowest, overall and during each year. There was also a relatively equal distribution of suicide deaths throughout the four seasons.

Fig. 1 presents the distribution of means of suicide, governorates and seasonality across genders during the period 2011–2018. Although the proportion of violent means of suicide was similar in males and females (87.2 % vs 85.1 %), there were significant differences in specific means utilized between genders ( $p < 0.001$ ). Males were more likely to use firearms than females (55.4 % vs 14.2 %,  $p < 0.001$ ) while females were more likely to use hanging (43 % vs 18 %,  $p < 0.001$ ) or jumping from a height (23.1 % vs 8.8 %,  $p < 0.001$ ) than males. There was no significant difference in the use of poisoning as a suicide means (14.8 % in females versus 12.6 % in males,  $p = 0.219$ ). There were no significant gender differences ( $p = 0.314$ ) in the distribution of suicides across governorates with the 2:1 male-to-female ratio holding true for Beirut, Mount Lebanon, Beqaa, and South Lebanon. In Nabatiyeh, the male-to-female ratio was around 1:1, whereas in North Lebanon, it was closer to 3:1. There were also no significant gender differences in the distribution of suicides across seasons ( $p = 0.711$ ).

Violent means of suicide were predominant across all governorates although with notable variations ( $p < 0.001$ ): Beirut 92.2 %, Mount Lebanon 88.1 %, Bekaa 90.2 %, North Lebanon 80.1 %, South Lebanon 78.4 %, and Nabatiyeh 70.6 %. They were also predominant across seasons with minimal variation in rates ( $p = 0.629$ ). Nonviolent means peaked in spring (30.2 % of all nonviolent suicides), especially in April (10 % of all suicides); while violent means peaked in summer (26 % of all violent suicides). On logistic regression analysis, only governorate was an independent and significant predictor for the use of violent vs

**Table 1**  
Suicide rates per 100,000 capita from 2008 to 2018 in Lebanon.

Year	Number of suicide cases	Total population*	Suicide rate per 100,000 capita	Change
2008	114	4,764,741	2.4	
2009	112	4,813,026	2.32	-3%
2010	107	4,953,061	2.16	-7%
2011	102	5,202,343	1.96	-9%
2012	108	5,538,634	1.95	-0.5%
2013	111	5,914,621	1.87	-4%
2014	144	6,262,410	2.3	+23 %
2015	141	6,532,678	2.16	-6%
2016	127	6,711,121	1.9	-12%
2017	143	6,811,873	2.1	+10 %
2018	157	6,848,925	2.3	+9.5 %

\* Total population estimates for the years 2008 through 2018 were based on the World Bank World Development Indicators<sup>3</sup>.

**Table 2**  
Characteristics of reported suicides from 2011 to 2018 in Lebanon.

Parameter	2011 (n = 102)	2012 (n = 108)	2013 (n = 111)	2014 (n = 144)	2015 (n = 141)	2016 (n = 127)	2017 (n = 143)	2018 (n = 157)	Overall (n=1033)
	69/33	71/37	70/41	103/41	93/48	87/40	90/53	99/58	682/351
Male/Female	(67.6/32.4)	(65.7/34.3)	(63.1/36.9)	(71.5/28.5)	(66/34)	(68.5/31.5)	(62.9/37.1)	(63.1/36.9)	(66/34)
Means*									
Violent	90 (88.2)	92 (85.2)	96 (86.5)	128 (88.9)	122 (86.5)	108 (85.0)	120 (83.9)	136 (86.6)	892 (86.4)
Firearms	48 (47.1)	45 (41.7)	42 (37.8)	55 (38.2)	59 (41.8)	58 (45.7)	57 (39.9)	64 (40.8)	428 (41.4)
Hanging	23 (22.5)	34 (31.5)	33 (29.7)	37 (25.7)	32 (22.7)	34 (26.8)	41 (28.7)	40 (25.5)	274 (26.5)
Jumping from a height	12 (11.8)	13 (12.0)	17 (15.3)	19 (13.2)	22 (15.6)	12 (9.4)	18 (12.6)	28 (17.8)	141 (13.6)
Explosion	1 (1.0)	0 (0.0)	0 (0.0)	11 (7.6)	3 (2.1)	1 (0.8)	0 (0.0)	0 (0.0)	16 (1.5)
Burning	3 (2.9)	0 (0.0)	2 (1.8)	2 (1.4)	2 (2.1)	2 (1.6)	1 (0.7)	1 (0.6)	13 (1.3)
Using a knife	2 (2.0)	0 (0.0)	1 (0.9)	3 (2.1)	1 (0.7)	1 (0.8)	1 (0.7)	3 (1.9)	12 (1.2)
Electrocution	1 (1.0)	0 (0.0)	1 (0.9)	1 (0.7)	3 (2.1)	0 (0.0)	2 (1.4)	0 (0.0)	8 (0.8)
Nonviolent	12 (11.8)	16 (14.8)	15 (13.5)	16 (11.1)	19 (13.5)	19 (15.0)	22 (15.4)	20 (12.7)	139 (13.5)
Poisoning†	11 (10.8)	16 (14.8)	15 (13.5)	16 (11.1)	19 (13.5)	19 (15.0)	22 (15.4)	20 (12.7)	138 (12.4)
Gas asphyxiation	1 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.1)
Governorate*									
Beirut	18 (17.6)	18 (16.7)	15 (13.5)	30 (20.8)	12 (8.5)	35 (27.6)	24 (16.8)	28 (17.8)	180 (17.4)
Mount Lebanon	45 (44.1)	44 (40.7)	55 (49.5)	59 (41.0)	73 (51.8)	50 (39.4)	59 (41.3)	62 (39.5)	447 (43.3)
Bekaa	7 (6.9)	19 (17.6)	14 (12.6)	21 (14.6)	19 (13.5)	10 (7.9)	17 (11.9)	16 (10.2)	123 (11.9)
North Lebanon	14 (13.7)	16 (14.8)	10 (9.0)	13 (9.0)	23 (16.3)	17 (13.4)	26 (18.2)	27 (17.2)	146 (14.1)
South Lebanon	13 (12.7)	9 (8.3)	15 (13.5)	17 (11.8)	12 (8.5)	6 (4.7)	12 (8.4)	18 (11.5)	102 (9.9)
Nabatieh	5 (4.9)	2 (1.9)	2 (1.8)	4 (2.8)	1 (0.7)	9 (7.1)	5 (3.5)	6 (3.8)	34 (3.3)
Season									
Winter	29 (28.4)	29 (26.9)	18 (16.2)	33 (22.9)	34 (24.1)	35 (27.6)	37 (25.9)	36 (22.9)	251 (24.3)
Spring	33 (32.4)	29 (26.9)	33 (29.7)	41 (28.5)	26 (18.4)	23 (18.1)	44 (30.8)	43 (27.4)	272 (26.3)
Summer	23 (22.5)	31 (28.7)	28 (25.2)	31 (21.5)	38 (27.0)	41 (32.3)	31 (21.7)	44 (28.0)	267 (25.8)
Autumn	17 (16.7)	19 (17.6)	31 (28.8)	39 (27.1)	43 (30.5)	28 (22.0)	31 (21.7)	34 (21.7)	243 (23.5)

Data presented as n (%).

\* Data missing on two cases for Means in 2017 and 2018 and one case for Governorate in 2015. †Ingestion of a lethal substance or drug overdose.

nonviolent means ( $p < 0.001$ ), while gender and season were not.

Nationalities of suicide decedents were available as of March 2014. These were primarily Lebanese (70.4 %), followed by Ethiopians (13.2 %), Syrians (10.9 %), and Palestinians (2%).

Fourteen different nationalities constituted the remaining cases. Most non-Lebanese Arabs

(Palestinians and Syrians) were males (60 % and 66.7 %, respectively), whereas almost all those of Ethiopian origin were females (96.9 %). As compared to Palestinians and Lebanese who had documented use of firearms in 50 % and 57.2 % of cases, respectively, firearms use was notably low among Ethiopians (1 case) and Syrians (9.2 %). For these two groups, hanging was the most common means of choice (68.8 % in Ethiopians and 51.9 % in Syrians), followed by jumping from a height for Ethiopians (24.6 %) and poisoning for Syrians (22.2 %).

#### 4. Discussion

This is the first study to report the actual recorded rate of deaths by suicide in Lebanon using data from Internal Security Forces death records. From 2008 to 2013, the annual suicide rates appear steady, albeit declining slowly. However, reported suicides increased by 23 % between 2013 and 2014, reaching 2.3 per 100,000 capita, a rate that was reiterated recently in 2018 at 2.3 per 100,000 capita. In 2006, a systemic analysis looking at the Global Burden of Disease Study data, reported that age-standardized mortality rates for suicide were around 2.4 deaths per 100,000 (Naghavi, 2019) in Lebanon. In recent years, there has also been an increase in the size of the population in Lebanon, due to regional conflicts and emigration. By December 2014, Lebanon had hosted close to 1.2 million refugees and asylum seekers with the majority of Syrian origin (United Nations High Commissioner for Refugees, 2014). Although assigned nationalities were only available for data reported between 2014 and 2018, this data analysis revealed that most suicides were completed by Lebanese (70.4 %), with only 10.9 % of decedents being Syrian nationals. Therefore, the increase in population size and its composition are insufficient to explain the apparent increase in suicide rates meaning that other factors are coming into play. Between 2013 and

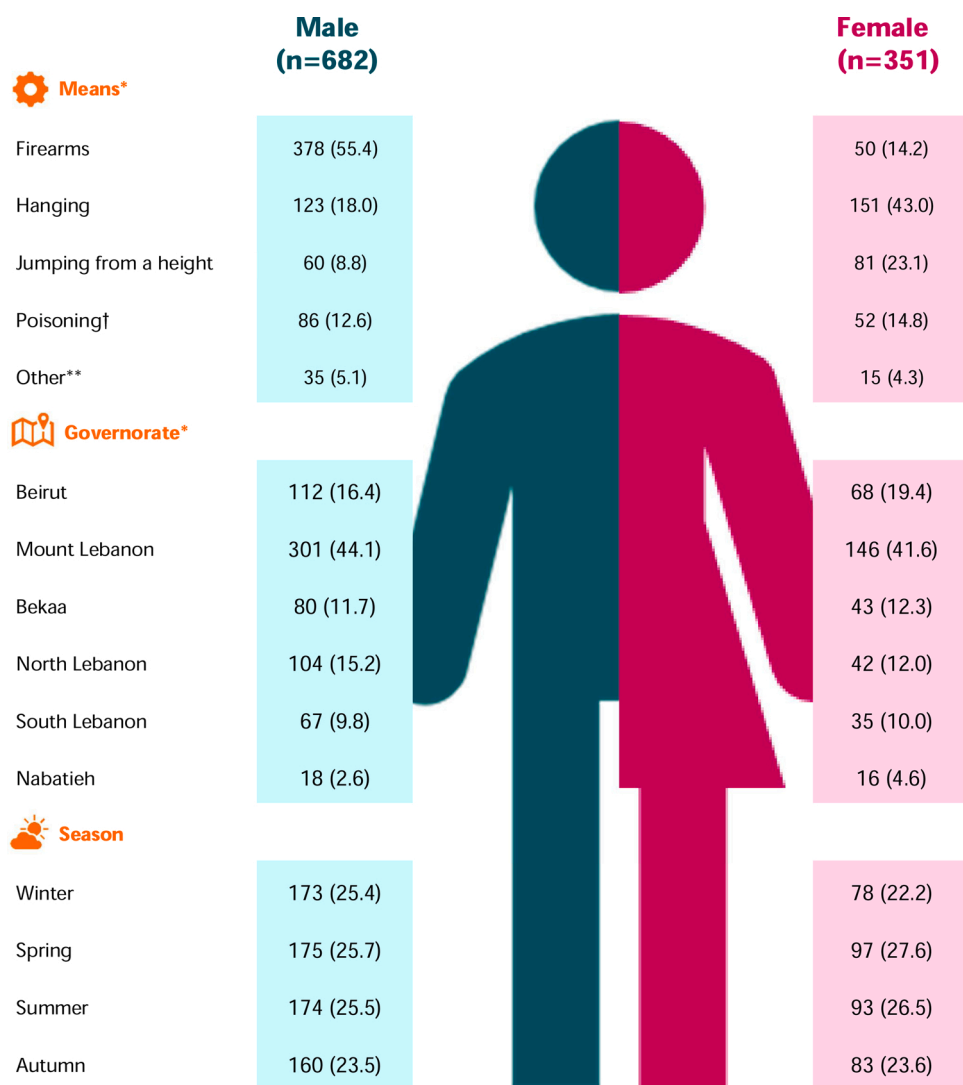
2014, there was an increased awareness about mental health in Lebanon through national campaigns and organizations launching their services towards the topic. Increasing the knowledge and awareness among police nationals and health care workers about suicide has shown to improve the quality and accuracy of suicide data collection. (Hagaman et al., 2016) Accordingly, the increase in suicide rates between 2013 and 2014 can be attributed to more accurate reporting of suicide attempts and consequent deaths due to an increase in community awareness.

##### 4.1. Gender and suicide

As with international data, the data from Lebanon shows most suicides were completed by men and were through violent means. (World Health Organization, 2014) Male to female ratio (2:1) was found to be higher than that reported for Eastern Mediterranean countries by the WHO (1.5:1) and lower than that found in high-income countries (3.5:1). (World Health Organization, 2014) This male predominance has been attributed to the higher suicide completion rate among men, as opposed to a higher attempt rate among females. (World Health Organization, 2014) The phenomenon of men having higher frequency of suicide completion, while females exhibit higher frequency of suicide attempts, is known as the gender paradox of suicidal behavior. (Schrijvers et al., 2012) Some theorists explain the higher suicide attempt in women, than men, to represent having a higher desire to communicate distress, than an intention to die and resorting to less violent means. (Freeman et al., 2017)

##### 4.2. Suicide means

Suicide means in Lebanon appear to differ from both neighboring and Western countries (Ajdacic-Gross, 2008) with the exception of the United States (World Health Organization, 2014). The literature records a continuous increase of incidences of suicide by firearms in males since 1990, becoming the leading means after 2010 and accounting for 50 % of all suicides in the United States. (World Health Organization, 2014; Crestani et al., 2020) While hanging is the prevalent mean both globally



**Fig. 1.** Characteristics of reported suicides from 2011 to 2018 in Lebanon stratified by gender. Data presented as n (%). \*Data missing on two cases for Means in and one case for Governate in females. †Ingestion of a lethal substance or drug overdose. \*\*Includes explosion, burning, using a knife, electrocution, gas asphyxiation.

and in the EMR (World Health Organization, 2014; Morovatdar et al., 2013),firearms (41.4 %) were the most widely used mean in Lebanon. In our study there is a steady rate in suicide by firearm over seven years from 2011 to 2018. It has been suggested that the higher use of firearms in men, could be due to the greater knowledge of handling the weapon and the deformation caused by a firearm, which women tend to reject (Crestani et al., 2020). In Lebanon particularly, while persons are not allowed to bear arms by constitution, there is also a wide angle and discretion by the government in the granting of permits. Hunting weapons’ permits are provided by “kaemaqams” – who are high ranking officials administrative districts of the country. These permits have no expiry date and are given to persons 18-years old and above, and to 16years old given permission and under the guidance of their legal guardians. (Saliba, 2013) Like many legislative systems in Lebanon, which function on the premise of clientelism, this may open doors to many persons receiving permits without having met the legal criteria.

Hanging, accounted for 26.5 % of reported suicides in Lebanon, and 43 % of female suicides. The gender difference in means (firearms in male vs hanging in females) contradicts Adjajic-Gross et al.’s suggestion that within a given country, a “popular” suicide means for men is likely to be “popular” for women. (Adjajic-Gross, 2008) The decision to die by suicide by hanging is driven by accessibility, especially as a substitute means (Adjajic-Gross, 2008) when more lethal means such as

firearms are limited. This would explain it being the most common means among decedents of Ethiopian and Bangladeshi origin. Jumping from height (13.6 %) stands out in our results as registering a higher rate than global and regional trends. In the EMR, the pooled proportion of suicide by jumping is 0.8 % (Morovatdar et al., 2013). Jumping from heights in Lebanon, tended to be used by females and was relatively common among non-Lebanese nationals (24.6 % of Ethiopians, 13.0 % of Syrians), and most common in urban areas, a finding supported by the UNHCR report. (Governorate Profile - Beirut and Mount Lebanon, 2014) Research indicates a correlation between jumping from heights as a means of suicide and urban societies mostly residing in high rise complexes. (Wu et al., 2012) Therefore, the choice of jumping from heights is likely being driven by accessibility.

Poisoning, a nonviolent means, was reported in 12.4 % of suicides in Lebanon, with no significant differences between males and females. This proportion seems to be well below global and regional numbers, where poisoning is among the more common means used. Globally, pesticide self-poisoning accounted for 30 % of global suicides between 1990 and 2007; (Gunnell et al., 2007) mostly in low and middle-income countries and in rural areas (World Health Organization, 2014). Regionally, this proportion was closer to 17 % in the EMR; but this was only based on numbers from Jordan and Pakistan. (Gunnell et al., 2007) More recent comprehensive, EMR data reveals proportions for poisoning

and drug overdose of 20.3 % and 2.5 %, respectively. (Morovatdar et al., 2013) In Lebanon, data suggests that among those reporting a past-year suicide attempt, most had resorted to toxic ingestions (66 % with medications, 22 % with poisonous material and 5% with illicit substances). (Karam et al., 2012) The discrepancy is most likely due to our study addressing only registered deaths by suicide and not attempted or all completed suicides. Two other factors could also explain the lower use of poisoning as a means to complete suicide in Lebanon. First, since 2003, there has been a tighter oversight to prevent disposing medications without prescriptions in Lebanon, namely psychoactive medications. (Ghandour et al., 2012) The second, and more likely explanation, is the underreporting of suicides by poisoning and illicit drug overdoses, either due to the criminality or stigma related to substance use. It is important to highlight that being one of the least frequently reported means of suicide, poisoning would not commonly be a method warranting investigations and could therefore be underrepresented.

Policies on access to means is one of the major global recommendations for suicide prevention. With firearms being the most common means for suicide in Lebanon, this study recommends the revision of legislative laws around gun policies in Lebanon and considering reinforcing stricter guidelines. Applicants for firearm permits should meet specific criteria, including not having been diagnosed or currently suffering from a mental illness, has a clean civil record with no history of being sentenced or convicted of any offenses, crimes, or felonies, has not been deported if the applicant is a foreigner, and has not been previously convicted of any violations with respect to weapon permit legislations.

#### 4.3. Suicide and governorates

Our study revealed significant regional variation among different governorates with Mount Lebanon holding the highest relative rate of reported suicides (most likely because it is the most densely populated) and Nabatiyeh the lowest. In our data, violent means were predominant across governorates, with Beirut suicide decedents being four times more likely to use violent means and more likely to be men. Gender distribution varied. In fact, male-to-female ratio was 1.6:1 in Beirut and increased in areas further away from the capital close to 2:1 in Bekaa, Mount Lebanon and South Lebanon and close to 3:1 in North Lebanon. This might be partially explained by female suicides being more prone to underreporting (Pritchard and Hansen, 2014) especially in rural areas, where mental health help-seeking behavior is lower. (Burrows et al., 2013) Again, it is possible there is underrepresentation due to lower investigations invested in these areas.

Rates of violent suicide in rural areas are very similar to rates in the city of Beirut (85.7 % vs. 92.7 %). Studies performed on this topic show that rural areas in the United States have higher rates of suicide than urban areas, with the use of firearms being the most frequent means. (Nestadt et al., 2017) Since 86.4 % of completed suicides in our study used violent means, this highlights its high lethality and the importance of prevention strategies such as creating protective environments through reducing access to lethal means.

#### 4.4. Suicide and nationalities

The population of foreign domestic workers in Lebanon is unique in its vulnerability to mental health conditions and suicide. (Kronfol et al., 2014) They are employed under a “Kafala” (sponsorship) system whereby the employer has authority over the legal status of migrant domestic workers, putting them at risk of abuse, poorer mental health, and arrest and deportation in case they try to flee their poor living conditions. This population has been recognized in the MoPH’s NMHP strategy as a vulnerable group. This study showed that the second highest suicide rate among the Lebanese population was for foreign domestic workers, specifically of Ethiopian nationality. It highlights the need for stronger implications of protection programs in Lebanon, as well as the need for further studies that target vulnerable populations to

better assist in their protection. With more than 250,000 foreign workers currently in Lebanon, and deaths among this population being among the highest in Lebanon, public health policies that ensure equal access to mental health care for foreign workers should be instituted and lobbied for through both governmental institutions and civil organizations.

#### 4.5. Limitations, strengths and final thoughts

By using official registered data, our methodology provides a solid estimate of suicide rates in Lebanon, but it is still prone to underreporting. One of the struggles faced internationally with suicide statistics is the underreporting of completed suicides, as well as attempts and prevented cases. (Goldney, 2006) In developing countries, laboratory experiments and autopsies are only performed on a small portion of unnatural deaths (Li et al., 2018) with suicides sometimes considered as illegal acts or dishonorable behavior prohibited by religion (Karam et al., 2008). In Lebanon, there is no routine autopsy used in suicide deaths, nor a solid reporting mechanism set in place.

One of the shortcomings of the current study is that age, and risk factors such as mental disorders, substance use, and socioeconomic factors were not available. From a public health perspective, the socioeconomic and concomitant substance use findings could have been noteworthy and should therefore be considered in future studies. The dataset also missed factors such as age in the last two years of the study and nationality in the last for years, which limited further exploration of these risk factors.

One of the strengths of this study is that it was conducted through captures on actual data rather than extrapolation, and in strong coordination with the ISF. During the process of data gathering and follow up, the research team suggested a new model of data collection for suicidal incidents that allowed for more documentation to be incorporated in the case files. The ISF readily adopted this new format of data reporting giving information on nationality as of 2014 onwards, and age as of 2018 and onwards. A methodological strength of the study is the presentation of data collected over 11 years, which increased the validity and power of the findings. Furthermore, compared to other studies, there was no variation in the definition of suicide used for selecting the cases, however, to our knowledge, there is no previous research done in Lebanon that we could compare our data with.

## 5. Conclusion

In summary, this study is the first to report suicide rates in Lebanon over a span of 11 years, shedding the light on the impact of completed suicide in Lebanon as an emerging public health issue. (World Health Organization, 2014) Recommendations were issued to the ISF for a more inclusive reporting of completed suicides, including age and a separation between substance overdoses due to illicit drugs, prescription medications or poisoning by pesticide. Future studies are encouraged to use improved data collection to better account for age, and continuously adjust to forced migration patterns. Moreover, future research should detail the suicidal behavior in Lebanon, and lead to targeted suicide prevention strategies.

#### Ethics approval and consent to publish

The Ministry of Interior and the Institutional Review Board at the American University of Beirut Medical Center gave consent to analyze and publish the results.

#### Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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## Authors' contributions

M.B.: Data collection, data analysis and interpretation, drafting of the article, critical revision of the article and final approval of the version to be published

L.Z.: Data analysis and interpretation, drafting of the article and final approval of the version to be published

A.M.: Data analysis and interpretation, critical revision of the article and final approval of the version to be published

M.D.: Data collection, drafting of the article and final approval of the version to be published M.A.: Conception and design of the work, drafting of the article and final approval of the version to be published

R.C.: Drafting the article, critical revision of the article and final approval of the version to be published

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## Declaration of Competing Interest

The authors declare that they have no competing interests.

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