

## Research



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## Maternal mortality by suicide in Morocco: prevalence and characteristics (study from 2003 to 2013)

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## Abstract

**Introduction:** the reduction of maternal deaths is highly valued by the global society. In Morocco, there isn't yet a suicide registry. This study was out to identify the characteristics of pregnancy-related deaths of Moroccan expectant mothers, determine the prevalence of perinatal suicide, and evaluate its risk factors. **Methods:** this is a retrospective descriptive study on maternal suicides in the Moroccan population between the ages of 14 and 45. The suicides happened between the time of pregnancy and the first two years after delivery. The study covered a ten-year period and focused on the death registry of Casablanca's forensic pathology department (January 2003-December 2013). To describe the characteristics of pregnancy-related deaths with a known cause of death among Moroccan mothers, the circumstances of their deaths, the manners used for suicide, and the presence of potentially stressful events, we developed a structured survey. In cooperation with

the medical examiners, two psychiatrists collected the data. **Results:** a total of 44 deaths by suicide were reported. Prevalence of suicide was 16.05% compared with the general female population (N= 274) and 3.85% of total deaths by suicide (N= 1142) in both sexes. The mean age of Moroccan suicidal mothers was 26.26 ± 7.09 (range: 16-44 years). Twenty five mothers were singles (or 56.82%) and ten were multiparous (22.73%). The educational attainment was primary school or less in 13.63% mothers (N=5), high school in 9.09% (N=4), and not specified in 77.27% (N= 34 cases). Furthermore, 63.64% (N= 28) were of rural origin. A history of substance abuse was reported in one suicidal mother (2.27%). Two mothers (4.54%) had history of mental illness and one suicide attempt (2.27%). The suicide happened at the first trimester of pregnancy in 31.82% (N=14). The most used method was drug overdose in 61.36% (N=27), and suicide had occurred in response to stressful life events in 31.82% (N=14). **Conclusion:** although there is a dearth of high-quality information about suicide in Morocco, it is undeniably a serious and expanding public health issue.

## Introduction

A woman's pregnancy is a challenging time in her life. The transition to motherhood entails a difficult process of transformation and restructuring of women's own identity. It is a time of significant emotional and physical changes [1]. For the international community, reducing maternal fatalities is a top concern, particularly in light of the increased focus on the Millennium Development Goals [2]. According to the Global Burden of Disease study, suicide is the fourth leading cause of death for women aged 15-49 years worldwide, it has been identified as one of the major killers of young women in low-income countries, [3-5] and in its revision of the causes of maternal mortality for the new ICD-11, the World Health Organization [6] proposed that all ante partum and postpartum suicide deaths should be included as direct obstetric deaths. Research in the prevalence and risk factors of suicidality in the postpartum period

has been extremely limited [7], and suicide is still a crime in many low and middle income countries, and associated with great stigma [8,9]. In Morocco, we do not have yet a register of suicide. Our study's main objectives were to estimate the suicide risk factors among Moroccan expectant mothers, to define the characteristics of pregnancy-related deaths, and to ascertain the prevalence of suicide in perinatal.

## Methods

**Study design and setting:** a retrospective descriptive analysis, from 01 January 2003 to 01 December 2013, focused on the death records of all forensic medical services in Greater Casablanca, which has a total population of about 4,055,807 persons and a geographical area of 1615 km<sup>2</sup>. In order to describe the socio-demographic traits of suicidal mothers, we employed a structured questionnaire. These traits included age, place of origin, parity, education, history of drug usage, and psychiatric disorders. We also looked at the circumstances of the death, the time it occurred, the suicide techniques employed, and the presence of potentially upsetting situations.

**Participants:** participants in the study comprised age groups between 14-45 years old of suicidal mothers related to perinatal period.

**Variables:** this study aims to describe the characteristics of pregnancy-related deaths with a known cause of death among Moroccan mothers, the circumstances of their deaths, the methods used for suicide, and the presence of potentially stressful events.

**Data sources/measurement:** in order to describe the socio-demographic traits of suicidal mothers, we employed a structured questionnaire. These traits included age, place of origin, parity, education, history of drug usage, and psychiatric disorders. We also looked at the circumstances of the death, the time it occurred, the suicide techniques employed, and the presence of potentially upsetting situations. In cooperation

with the medical examiners, two psychiatric residents gathered the data.

**Bias:** our results lead us to be cautious about reading and interpreting the data collected. Indeed, the biases of this study include its retrospective nature, as for its poor quality of evidence in comparison to prospective studies, besides controls are not representative of the general population and prone to selection bias.

**Study size:** a total of 44 deaths by suicide in perinatal were reported in the study from 01 January 2003 to 01 December 2013.

**Statistical methods:** the data were entered and coded in Excel. The statistical analysis was performed using the statistical analysis software SPSS: Statistical Package for Social Sciences (SPSS) for Windows, version 13.0 (SPSS, Inc, Chicago). The descriptive analysis consisted of calculating the frequencies for quantitative and qualitative variables.

## Results

**Participants:** a total of 44 deaths by suicide in perinatal were reported in the study from 01 January 2003 to 01 December 2013, included in the study, and analyzed. There were no reasons for non-participation at each stage of the study.

**Descriptive and data:** the characteristics of pregnancy-related deaths: the mean age was  $26.16 \pm 7.09$  years (range: 14-45 years). Twenty-five mothers (56.82%) were unmarried. Educational attainment was primary school or less in 13.63% (N=5) mothers, high school in 9.09% (N=4), they were multiparous in 22.73% (N=10), and from rural origin in 63.64% (N=20). A history of substance use was found in 2.27% cases (N=1). Psychiatric disorder was described in 6.82% (N=3), and 2.27% of the mothers had already made a suicide attempt (Table 1).

**Main results:** prevalence of suicidality: the prevalence of suicide during the 10 years was

16.05% compared with the general female population (N=274) and 3.85% in both sexes of total deaths by suicide (N=1142). Characteristics and circumstances of suicide: the diagnosis of pregnancy was unknown before 61.36% (N=27) and confirmed after the autopsy examination in 45.45% of cases (N=20). The dosage of Beta human chorionic gonadotropin was done only in 2.28% (N=1). The suicide happened at the first trimester of pregnancy in 31.82% (N=14), at the second in 20.45% (N=9), at the third in 25.01% (N=11), and during the postpartum period in 22.72% (N=10). The most used method was drug overdose in 61.36% (N=27), followed by hanging in 13.64% (N=6), defenestration in 6.82% (N=3), and undetermined in 18.18% (N=8). Suicide occurred in response to stressful life events in 31.82% (N=14) (Table 2).

## Discussion

**Key results:** our study's findings relate young, single, multiparous mothers to a high prevalence of perinatal suicide.

**Interpretation:** this study examined 44 suicide deaths that occurred during a ten-year period, from 2003 to 2013. Moroccan expectant mothers frequently committed suicide. In comparison to all females, there were 16.05% more cases of perinatal suicide than there were in the general population (3.85% more cases). Although one of the primary causes of death for young women in low- and middle-income countries is suicide, it is unknown whether injuries or accidents contribute to pregnancy-related mortality [10]. Suicidality during pregnancy has been studied extensively, and prevalence in the postpartum period ranges from 4% in Finland to 15% throughout India [11]. In their systematic review and meta-analysis on the link between pregnancy and suicide in low and middle-income countries (LMICs), Daniela Fuhr and colleagues found 36 papers from 21 different nations. They demonstrated that injuries account for around one in twenty pregnancy-related deaths, and suicide accounts for one in one

hundred. Regions varied greatly from one another. The Americas (3.03%, 1.20-5.49), the eastern Mediterranean region (3.55%, 0.37-9.37), and Southeast Asia (2.19%, 1.04-3.68) had the highest prevalence of suicide, while the western Pacific (1.16%, 0.00-4.67) and Africa (0.65%, 0.45-0.88) regions had the lowest. The pooled total prevalence across the regions was 1% for suicide (95% CI 0.54-1.57) and 5.06% for injuries (3.72-6.58). However, research showed that women who are not pregnant or in the postpartum period had a higher chance of dying from injuries and suicide [11,12].

Suicide is still associated with stigma in some societies [13]. A systematic review by Salvatore Gentile [14] showed that in developing countries, suicide can be precipitated by an illegitimate pregnancy, especially in those societies where social sanctions and religious condemnation are particularly harsh [15]. Additionally, there is a clear link between antenatal depression and suicidal behavior in certain religious and cultural contexts between having a female fetus, a history of being beaten by the husband either before or during the current pregnancy, and having an unsupportive or unhelpful mother-in-law [16]. These correlations' explanations seem to be entrenched in the cultures of many developing nations [17]. We discovered that psychological risk factors were significant in Morocco. Young single mothers (56.82%) and multiparous mothers (22.37%) are more likely to commit suicide in Morocco, and it is more closely linked to poverty (63.64%), drug use (61.36%), and unintended or unwelcome pregnancies (61.36%), while being less linked to mental illness (2.27%) and drug addiction (2.27%). Teenage pregnancy, unplanned pregnancies, being single or recently divorced, unemployment, and difficulty accessing safe abortion services are all psychosocial factors that may also raise the likelihood of maternal suicide attempts during pregnancy [17,18]. The high rate of unintended births among young females who are not married has been a major factor in explaining the rise in suicide and injury among pregnant teens [19].

On the other hand, low and middle-income nations have a high prevalence of depression during pregnancy and the postpartum period, a significant risk factor for suicide [5,11,20]. Three mothers, or 6.82% of the research population, had psychiatric disorders, with one having already attempted suicide. In contrast, utilizing the Present State Examination (PSE) assessment, a study of 95 mothers in a hospital in Dubai, United Arab Emirates, revealed a prevalence of postnatal depression of 15.8% [21]. In Morocco, the prevalence of postnatal depression at two weeks post-delivery was 18.7%, using the Mini International Neuropsychiatric Interview (MINI), and 20.1% using a cut-off score of 12 with the Edinburgh Postnatal Depression Scale (EPDS) [22]. A community of pregnant Tunisians had a 13.2% prevalence of postpartum depression [23]. In Lebanon, using EPDS score of 12/13 at 4-5 months postpartum recorded a prevalence rate of 21% [24]. In addition, hospital-based cohort studies and literature reviews have revealed that some characteristics, such as intimate partner violence, prior sexual assault, and interpersonal disputes, are linked to a higher likelihood of suicidal ideation [25,26]. Almost invariably, pregnant women who attempt suicide choose to consume poisons or take an excessive amount of medicines [27].

Our findings corroborate those of other studies, showing that drug poisoning was the method of choice for Moroccan women in 61.36% (N=27), hanging in 13.64% (N=6), and defenestration in 6.82% (N=3). According to a Thai study, poisoning is the most prevalent means of suicide, and parathion and other organophosphate insecticides are the most popular poisons [28,29]. Contrarily, the most popular pharmaceuticals for suicide attempts in western nations include a number of licit drugs, including benzodiazepines [30]. However, a variety of drugs, such as analgesics (acetaminophen in particular), iron or vitamin supplements, antibiotics, antihistamines, or decongestants, can be used in an attempt at suicide [9]. According to this study, the diagnosis of pregnancy was unclear before the autopsy in 61.36% of instances and was

determined to be true in 45.45% of cases. Beta Human Chorionic Gonadotropin was only administered in a dosage of 2.28%. Additionally, multiple investigations shown that forensic doctors frequently neglect to examine the uterus or fail to look into possible pregnancy-related factors. Among those who have died by suicide or homicide, the administration of beta human chorionic gonadotropin is likewise frequently not consistent [31].

**Generalizability:** replication of this study in the context of a follow-up could, in the future, overcome some of these biases.

**Limitations:** nevertheless, the retrospective character of the study, the non-representativeness of the controls to the overall population, and the possibility of selection bias are all limitations.

## Conclusion

In Morocco expectant mothers, maternal suicide death is a common occurrence. Suicide in Morocco is more common in young single women, considerably more likely to entail drug consumption, more closely related with poverty, and less closely associated with mental illness than suicide in high-income nations.

### What is known about this topic

- *The most common cause of mortality during the perinatal period (pregnancy and the first year after delivery) is suicide;*
- *A significant risk factor for suicidality in the prenatal period is having a mental diagnosis.*

### What this study adds

- *Since Morocco does not yet have a suicide register. This study sought to increase awareness of maternal suicidality in the first place, as well as to determine the risk factors for suicide and its prevalence among Moroccan mothers.*

## Competing interests

The authors declare no competing interests.

## Authors' contributions

This work is the result of the collaboration of all the authors who participated in the design of the study, the bibliographic research and the drafting of the article ensured mainly by: Imane Salihi, Nadia Attouche, Bouchra Hallab, Elkhansa Layoussifi, Mohamed Agoub, Khadia Mchichi Alami. All the authors have read and agreed to the final manuscript.

## Tables

**Table 1:** characteristics of pregnancy-related deaths with a known cause of death in Morocco between 2003 and 2013

**Table 2:** characteristics and circumstances of the present suicide in Morocco between 2003 and 2013

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**Table 1:** characteristics of pregnancy-related deaths with a known cause of death in Morocco between 2003 and 2013

Characteristics	Number	Percentage
<b>Mother's age, years</b>		
[14 -20]	12	27.27%
[ 20 - 30]	18	40.91%
[ 30 - 40]	10	22.72%
[ 40 - 45]	2	4.55%
Missing	2	4.55%
<b>Mother's origin</b>		
Urban	8	18.18%
Rural	28	63.64%
Missing	8	18.18%
Total	44	100%
<b>Mother's marital status</b>		
Single	25	56.82%
Married	17	38.63%
Divorced	2	4.55%
<b>Mother's educational attainment</b>		
Primary school or less	6	13.63%
High school	4	9.09%
University	0	0.00%
Missing	34	77.28%
<b>Mother's obstetric history</b>		
Multiparous	10	22.73%
Primiparous	4	9.09%
Missing	30	68.18%
<b>Mother's history of substance use</b>		
Yes	1	2.27%
No	2	4.55%
Missing	41	93.18%
<b>Mother's history of mental illness</b>		
Yes	3	6.82%
No	5	11.36%
Missing	36	81.82%



**Table 2:** characteristics and circumstances of the present suicide among women in Morocco between 2003 and 2013

<b>Mother's pregnancy diagnosis</b>		
Known	17	38.64%
Unknown	27	61.36%
1-Beta-HCG test	1	2.28%
2-Autopsy	26	45.45%
3-Amenorrhea	0	0.00%
4-Unspecified	6	13.90%
<b>Timing of death</b>		
First trimester	14	31.82%
Second trimester	9	20.45%
Third trimester	6	13.64%
Postpartum	10	22.72%
Unspecified	5	12.37%
<b>Manner of death</b>		
Drug overdose	27	61.36%
Hanging	6	13.64%
Drowning	0	0.00%
Defenestration	3	6.82%
Phlebotomy	0	0.00%
Unspecified	8	18.18%
<b>Presence of stressful life events</b>		
Yes	14	31.82%
No	0	0.00%
Unspecified	30	68.18%