

Maternal To Suicide Continues Reach Frightening Rates: Systematic Review

Monique Leite Sampaio^{1,3},
Kimberly Virgin Cruz Correia
E Silva²,
Gabriel Cabral Alencar Dos
Santos²,
Jannine Granja Aguiar Muniz
De Farias⁴,
Nádia Nara Rolim Lima⁵ and
Modesto Leite Rolim Neto^{6*}

Abstract

Introduction: Maternal death by suicide raises serious perplexities. The ICD-10 classifies maternal suicide as an indirect form of maternal death. Due to this current misclassification, a classificatory consensus of maternal suicide as a direct form of maternal death is urgent.

Objective: Analyze the psychological that permeate the phenomenon of maternal suicide, to define the profile of mothers in the postpartum period and pregnant women who commit suicide, with the purpose of elucidating ways of preventing maternal suicide.

Method: A systematic review was made following the PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analysis).

Results: Twenty-one studies reported the urgent need to implement interventions in order to prevent or reduce mental health problems caused by mothers and pregnant women who commit suicide. Twenty studies demonstrate the need for interventions to organizational adjustments, especially related to the emotional conflicts involved suicide and maternity.

Conclusion: Maternal suicide is mainly caused by severe psychiatric disorders, however, higher suicide rates are seen due to psychosocial factors, such as poor familial support and domestic violence, illegal substance abuse and alcoholism, history of sexual or physical violence, racial oppression, economic instability, unwanted pregnancy, difficulty in accessing intentional abortion, and trauma related to past maternity experiences..

Keywords: Maternal death; Suicide; Mental disorders; Pregnancy; Postpartum period

- 1 Obstetrician Gynecologist, Preceptor of the Federal University of Campina Grande - UFCA, Campus Cajazeiras-PB/HUJB
- 2 School of Medicine from Juazeiro do Norte – FMJ/Estacio, Juazeiro do Norte, Ceará, Brazil
- 3 School of Medicine, Federal University of Campina Grande - UFCA, Campus Cajazeiras-PB/HUJB, Brazil
- 4 Emergency Care Unit - UPA and Family Health Program - PSF of Araripina, Pernam-buco, Recife, Brazil
- 5 Postgraduate Program in Neuro-Psychiatry, Federal University of Pernambuco - UFPE, Recife, Pernambuco, Brazil
- 6 Faculty of Medicine, Federal University of Cariri (UFCA), 284, Divine Savior Street, Downtown, Barbalha, Ceará 63180000, Brazil

*Corresponding author:

Modesto Leite Rolim Neto

✉ modesto.neto@ufca.edu.br

Faculty of Medicine, Federal University of Cariri (UFCA), 284, Divine Savior Street, Downtown, Barbalha, Ceará 63180000, Brazil.

Tel: + 55 88999042979

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Introduction

The death of a mother, in of itself, leaves unbearable trauma and irreparable damage not only for the children but for the entire family and social context surrounding the mother. Hence, the struggle for the survival of pregnant women and mothers in the post-partum period has raised great scientific and social efforts, resulting in the global decline of annual rates of maternal death by 46% between the years of 1990 and 2010 [1]. Most causes of maternal death, such as hemorrhage, eclampsia, malnutrition, infection, and venous thromboembolism have been combated and mitigated [2,3]. However, little focus has been placed on maternal suicide, which is now characterized as the primary

cause of maternal death in developed countries as well as among the leading causes in developing countries [4].

Maternal death is defined by the tenth edition of the International Classification of Diseases (ICD-10) as the death by any means of a pregnant woman up to one year after the end of her pregnancy, whether directly, i.e., pregnancy-related obstetric causes, childbirth, and puerperium, or indirectly, due to non-obstetric or pre-existing conditions, aggravated by the effects of pregnancy [5]. In this context, maternal death by suicide raises serious perplexities. The ICD-10 classifies maternal suicide as an indirect form of maternal death, making these cases even more difficult to classify, analyze, and prevent [6]. Due to this current misclassification, a classificatory consensus of maternal suicide as a direct form of maternal death is urgent [7]. Because of this, the discussion for the eleventh edition of the International Classification of Diseases (ICD-11) has proposed to include suicide as a direct form of maternal death in order to facilitate its epidemiological analysis, screening and prevention [4,6,7]. Nevertheless, even with ICD-10 applied the notification and computation of maternal suicides are extremely impaired because there is still no definitive, standard classification; many countries, especially the least developed, still do not classify maternal suicides as direct maternal deaths, leading to an important gap in the knowledge of maternal deaths due to suicide worldwide [4].

In the midst of this situation, maternal suicide continues to reach terrifying rates. There are 2 suicides per 100,000 live births in the USA [8] and Canada [9], while there are 3.7 suicides for every 100,000 in Sweden [10], and 2.3 per 100,000 in Italy [11], with similar rates worldwide. This paper aims to understand the phenomenon of maternal suicide by qualitatively analyzing the relationship between suicide and maternity, characterizing causes, issues, and cofactors involved in the process of maternal suicide, as well as pro-posing preventative measures. Above all, this paper aims to identify who are the mothers and pregnant women who commit suicide.

Methods and Materials

A systematic revision was made, following the PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analysis).

Inclusion criteria

To search for studies, the following databases were used: Pubmed Scopus and Embase. We identified categorized references for the "Maternal death"; "Suicide"; "Mental disorders"; "Pregnancy"; "Postpartum period". Besides, we identified references by searching (title/abstract) in the database, using the keywords: suicide*, psych*, stress*, ans *, depr*, mental *. We selected all references identified specifically for the inclusion criteria for this systematic review.

Data extraction and assessment methodological quality

We have developed a data extraction form to collect data on participants and exposure intervention, if relevant, results related

to relationship between suicide and maternity, characterizing causes, issues, and cofactors involved in the process of maternal suicide. We extracted data on mental health problems, as well as related ones (that is, risk/resilience factors); strategies implemented or accessed by with the objective to identify who are the mothers and pregnant women who commit suicide.

Three researchers (MLRN, SNAO and NNRL) extracted data and another verified the extraction. Three researchers (KRDA, FC and MMMB) independently assessed the methodological quality of systematic reviews using the AMSTAR tool [12] and qualitative studies using the CASP checklist (Critical Appraisal Skills Program – CASP) [13]. A researcher (MLRN) assessed the quality of cross-sectional studies using the JBI Prevalence or the JBI Cross-sectional analytical checklist and longitudinal studies using the JBI Cohort checklist (Johanna Briggs Institute) [14].

Data presentation and analysis

We summarized the results narratively. We described interventions and outcomes based on the information provided in the studies. We decided not to perform a quantitative analysis of summaries of the associations between the various correlates and health factors, due to a combination of heterogeneity in the measures and lack of control groups, and an embraced lack of descriptions necessary to confirm sufficient homogeneity. We rated the certainty of the evidence using the GRADE approach- (Grading of Recommendations Assessment, Development and Evaluations [15].

Results

The search strategy yielded 229 results in Pubmed Scopus and Embase. Titles and/or abstracts of these records were screened and 156 did not meet the eligibility criteria. Out of the remaining 73 full-text articles, 32 were excluded for various reasons, such as lack of relevancy to the proposed topic. Thus, our systematic review includes 41 publications (**Figure 1 and Table 1**).

Evaluation of the methodological quality of the included studies

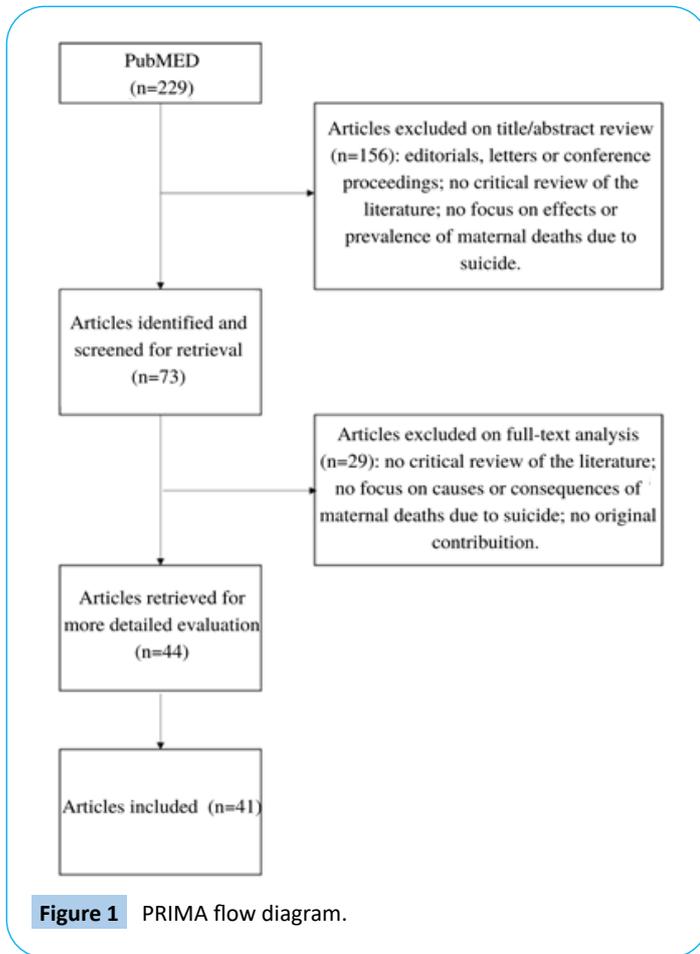
The most common methodological weaknesses in all the studies arose from insufficient reporting: samples, scenarios, and recruitment procedures were often not fully described.

Interventions in mental health

Twenty-one studies reported the urgent need to implement interventions in order to prevent or reduce mental health problems caused by mothers and pregnant women who commit suicide. Twenty studies demonstrate the need for interventions to organizational adjustments, especially related to the emotional conflicts involved suicide and maternity.

Changes in mental health

Fifteen of the studies that implemented mental health interventions reported the effects of interventions on emotional conflicts involved suicide and maternity. The only data available to connect the impact of the suicide came from three longitudinal research studies that report changes over time, both of low-



quality methodological value.

The summary of the results table below shows the studies that contribute to each mental health result. We evaluate that the certainty of the reported results of levels of anxiety, depression, distress, and sleep problems in pregnant women who commit suicide, using the GRADE approach, is moderate. 3.9.

Discussion

Studies report that motherhood can work as a protective factor for mental health, reducing the risk of suicide, especially in pregnant women and women who have recently given birth [16,17]. However, maternal suicide is a major cause of maternal death around the world, primarily in developed countries [4,18]. Pregnancy and the arrival of a child represent, for many women, a unique experience of hope and joy, but for some women, this period may become overlapped by serious psychiatric disorders, which destabilize and lead to life-threatening situations for many mothers and pregnant women [18,19]. In this context, motherhood seems to intensify the prevalence of mental illnesses in vulnerable women [3], with a history of suicidal thoughts, i.e. a set of suicidal behaviours that include intentional self-harm (with or without the intention to die), suicide ideation and suicide attempts [20]. Major depressive disorders during pregnancy and the postpartum period, which is considered a main risk factor for maternal suicide, is heavily prevalent, affecting around 20% of

women worldwide, from mild forms to more severe ones and, more rarely, psychosis [4,21]. Indeed, perinatal depression is a unique subtype of major depressive disorder, where women rapidly experience severe forms of depressive episodes with high levels of comorbidities such as anxiety, obsessive compulsive disorders, and ideations of inflicting self-harm and harm to the child [18,22].

Women in mental distress are more likely to commit suicide [18], mainly in the first months postpartum [17,23] and during the pregnancy [8,23]. Studies confirm this notion, stating that the vast majority of pregnant women and mothers who commit suicide are afflicted with severe mental illnesses [3], such as major depressive disorders and schizophrenia (Bachmann. 2018; Austin et al., 2007), and account for nearly 75% of all maternal suicides [2,10,24]. Furthermore, high rates of suicidal behaviour are also seen in women with a history of illegal substance abuse [23-25], alcoholism [23,26,27], and even tobacco consumption [3]. A study performed in Sri Lanka links the high prevalence of depression in pregnant women, with 27.1% of the pregnant women having a depressive episode prior to the pregnancy and 16.2% having postpartum depression, with the high rate of maternal suicides, which represents almost 18% of all of the causes of maternal deaths in the country [28]. Suicide is also one of the main causes of maternal deaths in other developing countries, but nonetheless, maternal suicide has remained under-investigated and under diagnosed and consequently undertreated [29]. The social stigma surrounding taking one's life, as well as inadequate health systems and classificatory obstacles still prevail, which all contribute to the serious problem of underreporting [4,29].

In any case, maternal suicide, as with any other psychological phenomenon, does not have one single cause. Pregnant women and mothers in postpartum in such a diverse world could not have the same sufferings nor could they suffer equally in any of their afflictions. However, family support has been shown to be a significant protective factor against maternal suicide [29,30], while mothers without adequate family support have higher rates of suicide [3,30]. Guasia, et al. [31] claim that in Bangladesh, unhelpful and unsupportive husbands and mother-in-laws were significant risk factors for suicide, especially for women who have suicidal ideation during pregnancy, which makes up 14% of all pregnant women in the country. In addition, unmarried or divorced marital statuses, as well as pregnancies outside of marriage are also presented as risk factors for maternal suicide, as these situations could be associated with a lack of familial ties and support [25,32]. On the other hand, marital satisfaction was revealed as a protective factor, due to the emotional support provided [33]. Not surprisingly, teenage mothers may be three times more likely to commit suicide than other age group of women [3,17].

Likewise, domestic violence has been demonstrated to aggravate the risk of maternal suicide [27,34,35]. In the USA, 54.3% of women who have committed maternal suicide have experienced some type of domestic abuse [8]. In India, Supraja, et al. [36] also indicates that domestic violence and inadequate familial and social support has a strong strong correlation with suicidal

Table 1 Description and results of the included articles.

Article Title	Author	Year	Name of Journal or Magazine	Methods used in the study	Significant outcomes
Maternal Deaths From Suicide and Overdose in Colorado, 2004-2012	Metz, Royner, Hoffman, Allshouse, Beckwith, Binswanger	2016	<i>Obstetrics and gynecology</i>	Case series of all women with pregnancy-associated deaths from self-harm in Colorado between 2004 and 2012. Data was extracted from state death certificates data and other sources, such as prenatal care and delivery hospitalization records.	30% of all maternal deaths in Colorado resulted from self-harm. The majority of the deaths occurred in the first postpartum year, only six maternal deaths occurred during pregnancy. Prior psychiatric diagnoses were documented in 54% of the women, and prior suicide attempts in 10%.
The prevalence and correlates of depressive symptoms among adolescent mothers: results from a 17-year longitudinal study	Gavin, Lindhorst, Lohr	2011	<i>Women & health</i>	Longitudinal study. Multiple logistic regression was used to estimate the associations between correlates and elevated depressive symptoms during five distinct developmental periods of the life course.	The prevalence of elevated depressive symptoms in adolescent mothers significantly increased over the 17 years of the study from 19.8 % to 35.2%. Intimate partner violence (IPV) was positively and significantly associated with elevated depressive symptoms at all but one developmental period. Other significant correlates of elevated depressive symptoms included welfare receipt, smoking, and parity
Contribution of suicide and injuries to pregnancy-related mortality in low-income and middle-income countries: a systematic review and meta-analysis	Fuhr, Calvert, Ronsmans, Chandra, Sikander, Silva, Patel	2014	<i>The Lancet. Psychiatry</i>	A systematic review to identify studies reporting the proportion of pregnancy-related deaths attributable to suicide or injuries, or both, in low-income and middle-income countries. Meta-analysis to calculate the pooled prevalence of pregnancy-related deaths attributable to suicide, stratified by WHO region	There might have underestimated suicide deaths because of the absence of recognition and inclusion of these causes in eligible studies. The pooled prevalence of pregnancy-related deaths attributed to suicide was 1.68% (1.09-2.37). Americas (3.03%, 1.20-5.49), the eastern Mediterranean region (3.55%, 0.37-9.37), and the southeast Asia region (2.19%, 1.04-3.68) had the highest prevalence for suicide, with the western Pacific (1.16%, 0.00-4.67) and Africa (0.65%, 0.45-0.88) regions having the lowest.
Homicide and suicide during the perinatal period: findings from the National Violent Death Reporting System.	Palladino, Singh, Campbell, Flynn, Gold	2011	<i>Obstetrics and gynecology</i>	An observational time-series study using data of female victims of reproductive age from the National Violent Death Reporting System.	There were 94 counts of pregnancy-associated suicide, yielding pregnancy-associated suicide rate of 2.0 deaths per 100,000 live births. Native Americans showed more suicide rates than other racial groups. 54.3% of pregnancy-associated suicides involved intimate partner conflict
Mental Health and Maternal Mortality- When New Life Doesn't Bring Joy.	Jago, Crawford, Gill, Gagnon	2020	<i>Journal d'obstetrique et gynecologie du Canada</i>	Retrospective cohort study using data from the Alberta Perinatal Health Program from 1998 to 2015.	The pregnancy-related maternal mortality rate for suicide up to 365 days after birth was 2.05 deaths per 100,000 deliveries. Close to 1 in 5 maternal deaths in the study were related to suicide or drug toxicity
Suicides during pregnancy and 1 year postpartum in Sweden, 1980-2007	Esscher. Essén, Innala, Papadopoulos, Skalkidou, Sundström-Poromaa, Högberg	2016	<i>The British journal of psychiatry</i>	An observational time-series study using data of the Swedish Cause of Death Register, Medical Birth Register, and National Patient Register, besides obstetric medical records.	The maternal suicide ratio was 3.7 per 100 000 live births for the period 1980-2007. The suicide ratio was higher in women born in low-income countries. Violent suicide methods were common. Most of the victims had psychiatric care at some point.
Maternal suicide in Italy	Lega, Maraschini, D'Aloja, Andreozzi, Spettoli, Giangreco, Vichi, Loghi., Donati, Regional maternal mortality working group	2020	<i>Archives of women's mental health</i>	An observational time-series study using data of the regional death registries, hospital discharge databases, and other data sources.	In Italy, the maternal suicide ratio was 2.30 per 100,000 live births in 2006-2012. The suicide rate was 1.18 per 100,000 after giving birth, 2.77 after an induced abortion, and 2.90 after a miscarriage. The majority of the women who died by maternal suicide had a previous psychiatric history.

Article Title	Author	Year	Name of Journal or Magazine	Methods used in the study	Significant outcomes
Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors: a national register-based study of all suicides in Denmark	Qin, Agerbo, Mortensen	2003	<i>The American journal of psychiatry</i>	An observational time-series study using data of four national Danish longitudinal registers.	History of hospitalization due to a psychiatric disorder was associated with the highest odds ratio and the highest attributable risk for suicide. Cohabiting or single marital status, unemployment, low income, retirement, disability, sickness-related absence from work, and a family history of suicide and/or psychiatric disorders were also significant risk factors for suicide. Having a young child with lower suicide risk in female subjects.
Life cycle and suicidal behavior among women	Mendez-Bustos, Lopez-Castroman, Baca-García, Ceverino	2013	<i>The Scientific World Journal</i>	Literature review. Narrative description of the evolution of female suicidal rates during a lifetime.	There is an idea that the birth of a child is a protective factor against fatal and non-fatal self-harm, especially in the first year after delivery. However, pregnant and postpartum women who experience depressive disorders are more likely to complete suicide. Suicidal behavior may be increased after abortion, miscarriage, or other factors, such as single marital status, low income, unemployment, poor social support.
Bipolar disorder, affective psychosis, and schizophrenia in pregnancy and the postpartum period	Jones, Chandra, Dazzan, Howard	2014	<i>Lancet</i>	Literature review. The evidence summarized regarding epidemiology, risk factors, and treatment of severe mental illness in relation to childbirth.	Suicide is a leading cause of maternal death. Severe mental illnesses are strongly associated with suicide in pregnancy and in the postpartum period, such as bipolar disorder, affective psychosis, major depression, and schizophrenia.
Maternal mortality and psychiatric morbidity in the perinatal period: challenges and opportunities for prevention in the Australian setting	Austin, Kildea, Sullivan	2007	<i>The Medical journal of Australia</i>	Comparative study. Analyses of three reports on maternal deaths in Australia.	Due to limitations in the scope of the data collection and methods of detection, maternal mortality associated with psychiatric illness in the perinatal period has been under-reported. Maternal psychiatric illness is one of the leading causes of maternal death, with the majority of suicides occurring by violent means.
Suicidality among pregnant women in Brazil: prevalence and risk factors	Castro e Couto, Brancaglion, Cardoso, Faria, Garcia, Nicolato, Aguiar, Leite, Corrêa	2016	<i>Archives of women's mental health</i>	An observational time-series study using semi-structured interviews as well as the Edinburgh Postnatal Depression Scale, Beck Depression Inventory, and Mini-International Neuropsychiatric Interview Plus.	The suicide risk among pregnant women was 23.53%. Antenatal depression, lifetime bipolar disorder, and any current anxiety disorder were identified as strong risk factors. Unemployment and fewer years of education were considered independent risk factors.
Maternal suicide - Register based study of all suicides occurring after delivery in Sweden 1974-2009	Lysell, Dahlin, Viktorin, Ljungberg, D'Onofrio, Dickman, Runeson	2018	<i>PloS one</i>	A case-control study designed with data from Swedish registries. The cohort consisted of all women given birth in Sweden between 1974 and 2009.	Suicide victims of the postpartum year more often had affective disorders, psychotic disorders, and a history of self-harm. A severe mental disorder after delivery and a history of self-harm was strongly associated with an increased risk of suicide in the postpartum year
Perinatal Depression: Embracing Variability toward Better Treatment and Outcomes	Galea & Frokjaer	2019	<i>Neuron</i>	Literature review. Narrative description of perinatal depression.	Perinatal depression (PND) is a distinct subtype of major depressive disorder. The postpartum period is the time of greatest risk to develop depression and/or anxiety disorders during a women's lifetime. Severe and rapidly deteriorating depressive episodes in the early postpartum period leading to suicidal ideation and, tragically, infanticide. Suicide is the leading cause of maternal deaths within a year from childbirth.

Article Title	Author	Year	Name of Journal or Magazine	Methods used in the study	Significant outcomes
Suicide during Perinatal Period: Epidemiology, Risk Factors, and Clinical Correlates	Orsolini, Valchera, Vecchiotti, Tomasetti, Iasevoli, Fornaro, Berardis, Perna, Pompili, Bellantuono	2016	<i>Frontiers in psychiatry</i>	A systematic literature review in accordance with the methods recommended by PRISMA guidelines.	Suicide is one of the leading causes of maternal mortality. Postpartum depression, bipolar disorder, postpartum psychosis, and other mental disorders have been reported with a higher risk of suicidal ideation, suicide attempt, or suicide.
Epidemiology of Suicide and the Psychiatric Perspective	Bachmann	2018	<i>International journal of environmental research and public health</i>	Wide narrative literature review.	The majority of suicides worldwide are related to psychiatric diseases. Among those, depression, substance use, and psychosis constitute the most relevant risk factors, but also anxiety, personality-, eating- and trauma-related disorders as well as organic mental disorders significantly add to unnatural causes of death compared to the general population.
Suicidal mothers	Gentile	2011	<i>Journal of injury & violence research,</i>	A narrative review of medical literature since 1950, using PubMed, Scopus, and Google Scholar databases.	Contribution factors to maternal suicide were: intimate partner violence, unmarried status, and poor familiar support, lack of social or institutional support, a pregnancy outside marriage, a pregnancy at teenage, cultural issues, physical and sexual violence, unplanned pregnancy, previous or present history of any psychiatric disorder, drug and alcohol abuse, unemployment and induced abortion.
Suicide and suicide attempts among women in the Manitoba Mothers and Fetal Alcohol Spectrum Disorder cohort: a retrospective matched analysis using linked administrative data	Singal, Brownell, Chateau, Wall-Wieler, Longstaffe, Hanlon-Dearman, Roos	2017	CMAJ Open	Retrospective cohort analysis of women with children born in Manitoba between 1984 and 2012.	Women with fetal alcohol spectrum disorder are at increased risk for suicide, with higher rates of suicidality.
Depression and thoughts of death among disadvantaged mothers: risk factors and impact on maternal and child health	Crandall, Sridharan, Schermer	2010	<i>Archives of suicide research</i>	Retrospective database analysis with bivariate and multivariate statistics utilizing 3 years of data from the prospective Fragile Families and Child Wellbeing Study	Depression and thoughts of death were significantly associated with family violence and alcohol use, also increasing the risk of infant hospitalization. Routine screening for these issues should be implemented.
Maternal mortality revisited: the application of the new ICD-MM classification system in reference to maternal deaths in Sri Lanka	Agampodi, Wickramage, Agampodi, Thennakoon, Jayathilaka, Karunarathna, Alagiyawanna	2014	<i>Reproductive health</i>	An observational study. Data analysis of maternal death surveillance system in North Central Province of Sri Lanka, for the period of 2005 to 2011.	Classification of maternal suicides as direct forms of maternal death has an immediate effect in raising maternal mortality thresholds, making it easier to understand the real number of maternal deaths attributed to suicide.
Prevalence and determinants of common perinatal mental disorders in women in low- and lower-middle-income countries: a systematic review	Fisher, Cabral de Mello, Patel, Rahman, Tran, Holton, Holmes	2012	<i>Bulletin of the World Health Organization</i>	Major databases were searched systematically for English-language publications on the prevalence of non-psychotic common perinatal mental disorders and their risk factors and determinants.	Risk factors were: socioeconomic disadvantage, unintended pregnancy, being younger, being unmarried, lacking intimate partner empathy and support, intimate partner violence, and history of mental health disorders. Protective factors were: more education, permanent job, ethnic majority, and kind and trustworthy intimate partner. In developing countries, maternal suicide seems underestimated.

Article Title	Author	Year	Name of Journal or Magazine	Methods used in the study	Significant outcomes
Maternal deaths from suicide in Singapore	Chen & Lau	2008	<i>Singapore medical journal</i>	An observational time-series study using data from 2000 to 2004 in Singapore, by linking coronial cases of female suicide in reproductive age with the birth registration database.	Only one maternal death due to suicide was identified. Strong familiar support in Singapore may help to diminish the rates of maternal suicidality.
Antenatal depression and suicidal ideation among rural Bangladeshi women: A community-based study	<i>Gausia, Fisher, Ali, Oosthuizen</i>	2009	Archives of women's mental health	A community-based study conducted during 2005 in the Matlab sub-district, rural area of eastern Bangladesh. Interviews were structured in accordance with the Edinburgh Postnatal Depression Scale.	The prevalence of depression and suicide ideation at 34-35 weeks pregnancy was 33%. Intimate partner violence, unhelpful and unsupportive familiar context, and cultural issues were highly associated with maternal depression.
<i>Suicidal ideation during pregnancy: prevalence and associated factors among low-income women in São Paulo, Brazil</i>	<i>Huang, Faisal-Cury, Chan, Tabb, Katan, Menezes</i>	2012	<i>Arch Womens Mental Health</i>	Cross-sectional analysis of women surveyed during 20 to 30 weeks of pregnancy using Self-Report Questionnaire-20.	The prevalence of suicidal ideation was 6.3%. Factors associated with suicidal ideation were common mental disorders, single partner status, past psychiatric history, and smoking tobacco. All cases of suicidal ideation were associated with common mental disorders.
Maternal depression and suicide at immediate prenatal and early postpartum periods and psychosocial risk factors.	Shi, Ren, Li, Dai	2018	<i>Psychiatry research</i>	Short-term longitudinal survey at perinatal stages of 213 Chinese women.	There was higher suicidal ideation incidence after childbirth. Marital satisfaction protected women from depression, while miscarriage experiences increased the risk. Family harmony was a protective factor, especially harmony with the mother-in-law.
Suicidal ideation in pregnancy: an epidemiologic review	Gelayea, Kajeepeta, Williams	2016	<i>Archives of women's mental health</i>	A systematic epidemiologic review in accordance with PRISMA guidelines.	Pregnant women are more likely than the general population to endorse suicidal ideation. Intimate partner violence, lower education, and major depressive disorder were strongly identified as risk factors. There is a need for enhanced screening for antepartum suicidal ideation.
Intimate partner violence and suicidal ideation in pregnant women	Alhusen, Frohman, Purcell	2015	<i>Archives of women's mental health</i>	Cross-section analysis of women between 24-28 weeks gestation using the Edinburgh Postnatal Depression Scale and the Abuse Assessment Screen.	Depressive symptomatology and intimate partner violence were significantly associated with an increased risk of antenatal suicidal ideation and, consequently, higher rates of suicidality during pregnancy and the postpartum period.
Suicidality in early pregnancy among antepartum mothers in urban India	Supraja, Thennarasu, Saryanarayana, Seena, Desai, Jangam, Chandra	2016	<i>Archives of women's mental health</i>	A cross-sectional study of pregnant women in Southern India, using Suicide Behaviors Questionnaire-Revised and Edinburgh Postnatal Depression Scale.	The severity of depressive symptoms, domestic violence, poor social support, younger age, economic instability, and history of suicidal ideation were associated with higher rates of suicidality.
Antenatal depression in socially high-risk women in Canada	Bowem, Stewart, Baetz, Muhajartine	2009	<i>Journal of epidemiology and community health</i>	A cohort study in two women groups (Aboriginal and non-Aboriginal), using the Edinburgh Postnatal Depression Scale.	Maternal depression was associated with a history of depression, mood swings, increased stressors, current smoker, and lack of social support. Aboriginal women were more likely to be depressed and experienced significantly more self-harm thoughts.
Refugee, asylum seeker, immigrant women and postnatal depression: rates and risk factors	Collins, Zimmerman, Howard	2011	<i>Archives of women's mental health</i>	Interactive and dynamic literature review, conducted across ten databases.	Postnatal depression may affect up to 42% of migrant women. Common risk factors for postnatal depression include history of stressful life events, lack of social support, and cultural factors.

Article Title	Author	Year	Name of Journal or Magazine	Methods used in the study	Significant outcomes
Maternal depression during pregnancy and the postnatal period: risks and possible mechanisms for offspring depression at age 18 years	Pearson, Evans, Kounali, Lewis, Heron, Ramchandani, O'Connor, Stein	2013	<i>JAMA psychiatry</i>	A prospective investigation of associations between symptoms of antenatal and postnatal parental depression with offspring depression at age 18 years in a UK community-based birth cohort.	Offspring were 1.28 times more likely to have depression at age 18 years for each standard deviation increase in maternal depression score antenatally, independent of later maternal depression. Postnatal depression was also a risk factor for mothers with low education, with offspring 1.26 times more likely to have depression for each standard deviation increase in postnatal depression score.
Causas externas e mortalidade materna: proposta de classificacao	Alves, Alves, Antunes, Santos	2013	<i>Revista de Saúde Pública</i>	An observational time-series study using data from coronial registries, hospitalization registries, besides family interviews.	Unplanned pregnancy, illegal intended abortion, and low-income settings are associated with higher maternal suffering.
Pregnancy associated death in record linkage studies relative to delivery, termination of pregnancy, and natural losses: A systematic review with a narrative synthesis and meta-analysis	Reardon, Thorp	2017	<i>SAGE open</i>	Wide literature review.	Termination of pregnancy, miscarriage, or failed pregnancy were associated with higher mortality rates. Within a year of their pregnancy outcomes, women experiencing a pregnancy loss are over twice as likely to die compared to women giving birth, with higher risks for suicide.
Views and experiences of suicidal ideation during pregnancy and the postpartum: findings from interviews with maternal care clinic patients	Tabb, Gavin, Guo, Huang, Debiec, Katon	2013	<i>Women & health</i>	Semi-structured interviews with 14 patient participants with positive screening for suicidal ideation on Patient Health Questionnaire-9 short form.	Suicidality during pregnancy was related to somatic symptoms, past psychiatric diagnoses, infanticide, family psychiatric history, and pregnancy complications.
Maternal suicide during pregnancy and the first postpartum year in Austria: Findings from 2004 to 2017	Knasmüller, Kotal, König, Vyssoki, Kapusta, Blüm	2019	<i>Psychiatry research</i>	Retrospective investigation of data between 2004 and 2017.	All of maternal suicide cases were performed using violent methods.
Perinatal psychiatric disorders: a leading cause of maternal morbidity and mortality	Oates	2003	<i>British medical bulletin</i>	Wide literature review.	All women should be asked early in their pregnancy about a previous history of serious psychiatric disorder. Management plans should be in place with regard to the high risk of recurrence after delivery.
Maternal deaths in NSW (2000-2006) from nonmedical causes (suicide and trauma) in the first year following birth	Thornton, Schmied, Dennis, Barnett, Dahlen	2013	<i>BioMed research international</i>	An observational study linking population datasets from births, hospital admissions, and death registrations between 2000 and 2007.	67% of women deceased due to suicide had a mental health diagnosis and/or a mental health issue related to substance abuse. 73% of suicide deaths were conducted by violent means.
Maternal suicidality and suicide risk in offspring	Bronisch, Lieb	2008	<i>The Psychiatric clinics of North America</i>	Baseline and 4-year follow-up data were used from the Early Developmental Stages of Psychopathology Study, a prospective, longitudinal community study.	Offspring of mothers reporting suicide attempts showed a remarkably higher risk for suicidal thoughts and suicide attempts and a tendency toward suicide attempts at an earlier age.

Article Title	Author	Year	Name of Journal or Magazine	Methods used in the study	Significant outcomes
Maternal or paternal suicide and offspring's psychiatric and suicide-attempt hospitalization risk	Kuramoto, Stuart, Runeson, Lichtenstein, Långström, Wilcox	2010	<i>Pediatrics</i>	An observation study using national, longitudinal, population-based registries between 1973 and 2003.	Maternal suicide is associated with an increased risk of suicide-attempt hospitalization for offspring, beyond the risk associated with maternal accidental death.
Effects of perinatal mental disorders on the fetus and child	Stein, Pearson, Goodman, Rapa, Rahman, McCallum, Howard, Pariante	2014	<i>Lancet</i>	Wide literature review, summarizing the evidence for associations between parental disorders and offspring outcomes from fetal development to adolescence in all income settings.	It is necessary for the early identification of parents at high risk of perinatal mental disorders in order to make earlier interventions and prevention researches, especially in socioeconomically disadvantaged populations and low-income countries.
Maternal suicidality and risk of suicidality in offspring: findings from a community study	Lieb, Bronisch, Höfler, Schreier, Wittchen	2005	<i>The American journal of psychiatry</i>	Comparative study. Baseline and 4-year follow-up data were used from the Early Developmental Stages of Psychopathology Study, a prospective, longitudinal community study.	Suicidality seems to run in families, independent of depression and other psychopathology.

ideation in early pregnancy. Furthermore, other types of abuse, whether physical or psychological, are also identified as determining factors for maternal suicide [20,25] such as sexual violence, where studies indicate that mothers who were victims of sexual abuse in the antenatal period have 2 to 4 times more symptoms of depression [3].

Social contexts of oppression, such as being an ethnic minority, also proves to be of high significance when examining the suicide of mothers and pregnant women world-wide [25,29]. In Canada, where approximately 1 in 5 maternal deaths occurs due to suicide or drug toxicity [9], self-harm ideation rates are alarmingly higher in Aboriginal women, who experience different forms of social disparities, than in other groups of Canadian women [37]. Similarly, in the USA, Native American women have been reported to have higher rates of maternal suicide than any other ethnic group [8]. In Sweden, women who have emigrated from developing countries had 3 times more psychiatric morbidities during postpartum than Swedish immigrants from more developed countries [10]. This situational framework is further intensified in women refugees and asylum seekers, where Collins, et al. [38] report that such groups reach three times higher prevalence of post-natal depression due to serious stressful and traumatic life events in the past.

A range of various social settings has been demonstrated to have significant impacts on maternal mental health and, therefore, a direct effect on maternal suicide. Furthermore, unemployment and low wages are already well understood to be related to suicide in the general population [12,29]. Supraja, et al. [36] also reports that, in India, the highest prevalence of maternal suicide occurs in middle-class women, potentially due to the unstable and still growing Indian economy, where even the middle class finds themselves lacking financial stability. There is also evidence that lower levels of education, which may be related to low income and unemployment, is a risk factor for suicide, particularly in the first postpartum year [21,34,35].

Unplanned or unwanted pregnancies are also described as a risk factor for maternal suicide [3,19]. Thus, difficult access to abortion services, as well as the illegality of abortion in certain countries, also tends to corroborate maternal suffering and possibly suicide [24]. A study conducted in Brazil by Alves, et al. [37] associated unwanted pregnancy, the illegality of intentional abortion, and less privileged social condition with maternal suicide, where suicide could present itself as the only resource in the face of the despair of women without adequate familial support. Intentional abortion is also associated with higher rates of maternal suicide in some studies [11,13]. However, the evidence establishes a higher suicide rate after intentional abortion because it stems from traumas experienced during the procedure, and not from the abortion decision or from the act itself [39]. Miscarriage and the loss of a child in the first year of life are described as very strong risk factors for suicidal behaviour [32], as well as the sorrow of having a stillborn child [20].

It is important to highlight that the general population of women is less likely to commit violent suicide [10], however, in the case of maternal suicides, the vast majority of women end up committing suicide violently [40], mainly by hanging or jumping [41]. Thornton, et al. [42] refers that, in Australia, 73% of maternal suicide cases were conducted by violent means, some cases including gunshot and lying in front of a moving object. Maternal distress and suicidal ideation during pregnancy are even associated with gestational and childbirth complications, as well as impairments in the newborn child's physiology, such as reduced dopamine levels and increased cortisol levels [25].

Revealing the singularity of the phenomenon of maternal suicide, the violent way in which pregnant or in postpartum women seek to take their own lives opens up the complexity of the theme and the severity of the despair suffered by those who do so. Countless reasons can lead women, both in the pregnancy period and in the postpartum period, to attempt violence against their

own lives. Many studies are in consensus that maternal suicide presents itself as a serious and unique psychiatric phenomenon despite the social factors strongly associated with suicidal behaviour mentioned above. Thus, a history of mental illness such as depression, anxiety, bipolarity, post-traumatic stress disorder, suicide ideation, substance abuse, or any other effect of psychotic disorder, in addition to a family history of psychiatric diseases and suicide is a primary risk factor for maternal suicide.

The death of a pregnant or a puerperal woman by suicide is a tragedy of incalculable damage, which carries immeasurable psychological damage for the entirety of their life [43]. The descendants of mothers who come to commit suicide are at an increased risk of also committing suicide [44], in addition to being prone to numerous other psycho-emotional disorders [43,45,46]. Lieb, et al. [47] still indicate that suicidal behavior may have genetic factors involved as well, as though suicide could run in families. Therefore, antenatal treatment of depression can prevent higher rates of suicide in the offspring [48,49].

Conclusion

Women who commit maternal suicide are, above all, women with serious mental illnesses, and with suicide aggravated by serious situations of psychosocial vulnerabilities, those of which include poor familial support, domestic abuse, a history of sexual abuse, illegal substance abuse and alcoholism, specific racial oppression,

economic instability, and unwanted pregnancy combined with difficulty or illegality to perform intentional abortion, in addition to severe trauma related to motherhood, such as miscarriage and loss of child during the delivery or within the first year of life.

Considering that pre-existing mental illness is strongly associated with most suicide cases, maternal suicides must be considered preventable with adequate medical care, especially with primary health care. With the universal and systematic screening of mental illness in the earlier stages of pregnancy, about a quarter of all maternal suicides could be prevented, with adequate pharmacological therapy and comprehensive psychological assistance. Regarding the profile of pregnant women and mothers in the postpartum period who have committed suicide, it is imperative to develop multidisciplinary monitoring standards for the preventative care for suicide in women defined as most vulnerable in all levels of care. Special treatments must be focused mainly on pregnant women who have related a past of psychiatric disorders or addictions, or even a history of suicide in the family, with great attention given to unmarried women, unemployed women, women in the course of unwanted pregnancy, those who have suffered from traumatic experiences, such as physical or sexual violence, those who lack adequate support from family and those belonging to marginalized social groups. Furthermore, there is an urgent need for a consensus on the classification of maternal suicide, in order to avoid misclassification bias and enable better analysis of the theme.

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