



# Maternal Mortality Among Immigrant Women in Europe and the USA: a Systematic Review

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Accepted: 11 November 2019  
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## Abstract

The aim of this systematic literature review was to analyse the differences in maternal mortality in immigrant women in European countries and in the USA with respect to native-born women. We performed a literature search in PubMed and EMBASE and reviewed those papers that analysed this perinatal outcome between the native-born and foreign-born populations in these countries. The initial number of articles identified was 172 in PubMed and 159 in EMBASE. Fifteen articles were included in the review after applying the exclusion criteria. In most of the publications, maternal mortality was statistically higher in the groups of pregnant foreigners with respect to that in the native population. Maternal mortality is an important public health burden. We should implement epidemiological systems and further research to monitor and analyse social and demographic factors that have an important impact on the perinatal prognosis of pregnant women.

**Keywords** Maternal mortality · Immigrants · Systematic reviews · Europe · USA

## Background

Currently, we live in a globalized world. In the past, it was the flow of goods and capital that was destined for developed countries and their main trading partners. At present, we are in a stage characterised primarily by the flow of people in search of new opportunities and a better quality of life.

This flow of people can lead to enormous inequalities that characterise our era and over time halt the accelerated progress occurring in developing countries. However, governments have disregarded the possible benefits that immigration can have in terms of economic development, and their response to adapting has been slow and suboptimal.

Migration processes are not a new phenomenon, but the increase in inequalities between neighbouring countries, the advance of globalisation, the international development of transportation and communication, and the scourge of

financial crises in many parts of the world have generated a significant increase of the migrant population.

It is estimated that in 2018, approximately one billion people have been displaced or are in the process of being displaced. Most of this migratory movement has occurred between low and middle income countries, although the international debate is focused mainly and almost exclusively on the displacement of people from low and middle income countries to high income countries.

Unfortunately, those territories in positions of political and economic power continue to establish restrictions on immigration in order to promote their own interests. This has led to the rise of radical nationalist movements with highly questionable immigration policies [1].

## Theoretical Framework

Maternal mortality is an undesirable and potentially avoidable adverse perinatal event whose prevalence varies widely among countries and which is still unacceptably high, with an estimated 303,000 deaths per year as a result of complications of pregnancy, childbirth, and puerperium. In 2015, the World Health Organization (WHO) published “Strategies towards ending preventable maternal mortality (EPMM)” (EPMM Strategies) with the aim of reducing maternal

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This article is part of the Topical Collection on *Medicine*

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mortality globally during the sustainable development goal (SDG) period [2].

Women from developing countries contribute to more than 95% of the total maternal deaths worldwide. Immigrants from low- and middle-income countries have a 20-fold higher risk of maternal death than those of the same origin living in high-income countries [3, 4]. However, immigrant women have twice the risk of dying from complications due to pregnancy and childbirth than those born in Western European countries [5]. The lower risk in terms of maternal mortality and morbidity of these immigrants compared with the natives may be because the women who migrate are in better health than those who remain and get incorporated into a health system that provides better prenatal healthcare [6].

By investigating the literature, we can see that the increase in the risk of maternal death is not equally distributed among the different groups of immigrants. Furthermore, marked differences can be observed among different regions of the same country, for example in France where maternal mortality is higher in non-native women, particularly in Paris, due to poorer prenatal care [7].

Groups of pregnant immigrant women can be very heterogeneous in the published studies, covering women from very different socioeconomic, educational and cultural backgrounds. There is added risk to non-native women who have recently moved and who do not have a residence permit, and they are especially vulnerable to perinatal complications.

Unfortunately, analysis of perinatal complications of the immigrant population is based on a very limited number of studies in Europe and the USA. Some recent publications have emphasized the importance of taking into account the origin of the pregnant women who have died and have precisely quantified the added risk that this factor supposes [8].

Understanding the risk factors and underlying mechanisms in the disparity of perinatal outcomes in immigrant women is crucial for the analysis and establishment of interventions to prevent complications for this most vulnerable population group. In this way, the objective of this literature review is to present the results published in the last 10 years about the risk of maternal death of immigrant women in high-income countries.

## Methods

We searched the literature in EMBASE and PubMed, including those studies published between January 1, 2008, and December 6, 2018. Our search was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and the study methodology published by Villalonga-Olives et al. [9].

The following inclusion criteria were applied to the literature search: human studies, published in English, with available abstract and information about maternal mortality in immigrant populations in European countries and in the USA. We excluded works in other languages, study periods outside the period described above, systematic reviews, intervention studies, economic analyses, and expert opinion papers. Additionally, we did not include studies that lacked comparative data between immigrant and native populations and studies that did not clearly reflect the non-native condition of one of the analysis groups.

The precise information about the strategy established in the literature search, the inclusion and exclusion criteria, and the number of studies that were included in the review are shown in Table 1 and Fig. 1.

## Results

### Excess Risk Associated with Maternal Death in Immigrant Women

The vast majority of the articles included in the current review show an increased risk of maternal death in immigrants in Europe and the USA, as seen in Table 2. However, there are certain groups of non-native women who are at greater risk of suffering this adverse perinatal event with respect to other non-native groups, as is the case for pregnant women from South America residing in Spain, according to a recent study published by Atanasova et al. [10], with an odds ratio (OR) of 3.92 (95% confidence interval (CI) 2.75–5.58) compared with the population of Spanish-born women.

Other studies also show that the immigrant population groups are heterogeneous and that depending on the place of origin, the perinatal outcomes of native-born women can vary [17].

Esscher et al. [17] analysed 75 maternal deaths of patients from low- and middle-income countries and native Swedish women during the period from 1988 to 2010, identifying major and minor factors related to prenatal checkups, accessibility and quality control through a system of auditing and structured review. These researchers showed that nonadherence to prenatal checkups, language barriers and problems of language interpretation were more frequent among the immigrant population and were present in more than 2/3 of the maternal deaths in this country during the study period [15].

Bollini et al. [21] studied trends in maternal mortality in Switzerland during the period from 1969 to 2006. There were a total of 279 deaths, 75 (27%) of which were immigrant women. Non-native patients presented a crude maternal death OR of 4.38 (95% CI 1.88–10.55) between 2000 and 2006.

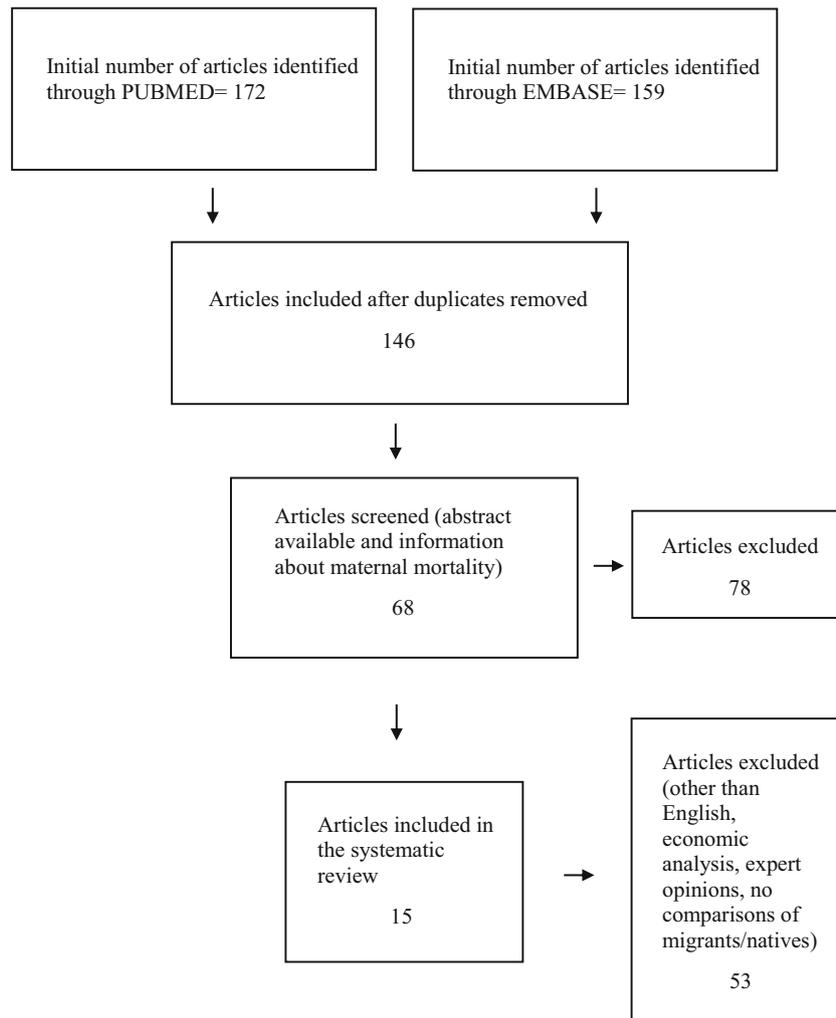
**Table 1** Literature search strategy

Topic	Literature search	Initial number of manuscripts published
Migration and maternal mortality (Pubmed)	("Emigration and Immigration"[Mesh] OR "Emigrants and Immigrants"[Mesh] OR emigration[ti] OR immigration[ti] OR immigrant[ti] OR immigrants[ti] OR emigrant[ti] OR emigrants[ti] OR foreign born[ti]) AND ("Maternal Mortality"[Mesh])	172
Migration and maternal mortality (Embase)	Migration'/exp OR 'migration' AND ('pregnancy'/exp OR 'pregnancy') AND ('Maternal Mortality'/exp)	159

## Causes of Maternal Death

In this literature review, we have been able to find the most frequent causes of maternal death in European countries and in the USA. The majority of articles indicated that the main causes of maternal death were haemorrhage, infection/sepsis, gestational hypertension and amniotic fluid embolism.

These data coincide with other cross-sectional population studies in which the causes of these adverse perinatal events were analysed without considering immigration as a risk factor. The most important of these studies was the 2015 Global Burden of Disease (GBD) Study in which a global and regional review was made using data from 186 countries during the period from 1990 to 2015, identifying the 8 most frequent causes of maternal death in low-, middle- and high-income

**Fig. 1** Flow chart of the literature review process

countries. In this publication, direct and indirect cardiovascular complications, childbirth and puerperium, obstructed labour and uterine rupture are also mentioned as leading causes of maternal death [25].

However, Say et al. [26] noted that many maternal deaths do not have well-identified causes. Approximately 73% of maternal deaths during the period between 2003 and 2009 that had data which could be extracted were due to direct obstetric causes [26].

The studies included in this review did not show statistically significant differences due to a specific cause of maternal death between the immigrant population and the group of native women. However, we know that there are certain events of maternal morbidity that are more frequent in pregnant immigrant women, which will be discussed below.

## Discussion

The current review of the literature shows that maternal mortality is more frequent in immigrant women residing in countries of the European Union and in the USA compared with that in the autochthonous population. The studies included in the analysis quantify the excess risk of maternal mortality faced by immigrant populations compared with the autochthonous population and shows statistically significant results in almost all of them. This excess risk depends on maternal birthplace, the region where the prenatal checkups and delivery took place and other maternal characteristics such as age or the presence of comorbidities.

### Heterogeneity in the Definition of the Immigrant Population

In general, the studies included in this review define the group of immigrants as those pregnant women who were born outside the country of study. However, the classification by maternal origin was very different among the authors.

Garcia-Tizon Larroca et al. [11] used the HDI (Human Development Index) to classify the origin of the patients. This index is an indicator of the degree of human development in the country of origin prepared by the United Nations Development Program. This parameter evaluates the arithmetic mean of three fundamental dimensions in the life of the citizens: the life expectancy at birth, the adult literacy rate and the per capita income in international dollars [11].

Creanga et al. [12] categorized women by race-ethnicity in non-Hispanic white, non-Hispanic black, Hispanic and other, as well as in groups born in the USA or born abroad. In this study, the status of being an immigrant or not, as well as the ethnicity of the pregnant woman, was taken into account [12].

In some studies, maternal origin was defined depending on the continent of maternal origin, such as Luque et al. [22] who

categorized pregnant women as being from sub-Saharan Africa, Latin America and the Caribbean, Asia, Europe, North America and others. Some authors such as Esscher et al. preferred to use the World Bank classification for the description of the country of maternal origin, as described in their methodology [27].

One of the reasons why immigrant population groups differ so much between studies is because each country has a specific profile of immigration, with very different sociodemographic characteristics among the countries where maternal mortality was analysed. In Spain, for example, the common language and the historical and diplomatic ties it has with most of the Latin American countries has resulted in an influx of people to this continent in recent years compared with those coming from other places such as Asia [28].

In the work published by Hastings et al. [14], all causes of death were analysed, focusing on the Asian population in the USA during the period from 2003 to 2011. Also included in the Asian group were those individuals descended from parents who were from China and Japan, even if they were born in the USA. In this study, it was observed that the USA-born citizens had lower mortality rates than those born in the aforementioned Asian countries [14].

### Impact on Health and Access to Healthcare for Undocumented Immigrant Women

There are very few published works that focus specifically on maternal mortality and the perinatal outcomes of undocumented immigrant women. Van Oostrum et al. [19] studied the differences in mortality due to specific causes between the refugee population and the Dutch autochthonous population. Regarding maternal mortality, refugee women had a 10 times greater risk of presenting this adverse event than the general population of the Netherlands. The authors observed certain risk factors in the immigrant population that, despite their displacement to the host country, were still present [19].

Regrettably, in the last decade, there have been legislative changes in European countries that have limited the access to healthcare for immigrant patients, especially those without documents. According to the REDER report published in 2017, some 873,000 citizens have been stripped of their European Health Insurance Card (EHIC) card in Spain since 2012. This report also showed that cases of minimal care exception, such as for children and pregnant women, who would theoretically have full access to health services, have not been fully respected [29].

There is evidence from national public health surveys in Italy, Belgium, Portugal, Spain and Malta that shows that immigrants from non-European countries have worse and less access to health services in general, less access to specialized services, more need for emergency services and less use of preventive health strategies [30, 31].

**Table 2** Literature review

Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
All immigrants subclassified according to continent of maternal origin: Asia Western Europe Eastern Europe North America South America Africa Oceania	Blagoeva Atanasova et al. 2018 [10]	Registry: Spanish National Institute of Statistics	7,614,878 live births 272 maternal deaths	1999–2015	To quantify the risk of maternal death by maternal origin and region of Spain where the birth occurred	Women from South America had the highest adjusted risk of maternal death, with an OR of 3.92 (95% CI 2.75–5.58)
All immigrants subclassified according to the HDI (Human Development Index) of the maternal country of origin	García-Tizon Larroca et al. 2017 [11]	Registry: data from a single centre in Madrid, Spain	38,719 live births 4 maternal deaths	2010–2016	To determine if the maternal HDI could be used to identify patients at risk of poor pregnancy outcomes	There were not statistically significant between-group differences in the rate of maternal mortality
Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
All immigrants categorized according to race-ethnicity and nativity non-Hispanic White, non-Hispanic Black, Hispanic, or other; country of birth was categorized as US- or foreign-born	Creanga et al. 2017 [12]	Registry: data from the CDC's Pregnancy Mortality Surveillance System (USA)	5259 maternal deaths	2011–2013	To examine characteristics and causes of pregnancy-related deaths in the USA	Non-Hispanic black women had a 3.4 times higher mortality ratio than did non-Hispanic white women. More than half of Hispanic women (53.9%) and women of other races (55.5%) dying from pregnancy complications during this period were foreign-born
Hispanic, non-Hispanic White, non-Hispanic Black, Native American, Asian	Moadab et al. 2016 [13]	Registry: data from the Centers for Disease Control and Prevention National Center for Health Statistics database in US counties	40,922,512 live births 7,031 maternal deaths	2005–2014	To investigate factors associated with the variation in mortality ratios and the contribution of various demographic factors	Non-Hispanic black deliveries were significantly associated with an increased maternal mortality ratio at least twice as high as in the other populations ( $p < 0.05$ )
Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
Chinese and Japanese decedents categorized by nativity status in the USA	Hastings et al. 2016 [14]	Registry: US national mortality records from the National Center for Health Statistics (NCHS)	10,458,849 deaths including all causes	2003–2013	To compare death rates and cause of death across foreign-born, US-born and country of origin Chinese and Japanese populations	All-cause mortality was highest in Hong Kong and Japan, intermediate for foreign-born, and lowest for US-born decedents. Communicable, maternal and nutritional conditions as the cause of death showed differences in the mortality rate between foreign-born and US-born in both Chinese and Japanese groups.
For all immigrants, country of birth was classified according to the World Bank classification.	Esscher et al. 2014 [15]	Registry: Swedish official and national registries	73 maternal deaths	1988–2010	To compare maternal death rates between foreign-born and native-born women in Sweden	Suboptimal care-seeking and quality of medical care were significantly more frequent contributing factors to maternal death for the foreign-born women ( $p < 0.05$ )

**Table 2** (continued)

Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
All immigrants categorized according to race-ethnicity and nativity: non-Hispanic White, non-Hispanic Black, Hispanic, Asian/Pacific Islander and Indian/Alaska Native	Creanga et al. 2014 [16]	Registry: Data collected from Healthcare Cost and Utilization Project's State Inpatient Database (SID)	3,476,392 deliveries—non-Hispanic deaths per 10,000 births 0.51 ± 0.06—non-Hispanic Black deaths per 10,000 births 1.61 ± 0.19—Hispanic deaths per 10,000 births 0.83 ± 0.09—Asian/Pacific Islander deaths per 10,000 births: 0.77 ± 0.18—all deaths per 10,000 births 0.78 ± 0.05	2008–2010	To examine ethnic disparities in severe maternal morbidity during delivery hospitalizations in the USA.	Non-Hispanic black and Hispanic patients had significantly higher rates of maternal death than did non-Hispanic white patients ( $p < 0.001$ )
Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
All immigrants grouped according to maternal country of origin as low-income, middle-income, high-income	Esscher et al. 2013 [17]	Registry: Swedish official and national registries	27,957 deaths of women of reproductive age (15 to 49 years old)	1988–2007	To analyse the correlation between the underlying cause of death and the economic situation of the individual's country of origin	Immigrants from low-income countries had a significantly higher risk of maternal death when compared to that for native women, risk ratio (RR) 6.6 (2.6–16.5) Middle- and high-income immigrants did not show significant differences in maternal death risk when compared with native women.
All immigrants grouped according to ethnicity White, Hispani, Black Asian or Pacific Islander	Creanga et al. 2012 [18]	Registry: data from the CDC's Pregnancy Mortality Surveillance System (USA)	7699 maternal deaths	1993–2006	To compare pregnancy-related mortality rates by ethnicity and nativity	Except for foreign-born white women, nativity groups were at higher risk of dying from pregnancy-related causes than were US-born white women
Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
All asylum seekers in the Netherlands	Van Oostrum et al. 2011 [19]	Registry: data published by Statistics Netherlands and the Community Health Services (CHS) for Asylum Seekers	Maternal mortality ratio in asylum seekers: 69.33/100,000 live births	2002–2005	To determine differences in overall and cause-specific mortality between asylum seekers and the Dutch population	Maternal mortality among asylum seekers was found to be extremely high, RR 10.08 (95%CI 8.02–12.83)
All immigrants in 5 regions from Italy	Donati et al. 2011 [20]	Registry: data from the official cause of death registry and the hospital discharge database	1,001,292 live births 118 maternal deaths	2000–2007	To analyse associated causes and compute absolute and specific maternal mortality ratio among participating Italian regions	There were not significant differences in maternal mortality ratios between immigrants and native-born women, RR 1.2 (95%CI 0.7–2.1)
All immigrants				1969–2006		

Table 2 (continued)

Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
	Bollini et al. 2011 [21]	Registry: data on maternal deaths from The Federal Office of Statistics in Switzerland	2,942,399 live births 605 maternal deaths		To examine whether maternal mortality was higher among immigrant women than Swiss women	Immigrant women had a higher risk of maternal mortality than did Swiss women during the study period, with a crude OR of 4.38 (95% CI 1.88–10.55)
Origin of migrants	Authors and publication year	Source	Sample size	Study period	Study aims	Pregnancy results
All immigrants in Spain classified by regions sub-Saharan Africa, Latin America and the Caribbean, Asia, Europe, North Africa, Other countries	Luque Fernández et al. 2010 [22]	Registry: data from National Statistics Institute (INE) and the Movement of Natural Persons (MNP)	3,648,788 live births 133 maternal deaths	1999–2006	To compare maternal mortality by region and mother's country of birth in Spain during 1999–2006	Immigrants had a significantly higher maternal mortality risk compared to Spanish women, RR 1.67 (95%CI 1.22–2.33) Sub-Saharan nationalities presented the highest maternal mortality rates
All immigrants	Schutte et al. 2010 [23]	Registry: data published by Statistics Netherlands	2,269,506 live births 302 maternal deaths	1993–2005	To assess causes and substandard care factors in maternal mortality in the Netherlands	Immigrants had a significantly higher risk of maternal mortality than did native-born women, OR 2.1 (95%CI 1.6–2.7)
All immigrants	Philibert et al. 2008 [24]	Registry: data from the National Confidential Enquiry into Maternal Deaths	267 maternal deaths	1996–2001	To test if the risk of maternal death in France remains significantly higher for women of foreign nationality	The excess risk of maternal death was significant for foreign women, OR 2.00 (95%CI 1.42–2.80)

## Excess of Morbidity in Immigrant Women

Although it is not the main subject of this review, there are several studies that have found a higher frequency of adverse perinatal events in immigrant patients.

Because maternal mortality is a rare event in high-income countries, including in pregnant women, maternal morbidity has been used as an indicator for the study of perinatal outcomes and the quality of care during pregnancy.

A study conducted in Sweden with national data of more than 900,000 deliveries during the period between 1998 and 2007 found 2655 near-miss events. In comparison to Swedish patients, immigrant women from low-income countries had an increased risk of severe morbidity events (OR 2.3, 95% CI 1.9–2.8) [32].

Another multi-centre study involving centres from six high-income countries with a total of 9,028,802 deliveries found that compared with immigrants from Western Europe, immigrant women from sub-Saharan Africa, Latin America and the Caribbean had a higher risk of preeclampsia and eclampsia after adjusting for relevant variables such as maternal age and parity [33].

The reasons why immigrant patients have a higher rate of severe morbidity events during pregnancy, delivery and puerperium have not been adequately clarified. There are certain hypotheses that point to two possible explanations. The first is that the health status of immigrant women is different from that of native patients due to inequalities in healthcare between the countries of origin. The second reason is that there may be an excess of risk acquired in the country of arrival due to the impossibility of the pregnant immigrant to access an adequate level of prenatal care [8].

## New Contribution to the Literature

This review shows that the risk of maternal death is higher among immigrant women in Europe and the USA. According to the authors, this is the latest analysis of the literature performed on this topic with the following conclusions:

The groups of pregnant immigrant women are heterogeneous; therefore, the quantification of the increased risk of this adverse perinatal event differs according to maternal origin.

Maternal death is a rare event in high-income countries, even among the immigrant population. However, migratory movements have led to an increase in maternal deaths, likely due to the higher frequency of severe morbidity events in immigrants for reasons not yet clarified.

Taking into account that a significant proportion of maternal deaths are avoidable, we should develop and implement epidemiological analysis systems in host countries to identify sociodemographic risk factors that have a significant impact on the perinatal outcome of pregnant immigrant women.

## Limitations of the Review

The main limitation of this review is the scarcity of studies published in recent years regarding this adverse outcome in immigrant women. One of the possible causes for this is the low frequency of maternal mortality in more developed countries and thus a small sample size for an appropriate analysis.

Another important limitation of this review is that the definitions of the immigrant populations in the included studies were not homogeneous, having very different inclusion criteria for the study group. In some studies, the comparative analysis of perinatal outcomes was made between the native population and a specific immigrant population, without including all non-native women. This makes it difficult to compare the results between the different research groups.

Several of the authors of these studies show the difficulty in obtaining data at a population level because there are no standardized or regular epidemiological analysis systems established in Europe or the USA [10]. In addition, maternal mortality appears to be often underestimated, with up to a 40–60% inaccuracy in the official collection of these data, which could explain the differences in maternal mortality rates in countries of similar socioeconomic status [34, 35].

Non-Western migrant women seem to have more complicated obstetric outcomes due to several reasons [36]. The analysis of maternal mortality also differs greatly among the authors, who use different variables for the adjustment of perinatal outcomes in multivariate models. In addition, some of the relevant epidemiological adjustment variables are not systematically included in the studies; however, they could provide useful information to better profile the immigrant population, such as the level of host country language fluency, education level, degree of social integration, degree of isolation and access to antenatal care and citizen healthcare programmes.

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Ethical Approval** This systematic review did not require ethical approval

**Informed Consent** Not applicable

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