Exposure to Local Violent Crime and Abortion, Miscarriage, and Stillbirth in Mexico

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Abstract

Violence and insecurity have substantial consequences for reproductive health, yet little is known about how local violent crime affects reproductive decision-making and well-being during pregnancy. This study focuses on abortion, miscarriage, and stillbirth in Mexico, where the War on Drugs policy has resulted in a dramatic surge in crime. We combine individual-level nationally representative surveys on women's experiences of pregnancy loss and termination (n = 70,519), administrative data from fetal death certificates (n = 32,736), and monthly municipality-level homicide rates based on cause-of-death registers in municipality-fixed effects models. Individual-level models show a modest positive association between local crime exposure during the first trimester and the probability of pregnancy loss and termination. Poisson models reveal a negative association between local violent crime and the number of registered fetal deaths. Our findings suggest the most fragile pregnancies are miscarried or terminated at higher rates in more crime-affected municipalities, resulting in fewer stillbirths.

Keywords: Abortion, miscarriage, reproductive health, intersectionality, crime, Mexico

Introduction

Research has shown that exposure to local violence related to organized crime and violent conflict affects fertility, with highly mixed findings (Lee et al. 2023), but less is known about its impact on proximate determinants. Thus, it remains unclear whether fertility outcomes of exposure to local violence reflect people's preferences, intentions, and the extent to which those are being realized. For example, fertility declines may arise if individuals retain access to quality healthcare and are able to make autonomous choices related to reproduction using contraception and abortion, despite surrounding insecurity (Svallfors, Caudillo, and Torrisi 2025). At the same time, fertility outcomes may also be shaped by biological responses to violence, with heightened stress increasing the likelihood of pregnancy loss, reducing fecundity, or compromising maternal health, ultimately resulting in fewer live births (Qu et al. 2017).

Knowledge is also limited about the well-being of pregnant people exposed to local violence, although studies show a link to adverse outcomes such as increased risk of post-partum depression, preterm birth, and low birth weight, which in turn confer life-long disadvantages for children (Pillai et al. 2023; Svallfors, Billingsley, et al. 2025; Torche and Nobles 2024). While pregnancy loss and termination are key indicators of both fertility regulation and maternal well-being, few studies have directly interrogated its relationship to local violence and insecurity. The existing literature focuses almost exclusively on contexts affected by civil war (Buitrago and Moreno-Serra 2021; Dagnelie, Luca, and Maystadt 2018; Elveborg Lindskog 2016a; León 2023; Luetke et al. 2024; O'Brien 2020; Valente 2015). This lack of research limits not only scientific understanding, but also evidence-based policy and interventions that may improve the lives of violence-affected communities worldwide (Wise and Darmstadt 2015).

Mexico serves as an ideal case study for understanding sexual and reproductive health consequences of local violence, for multiple reasons. Mexico has faced a recent surge in the homicide rate since 2006, due to expanding narcotrafficking activities and military law enforcement responses. While not classified as a formal war, insecurity has consistently ranked among the top policy concerns by the Mexican people over the prior decades (Gutiérrez-Romero 2016). Violence in Mexico is highly gendered; while young men are more likely to die in homicides (Aburto et al. 2016), women, girls, and gender-nonconforming people face several specific harms in intimate relationships, broader family settings, and wider society (González-López 2015). Gender-based violence is also used by organized crime networks to foster cohesion, assert masculine power, and exercise coercion (Weitzman, Caudillo, and Levy 2024). This is important considering the strong link between gender-based violence and reproductive outcomes (Pallitto et al. 2013). Although Mexico has made significant gains in sexual and reproductive health over the past decades, access to and quality of services vary greatly across individual- and community-level social status (Salas-Ortiz 2023; Serván-Mori et al. 2022,

2023). Mexico thus serves as an important case of how local violent crime affects health in a setting marked by social inequality. Finally, Mexico's unique data availability permits analyses that are typically unfeasible in other contexts affected by high rates of violence.

This study provides the first account of the associations between exposure to local violent crime and pregnancy loss and termination, focusing on the case of Mexico. We draw on retrospective individual-level data on women's pregnancy histories from the National Survey of Demographic Dynamics (ENADID) in 2014 and 2018 (n = 70,519 pregnancies occurring in 2009–2018) and administrative data on fetal deaths provided the Mexican Secretariat of Health (n = 32,736 cases in 2007–2019). The independent variable of interest is exposure to monthly municipality-level homicide rates based on cause-of-death registers and population registers. Methodologically, we employ fixed-effects models to analyze the likelihood of pregnancy loss and termination, as compared to live birth, while adjusting for many individual- and local-level factors that could confound the exposure and outcome. To predict fetal deaths, we use Poisson models with municipality and year fixed effects offset by the number of live births and incorporate the same local controls used in individual models.

While our data do not allow us to disentangle induced abortion from miscarriages and stillbirths, we explore the plausibility that the end of a pregnancy represents an induced abortion in three ways. First, we analyze heterogeneous effects across intersecting social groups, anticipating that women with higher socioeconomic status (SES) are more likely to be able to access abortion services if that is their choice, although low-SES women are more likely to be exposed to violence. Second, we analyze the trimester at which the pregnancy ended, since induced abortions are typically only available in the first trimester. Third, we analyze the associations between exposure to local violent crime in the unique case of Mexico City, the only administrative unit in the country where abortion has been legal on request during our observation period (since 2007). Although none of these approaches are perfect strategies for distinguishing elective from spontaneous abortion, they add additional nuance to understanding how pregnancy decisions and outcomes are shaped by intensified local violence.

Our study contributes to several bodies of literature. This study adds to research on the impact of insecurity on fertility and reproductive health by examining a case that is highly affected by violent crime, rather than armed conflict. Further, we add to the neighborhood effects literature by investigating exposure to local violent crime as a determinant of sexual and reproductive health, which is a less analyzed outcome in this literature. In a broader sense, this also adds to our understanding of the social determinants of health, by calling attention to the importance of context (Bernard et al. 2007; Wilkinson and Marmot 2003). Our study also contributes to understanding the consequences of violence and insecurity in Latin American societies, a region that has grown into one of the most violent-plagued in the world despite relatively few instances of armed conflict (Canudas-Romo et al. 2017; Canudas-Romo and Aburto 2019; Gutiérrez-Romero 2016; Weitzman et al. 2024). In Mexico, specifically, a limited number of studies have considered fertility-related outcomes of homicides

(Caudillo 2017; Caudillo and Lee 2023b; Svallfors 2024a; Svallfors, Caudillo, et al. 2025; Torrisi, Svallfors, and Gargiulo 2024). Finally, we examine how exposure to local violent crime interacts with social marginalization to shaping pregnancy outcomes, thus adding to discussions about the importance of considering intersectionality in population health research (Bauer 2014).

The findings can be used to inform secondary prevention initiatives aiming to improve the health of violence-affected people and policymakers aiming to support the Sustainable Development Goals, in particular #3 on health and well-being, #5 on gender equality, and #16 on peaceful societies.

Understanding the Link Between Local Violence and Pregnancy Outcomes

Understanding how fertility responds to violence and crises requires attention to mechanisms such as fertility preferences, sexual activity, contraception, abortion, and fecundity (Bongaarts 2015). This section outlines the current state-of-the-art in how local violence related to violent crime and armed conflict affects the proximate determinants of fertility.

The few available studies available on fertility preferences and desires show mixed findings; in Rwanda after the genocide, preferences shifted towards large families due to replacement effects (Rutayisire, Broekhuis, and Hooimeijer 2013), while in other conflict-ridden contexts in sub-Saharan Africa, exposure to armed conflict was associated with modest reductions in respondents' preferred family size (Thiede et al. 2020). In Colombia, by contrast, fertility preference have remained stable despite armed conflict (Svallfors 2022).

We are only aware of one study investigating sexual behaviors in response to armed conflict, showing that during the genocide in Rwanda, young women were more likely to have a premarital sexual debut, which could indicate weaker social control and/or increased risks of sexual assault (Elveborg Lindskog 2016b).

Although local violence can significantly deteriorate healthcare systems' ability to provide sexual and reproductive healthcare (Svallfors 2024b), research from Mexico shows that municipality-level homicides are positively correlated with both the transition to first contraceptive use and contraceptive provision of reversible methods (Svallfors, Caudillo, et al. 2025). In Michigan in the US, by comparison, young women are *less* likely to use contraception, potentially because of reduced inclinations to decisively avoid unwanted pregnancy (Weitzman et al. 2023). In both Colombia and Mali, conflict-affected women are less likely to use contraception (Svallfors and Billingsley 2019; Torrisi 2024). Indeed, in settings such as Colombia, Lebanon, Iraq, Mali, and the US, women living in violent communities face higher risks of unwanted pregnancy and childbirth (Balinska et al. 2019; Harding 2009; Svallfors 2025; Torrisi 2024; Uscher-Pines and Nelson 2010; Weitzman et al. 2023),

which may in turn shape long-term health outcomes of mothers and their children (Yeatman and Smith-Greenaway 2021).

Exposure to local violence has also been associated with higher risks of miscarriage, stillbirth, and neonatal mortality. In countries such as Colombia, the Democratic Republic of Congo and Nepal, studies have shown that higher levels of conflict exposure predicts stillbirths, miscarriages and perinatal deaths (Buitrago and Moreno-Serra 2021; Elveborg Lindskog 2016a; León 2023; Valente 2015). Those with lower levels of education may be especially at risk (León 2023). Evidence also suggests that male fetuses are at higher risk of pregnancy loss than female (Dagnelie et al. 2018; Valente 2015).

There is currently very limited available evidence about the extent to which exposure to local violence affects abortion. O'Brien (2020) investigated this topic during the 1992–1997 civil war in Tajikistan, finding that exposure to nearby conflict was associated with a higher risk of miscarriage, while more distally occurring conflict events predicted a higher likelihood of abortion. In contrast, Luetke et al. (2024) found that exposure to local conflict during the first trimester was associated with a lower risk of pregnancies ending in a loss and termination in Burkina Faso. Although the authors could not distinguish spontaneous from induced abortion due to data limitations, they discuss that potential pathways could include both disrupted health systems and shifts in fertility preferences towards more deliberate planning and intentional childbearing.

To our knowledge, few studies to date have focused on pregnancy losses and terminations in contexts affected by local violent crime. Crime affects countries on all income levels—unlike armed conflict, that tend to concentrate in low- and middle-income countries—and has well-known negative impact on the health of direct victims (Freire-Vargas 2018; Rivera 2016; Ross and Solinger 2017). However, little is known about whether local crime can also indirectly shape the well-being of those living in affected settings, even without direct exposure (Kalyvas 2015; Sharkey 2018). While deteriorating security conditions are likely to alter fertility preferences and behaviors, for example due to changes in perceived survivability (Aburto et al. 2023; Gutiérrez-Romero 2016), the impact on the healthcare system may not be the same as in large-scale armed conflicts (Svallfors, Caudillo, et al. 2025; Vargas et al. 2022).

Intersectional Dimensions of Health Stressors

An intersectional perspective is necessary to fully understand the effects of local violence on reproductive health. Pregnancy outcomes often operate as a "canary in a coal mine" for broader societal issues like discrimination, stress, and inequality (Kramer and Hogue 2009; Krieger 2020). Pregnancy is also a unique stage of the life course since it confers health conditions to future generations, resulting in social inequalities already at birth (Torche and Nobles 2024). As such,

pregnancy and reproduction are key issues for understanding the links between social environment, social inequality, and well-being, with long-term consequences for population and development.

We draw on an intersectionality framework to understand pregnancy outcomes of exposure to local violent crime. Originally founded by Black feminists (Collins 2015; Crenshaw 1989; McCall 2005), intersectionality as a concept is understood here as a recognition of how multiple axes of social inequality—such as gender, class, ethnicity, and age—jointly impact health outcomes (Bauer 2014; Brown et al. 2023). Intersecting socioeconomic and demographic characteristics may moderate the effects of violent exposure, because certain groups of people may face both higher exposure and higher baseline risks of adverse outcomes (Ross and Solinger 2017). However, since our dependent variable under study includes all types of endings to a pregnancy that is not a live birth—induced abortion, miscarriage, and stillbirth—the anticipated effects of violent exposure may differ depending on the outcome.

Women with higher socioeconomic status (SES) are more likely to have access to quality abortion services, either in their home state or by travelling to another state where abortion is legal, and to resources that facilitate better health during pregnancy, such as prenatal care and nutritious food. As such, they may be at lower risk of miscarriage and stillbirth, but more likely to have an elective abortion. Women with lower SES and with pre-existing morbidities, on the other hand, are plausibly more vulnerable to negative effects of violent exposure and have fewer health-protective resources at their disposal, which from an intersectionality perspective operates as a double jeopardy or multiplicative effects of multiple health disadvantages (Bauer 2014). As such, women with lower SES may be more likely to have a miscarriage or stillbirth, but less likely to have an elective (safe) abortion. Considering the high risks of having an illicit unsafe abortion, low-SES women may also face higher risks of maternal mortality, thus resulting in selection effects into who survives their pregnancy and can report on it in survey data. Since our study also uses administrative data on fetal deaths, selection is not as big of an issue here.

Healthcare and Violent Crime in Mexico

Besides exposure to local violent crime, we also consider another contextual feature that may interact with violence to shape reproductive health: the legal landscape of abortion policy in women's state of residence. Abortion legislation varies throughout Mexico, which is a federal state. Elective abortion during the first trimester was legalized in the federal district of Mexico City in 2007. The Mexican Supreme Court decided unanimously that abortion criminalization is unconstitutional on September 7, 2021. However, abortion legalization has been gradually implemented across states, and access to services has varied greatly. While women can travel between states to access elective abortions, we

anticipate that women in Mexico City and adjacent states are more likely to have an abortion to terminate an unwanted pregnancy due to better access to services.

We will provide further descriptions of the healthcare system and violent crime in Mexico in future versions of this manuscript.

Data and Variables

We combine multiple sources of data to analyze the impact of local violent crime on pregnancy loss and termination in Mexico.

First, we use data on individual women's pregnancies from two pooled rounds of the National Survey of Demographic Dynamics (ENADID), collected in 2014 and 2018 by the National Institute of Statistics, Geography and Information (INEGI). The ENADID is a cross-sectional survey that includes reproductive histories of a nationally representative sample of Mexican women aged 15–54. After removing cases with missing values on the timing of pregnancy outcomes (n = 1,351, out of which 834 were abortions), age (n = 57), pregnancy order (n = 630), and women who changed their place of residence in the prior five years (n = 4,393), our analytical sample included 70,836 pregnancies occurring in 2009–2018.

The dependent variable captures whether women's latest pregnancy in the prior five years before the survey interview ended in a loss or termination, or a live birth. The ENADID collects information about pregnancy loss and termination by distinguishing between two types of outcomes: *mortinatos* (stillbirths) and *abortos* (elective abortions and miscarriages). We pragmatically group these two events together because the number of stillbirths were very few (n = 536; <1% of the sample) and because of potential difficulties for respondents in distinguishing between the clinical definitions of stillbirth in later gestational stages (after week 28 according to the WHO[1] and week 20 according to the NIH[2]) and miscarriage occurring earlier in the pregnancy. For all pregnancies that did not end in a live birth, the survey also asks about gestational timing in months and date of occurrence.

From the ENADID, we include the following individual-level social characteristics of the respondent: age at the event (<19, 20–34, 35+), type of place of residence (urban, rural), whether the respondent identifies as Indigenous, and educational attainment at the event (less than lower secondary school, some or completed secondary school, higher than secondary school; approximated from the respondent's age, educational attainment at the interview, and the timing at which educational levels

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[1] https://www.who.int/health-topics/stillbirth

[2] https://www.nichd.nih.gov/health/topics/stillbirth

would typically be completed in Mexico). We also include covariates related to the pregnancy: year at the event, whether it was a twin birth, pregnancy order, whether the respondent suffered from any pre-existing health conditions (including diabetes, high blood pressure, thyroid issues, kidney problems, obesity, HIV, other[3]).

Second, we draw on administrative registers provided by the Mexican Secretary of Health capturing cases of fetal death by municipality and month/year. This data source included 32,736 cases of fetal death recorded in 2000–2019, derived from official Death and Fetal Death Certificates (*Certificados de Defunción y Muerte Fetal*) issued by medical professionals or persons authorized by health authorities once death has been verified and its causes determined. The definition includes "Loss of life of a product of conception before complete expulsion or extraction from the mother's body, regardless of the duration of pregnancy."[4] For pregnancies of at least 22 weeks' gestation that met these conditions, the certificate is always produced. For pregnancies of 21 or fewer weeks, the certificate is produced only if the parent(s) request the product's remains (Secretaría de Salud 2022). Therefore, these fetal death records include primarily what in other countries would be classified as stillbirths. The data also includes the reason for fetal death, sociodemographic characteristics of the mother, characteristics of the fetus (such as sex and whether it was a multiple pregnancy), and the location and timing.

Third, we draw on data from cause-of-death registers and population estimates to generate indicators of exposure to local violent crime, operationalized as monthly municipality-level homicide rates. The homicide data provided by INEGI are based on death certificates reporting the occurrence, timing and location of homicides, based on the ICD classification. We combine these with municipality population estimates from the censuses or population counts conducted every fifth year, with linear interpolation for years in between (CONAPO 2015; INEGI 2023), to create municipality-monthly homicide rates from January 2004 (i.e., up to five years before the included births).

We operationalize exposure to violent crime as spatiotemporal variation in municipality-monthly homicides and build moving average monthly homicide rates per 10,000 inhabitants in each municipality, following previous studies (e.g., Caudillo and Lee 2023a; Svallfors, Caudillo, et al. 2025). We use average rate measures to smooth over noise and to account for population differences between municipalities. We link the datasets by the municipality of residence at the interview for survey data and the municipality of occurrence for administrative data, for various temporal durations of interest: in the first trimester and one year, three years, and five years preceding the interview.

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[3] We did not include pre-existing health behaviors such as use of alcohol, tobacco or drugs as it was not identified whether these behaviors occurred recently or a long time ago.

[4] https://www.gob.mx/salud/documentos/certificados-de-defuncion-y-de-muerte-fetal?state=draft

Comparing different temporal exposure indicators allows us to investigate whether the impact of violent crime on pregnancy loss and termination is more immediate or long-term. We consider both continuous, transformed, and categorical indicators (the latter are based on a median split between high and low levels of exposure) to account for different functional forms in the relationship between exposure to violence and pregnancy loss and termination.

INEGI's data on homicides are considered the most accurate data source for violent crime in Mexico as there is generally lower underreporting compared to other crimes, the definition does not vary between administrative units, and the homicide incidence is highly correlated with that of other crimes, such as robberies (Atuesta, Siordia, and Lajous 2019; Fajnzylber, Lederman, and Loayza 2002; Glei et al. 2021). Hence, these data have been widely used in similar research (e.g., Aburto and Beltrán-Sánchez 2019; Brown 2018; Caudillo and Lee 2023a). However, the data represent a lower bound since death certificates rely on finding and identifying a victim (Imbusch, Misse, and Carrión 2011; Mobayed Vega and Gargiulo 2024).

Methods

In our individual-level analyses, we use municipality-fixed effects linear probability models (LPMs) with robust standard errors to analyze whether and how exposure to violent crime predicts the likelihood of pregnancies ending in an abortion, stillbirth or miscarriage, as compared to a live birth (Angrist and Pischke 2014).

Our models of administrative data use Poisson regression to analyze the association between local violent crime and the number of fetal deaths. In a second step, we analyze the types of fetal death.

We control for potential confounding factors at both individual and local levels. All our individual-level models adjusted for year of the event, age of the respondent, residence, indigeneity, and educational level. We then added health-related and community-level covariates in a stepwise fashion. The latter included the following yearly local time-varying indicators: the state-level unemployment rate, the municipality-level sex ratio, the percentage of the population residing in rural communities, and the percentage of the population earning minimum wage. Additionally, the individual-level models control for the number of women aged 15–39. These covariates are available for years when a Census or Population Count was conducted and linearly interpolated in between.

The Poisson models for fetal deaths were estimated at the municipality-year level and included the same time-varying local covariates used in the survey data analysis, as well as municipality- and year-fixed effects. These models were additionally offset by the log-transformed number of live births. All Poisson models are weighted by municipality population size in 2000.

To analyze heterogeneity and intersectional effects, we stratify our individual-level models by the covariates: age, residence, indigeneity, educational attainment, pregnancy order, and whether the respondent suffered from any pre-existing health conditions. This approach allows us to investigate whether the impact of exposure to local violent crime differs depending on people's social characteristics and health endowments, since we might anticipate that socially marginalized people are more likely to suffer negative effects from adverse community conditions (Bauer 2014; Homan 2019; Svallfors 2024b). We also stratify our models by the trimester when the pregnancy event occurred and the state of residence/occurrence to provide further interpretation of whether pregnancy endings were likely induced abortions, miscarriages, or stillbirths. We anticipate that respondents residing in Mexico City or its neighboring states have better access to abortion services.

Preliminary Results

We examined the consequences of local violent crime for pregnancy outcomes in Mexico, where the surge in violence due to the War on Drugs policy has dramatically increased levels of violence.

Descriptive characteristics of the sampled population are displayed in Table 1. Out of the 70,836 reported pregnancies, 12% ended in termination. Around one-fifth of the respondents were 19 or younger, 70% were aged 20–34, and 11% were aged 35 or older. Nearly three-quarters were urban residents and one-third identified as indigenous. One-fifth had less than upper secondary schooling, while two-fifths each had either some/completed or more than upper secondary schooling. 2% were twin births, and 20% had a prior health condition before pregnancy. 2013 was the mean year of the event, and 2 was the mean parity. Respondents were exposed to between 1.53–1.73 homicide per 10,000 population in their municipality of residence in the first trimester and the prior 1, 3 and 5 years.

Table 2 displays municipality-fixed effects linear probability models of municipality-level homicides as a predictor of the likelihood of pregnancy loss and termination, adjusted for sociodemographic covariates. Health covariates and local-level covariates were added stepwise. Preliminary results suggest that exposure to local violent crime during the first trimester is associated with an increased probability of pregnancy loss and termination. This association remains robust across specifications that progressively include sociodemographic, health-related, and local-level covariates. Specifically, an increase of one more homicide per 10,000 population corresponds to a 0.12 percentage point higher likelihood of termination when accounting for the full set of covariates. The robustness of the first trimester effect across different covariate specifications, combined with the absence of significant associations for temporally distant exposure, provides evidence consistent with a link between immediate violence exposure to reproductive outcomes rather than spurious associations driven by unobserved heterogeneity across municipalities.

There is a notable temporal specificity of this relationship: homicide exposure during longer time periods prior to conception shows no statistically significant association with pregnancy outcomes. This pattern suggests that the observed effects reflect acute rather than cumulative exposure to community violence. Given that the dependent variable encompasses induced abortion, miscarriage, and stillbirth, the positive association may reflect multiple pathways. These may include stress-induced physiological responses leading to pregnancy loss, behavioral adaptations whereby women elect to terminate pregnancies in response to perceived insecurity, or disruptions to healthcare access that compromise pregnancy outcomes.

Upon closer examination across distinct population subgroups, we found that these patterns were primarily driven by respondents with some or completed upper secondary schooling (by 0.19 percentage points in the first trimester) and with pre-existing health conditions (by 0.26 percentage points in the first trimester and 0.24 percentage points in the year preceding conception). These results will be added to future versions of the manuscript, and point to an increased probability of health issues or elective abortions in these specific groups.

Table 3 shows incidence rate ratios (IRR) from municipality fixed-effects Poisson models that predict fetal deaths in every municipality-year. IRRs that are smaller than zero denote a negative association, and those larger than zero indicate a positive relationship. Models in Table 3 suggest that the contemporaneous homicide rate, and the rate over the last one, three and five years has a negative association with the number of fetal deaths ($p<0.001$). This is consistent with the most fragile pregnancies being miscarried or terminated at a higher rate in municipalities affected by violence, as suggested by models in Table 2, in such a way that there are fewer of them that end in stillbirth.

Future versions of this manuscript will investigate how patterns vary by the trimester of the event, in Mexico City, as well as by the reason for fetal death reported in administrative data from the Mexican Secretary of Health.

Tables and Figures

Table 1. Descriptive statistics of the study sample

	Frequency/mean	Percent/SD
Pregnancy loss and termination		
No	62,670	88.47
Yes	8,166	11.53
Age at event		
<19	13,352	18.85
20–34	49,377	69.71
35+	8,107	11.44
Residence		
Urban	50,485	71.27
Rural	20,351	28.73
Indigenous		
No	45,336	64.00
Yes	25,500	36.00
Educational level		
Less than lower secondary	27,620	38.99
More than lower secondary	30,057	42.43
Twin		
No	69,534	98.16
Yes	1,302	1.84
Pre-existing health conditions		
No	56,608	79.91
Yes	14,228	20.09
Year of event	2013.29	2.58
Pregnancy order	2.19	1.08
Homicide rate per 10,000 population		
Trimester 1	1.73	2.96
Prior year	1.73	2.52
Prior 3 years	1.63	2.10
Prior 5 years	1.53	1.91
n	**70,836**	

Table 2. Municipality-fixed effects linear probability models using homicide rates to predict pregnancy loss and termination in Mexico

	Model 1 B (SE)	Model 2 B (SE)	Model 3 B (SE)	Model 4 B (SE)	Model 5 B (SE)	Model 6 B (SE)	Model 7 B (SE)	Model 8 B (SE)	Model 9 B (SE)	Model 10 B (SE)	Model 11 B (SE)	Model 12 B (SE)
Homicide rate 1st trimester	0.0013*	0.0013*	0.0012*									
	(0.0005)	(0.0005)	(0.0005)									
Homicide rate prior year				0.0007	0.0007	0.0005						
				(0.0006)	(0.0007)	(0.0006)						
Homicide rate prior 3 years							-0.0002	-0.0002	0.0004			
							(0.0009)	(0.0009)	(0.0009)			
Homicide rate prior 5 years										-0.0003	-0.0003	0.0010
										(0.0012)	(0.0012)	(0.0012)
Sociodemographic covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Health covariates	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Local-level covariates	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	70821	70821	70821	70821	70821	70821	70821	70821	70821	70821	70821	70821

Note: Pregnancy records were obtained from the nationally representative ENADID, waves 2014 and 2018.
* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Table 3. Municipality-fixed effects Poisson models using homicide rates to predict fetal deaths in Mexico

	Model 1 **B (SE)**	**Model 2** **B (SE)**	**Model 3** **B (SE)**	**Model 4** **B (SE)**
Homicide rate	0.943*** (0.000002)			
Homicide rate prior year		0.942*** (0.000002)		
Homicide rate prior 3 years			0.921*** (0.000003)	
Homicide rate prior 5 years				0.942*** (0.000004)
Local-level covariates	Yes	Yes	Yes	Yes
Observations (municipality-years)	32736	32736	32736	32736

Note: Data was obtained from national administrative records of fetal death certificates 2000–2019. All models are weighted by municipality population size in 2000 and offset by the log-transformed number of live births per municipality-year.
* p<0.05, ** p<0.01, *** p<0.001

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