



Women's police stations and intimate partner violence: Evidence from Brazil



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ABSTRACT

Although women's police stations have gained popularity as a measure to address intimate partner violence (IPV), there is little quantitative evaluation of their impacts on the incidence of IPV. This paper estimates the effects of women's police stations in Brazil on female homicides, a measure of the most severe form of IPV. Given that a high fraction of female deaths among women ages 15–49 years can be attributed to aggression by an intimate partner, female homicides appear the best proxy for severe IPV considering the scarcity of data on IPV in Brazil. We assemble a panel of 2074 municipalities from 2004 to 2009 and apply a difference-in-differences approach using location and timing to estimate the effect of establishing a women's police station on the municipal female homicide rate. Although we do not find a strong association on average, women's police stations appear to be highly effective among young women living in metropolitan areas. Establishing a women's police station in a metropolitan municipality is associated with a reduction in the female homicide rate by 1.23 deaths per 100,000 women ages 15–49 years (approximately a 17 percent reduction in the female homicide rate in metropolitan municipalities). The reduction in the homicide rate of women ages 15 to 24 is even higher: 5.57 deaths per 100,000 women. Better economic opportunities and less traditional social norms in metropolitan areas may explain the heterogeneous impacts of women's police stations.

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1. Introduction

Intimate partner violence (IPV) affects 30 percent of all ever-partnered women in the world (Garcia-Moreno et al., 2013), and has grave health consequences for affected women and their children. Abused women are significantly more likely to report poor physical and mental health (Garcia-Moreno et al., 2013), to have babies with lower birth weight (Aizer, 2011; Neggers et al., 2004; Valladares et al., 2002), to suffer from malnutrition (Ackerson and Subramanian, 2008), and to have sexually transmitted diseases, anemia (Morrison and Orlando, 2004), or HIV (Dunkle et al., 2004). Negative health consequences are also captured in increased use of health services: abused women tend to use general medical services approximately twice as much as women who have not experienced domestic abuse (Ulrich et al., 2003), and mental services three to eight times as frequently (Wisner et al., 1999).

Over the last decades, IPV has been increasingly recognized as a

public policy concern through international conventions, such as the Convention for the Elimination of All Forms of Discrimination against Women (CEDAW) or the Inter-American Convention on the Prevention, Punishment, and Eradication of Violence Against Women (Belém do Pará), and by national governments. An increasing number of countries are enacting measures to reduce IPV, ranging from comprehensive legislation to launching networks of one-stop-centers for women in a situation of violence. For example, nine Latin American countries passed legislative measures to prevent and punish IPV between 2005 and 2015 (World Bank, 2015). In the same decade, Brazil, El Salvador, Nicaragua, and Peru launched or expanded facilities to provide comprehensive support to survivors of IPV. Ethical considerations and inherent difficulties in collecting reliable data make impact evaluations of policies and programs particularly difficult.

Women's police stations are one such intervention that has gained popularity over the last decade. So far, such stations have been adopted by Argentina, Bolivia, Brazil Ecuador, Ghana, India, Kosovo, Liberia, Nicaragua, Peru, the Philippines, Sierra Leone, South Africa, Uganda and Uruguay. As of 2010, within Latin

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America, Brazil had the largest operation with almost 500 stations; Nicaragua followed with 37 (Jubb, 2010). A large push in establishing the Brazilian stations occurred after the 2006 “Maria da Penha” law against IPV. Despite their growing popularity, little is known about actual effectiveness of such police stations. To our knowledge, only one quantitative evaluation of the impacts of women’s police stations on incidence of IPV or any other manifestations of gender equality has been carried out (Agüero, 2013). A recent review article indicates the need for more research on the effectiveness of these police stations as well as rigorous evaluations on domestic violence interventions in lower and middle income countries (Ellsberg et al., 2015).

Our paper provides quantitative evidence on the effects of women’s police stations in Brazil, *Delegacias Especializadas de Atendimento das Mulheres* (Police Stations Specialized in Serving Women, DEAMs), on female homicides, a measure of the most severe form of IPV. Given that a high fraction of female deaths among women aged 15 to 49 can be attributed to aggression by an intimate partner, as we will describe in detail in the data section, and given the scarcity of other data on IPV, female homicides appear the best available source of data for the analysis of the effects of DEAMs on the most irreparable form of violence against women.

The focus on Brazil, as opposed to a different country which has implemented a similar intervention, is due to three reasons. First, Brazil’s open data policy makes the data that allow for undertaking such analysis publicly available. Second, in Brazil the number of women’s police stations grew by over 100 stations within six years, providing sufficient variation for analysis. Finally, IPV has been endemic in Brazil and an important policy concern over the last decade.

Brazil has one of the highest female homicide rates in Latin America, only behind El Salvador, Guatemala and Honduras – all countries with much lower levels of economic development. Much of the violence against women in Brazil is perpetrated by family members: *Movimento Nacional de Direitos Humanos* (National Movement of Human Rights) estimates it to be close to 70 percent. Moreover, 66.3 percent of those accused in homicides against women are their partners (AGENDE, 2007). The Brazilian government has been actively trying to address the issue of IPV: in 2003, the establishment of a new ministry, the *Secretaria de Políticas para Mulheres* (SPM), triggered an increase in governmental funding to services aimed at prevention and treatment of IPV, including DEAMs. The year 2006 saw the enactment of the Maria da Penha law, considered among the most innovative and advanced national legislative measures aimed at eradication of domestic violence due to its comprehensiveness.

The effectiveness of these efforts is not clear. On the one hand, more women are denouncing their perpetrators. From 2007 to 2009 calls to the women’s help hotline *Ligue 180* doubled (Comunicacao Social, Secretaria de Políticas para as Mulheres, 2013). Other indicators suggest a less optimistic picture: despite a dip in 2007 for female homicides and a flattening for male homicides after the passing of the well-publicized Maria da Penha law, both homicide rates continued to rise as they had over the last decade (Fig. 1). This seeming incongruity with the increase in anti-violence efforts by both women denouncing and policy makers providing more resources underscores the importance of a careful analysis of the effectiveness of interventions, including DEAMs.

Theoretical literature suggests that DEAMs are likely to trigger a reduction in IPV. DEAMs generate a higher cost of violence with increased enforcement against perpetrators. The presence of a DEAM may facilitate the dissolution of abusive relationships and lower conflict in continuing relationships (Manser and Brown, 1980). Through issuing restraining orders, assisting with the court procedures, and in some cases, helping women navigate social

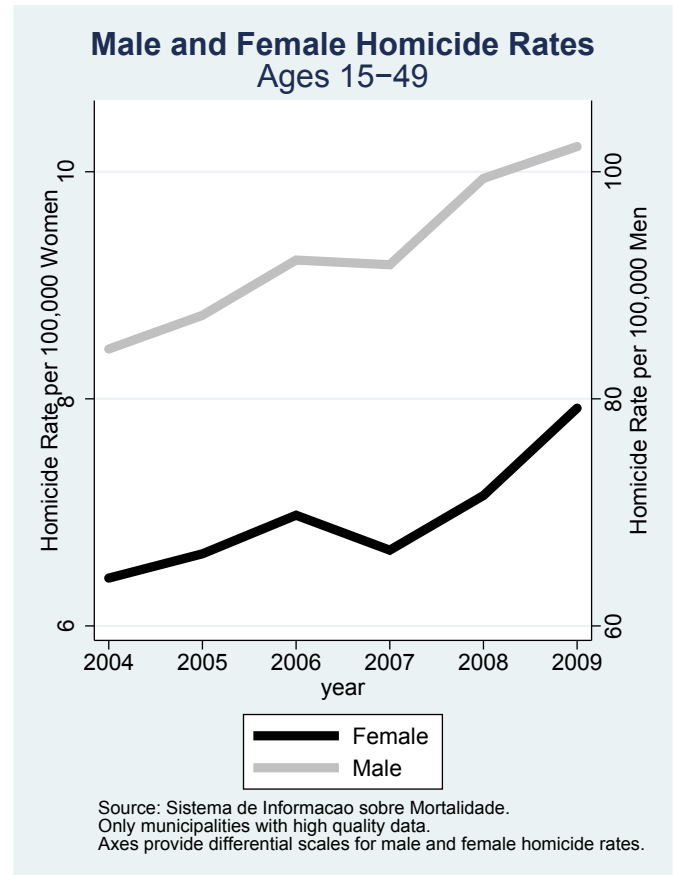


Fig. 1. Brazil’s male and female homicide rates increase over time.

services, DEAMs may be contributing to creating safer outside options for battered women: if they decide to leave their partners, they are less likely to become victims of the abusers’ retaliation. Such safe outside options may discourage the use of violence within a marriage (Aizer, 2010). Empirical literature, however, suggests achieving impacts may not be so simple. Hidrobo and Fernald (2013) find differential impacts of a conditional cash transfer program on domestic violence depend on a woman’s education level. Jewkes (2002) indicates social norms—both regarding gender and use of violence—can be a limiting factor in a policy’s effectiveness.

Overall our paper contributes to the literature on IPV by providing quantitative evidence on the effects of women’s police stations, an intervention that has been gaining popularity in the array of tools to address IPV. It also provides an evaluation of the effectiveness of an important component of Brazil’s policy aimed at curbing IPV.

2. Background

DEAMs constitute a part of the Civil Police and are focused on crimes such as rape and IPV that target women. The first DEAM was established in São Paulo in 1985 (Jubb, 2010). Other municipalities copied this model, and the network of DEAMs has been expanding ever since. (See appendix for more details.) Fig. 2 illustrates expansion since 2000, when the first available municipal survey included questions on women’s police station existence. By 2009, DEAMs had been established in just under 500 municipalities (out of 5564), where 60 percent of the population ages 15–49 years

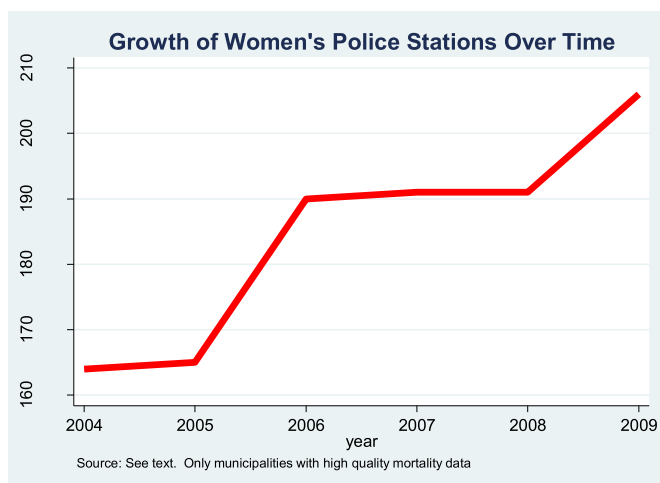


Fig. 2. Expansion of women's police stations in Brazil.

resides.

The Maria da Penha law of 2006 gave additional impetus to the creation of DEAMs and affected their functioning. First, the law moved domestic violence from the realm of civil to criminal code. Second, the law expanded the responsibilities and mandate of DEAMs, as well as of any other police station, by delineating specific measures to be taken in the cases of domestic violence. Third, the law established a mandate for the federal, state, and municipal governments, as well as NGOs, to collaborate on creating DEAMs. Similarly, the law strengthened coordination between different public entities, as it required creation of multidisciplinary teams specialized in providing health, psychological, and legal support to survivors of domestic violence. Finally, the law strengthened financing mechanisms for state-level measures: the federal government provides funding for states which commit to implementing the Maria da Penha law, which includes establishment of DEAMs.

The women's police stations do not have a single model: only in 2005 did a Technical Norm by the Ministry of Women establish the minimum infrastructure, human resources, and materials that defined a DEAM (Sardenberg & Queiroz de C. Gomes, 2010). Beyond this, DEAMs are legislated by state governments, but federal and municipal governments also play a role through co-financing mechanisms. Though all offer police services, some offer psychological, social and legal advice; some offer services that are educational and preventative or more like mediation than police intervention; and some focus just on family crimes of domestic violence while others may also consider crimes based in gender inequality, no matter the cause (Sardenberg & Queiroz de C. Gomes, 2010).

In addition to models differing, implementation also varies, as is especially challenging in developing countries. On average, each DEAM has 2.6 officers, often below the recommended number of officers based on the size of the city (SENASP, 2010). Other limitations include limited hours of operation or lack of specific services. A 2010 report (Sardenberg & Queiroz de C. Gomes, 2010), which consisted of surveys & interviews in 40 DEAMs located in capital cities of all but two states, indicates that 65 percent were only open during commercial hours, and only 58 percent investigated homicides. Over half offered psychological orientation to victims, but less than a fourth offered legal assistance. Considering the shortcomings in implementation, it is particularly important to evaluate whether DEAMs have an effect on the incidence of IPV, and to assess the magnitude of this effect.

Given heterogeneity in DEAMs, our analysis is most likely capturing the effect of the largest common denominator among them: police stations with an explicit mandate to make crimes against women their priority and greater likelihood to have predominantly female staff. As these features of the model are shared by women's police stations in other countries, our results are relevant beyond Brazil. For a comparative analysis of women's police stations in Latin American countries, see Jubb et al. (2008).

3. Data

Data on IPV is notoriously difficult to obtain. Self-reported measures gravely underestimate the problem (Ellsberg et al., 2001). Moreover, measurement issues related to self-reported data are a challenge because of selection issues. Although overall violence in the household may be falling, women may report more IPV as their outside options improve and fear of retaliation subsides or as it is perceived as more socially acceptable to renounce abusers. In contrast, women who are abused but live in a world where violence against them is a cultural norm may not perceive the injustice. Men may also be victims of IPV, however, women's violence towards male partners is less injurious, so we focus on women as victims (Kimmel, 2002).

Data from Brazil's nationally representative household survey illustrates the challenge of measuring IPV. In 2009, the *Pesquisa Nacional por Amostra de Domicílios* (National Household Survey, PNAD) included a section on victimization and justice. The questions on crime include asking if the subject had suffered aggression within the last year and the identity of the perpetrator. There is certainly underreporting taking place, as only 1.65 percent of women aged 15–49 admit having ever been a victim of aggression, and only 0.5 percent report that the last incidence of aggression was by a domestic partner. This is much lower than the numbers presented by a 2005 World Health Organization (WHO) study, where 29–37 percent of Brazilian women interviewed reported having been victims of IPV (García-Moreno et al., 2005). The discrepancy may arise due to the fact that the focus of the WHO study was IPV, so the enumerators were women trained to elicit trust from respondents. As a single question on a survey focused more on economic measures, the need for establishing a rapport of this caliber would be less important for the PNAD survey team, and the enumerators were not necessarily women.

There are other Brazilian surveys that collect data on IPV, but each has limitations that overweigh their advantages for studying the effects of DEAMs. For example, the Brazilian National Alcohol and Drugs Survey includes questions on exposure to violence, including IPV. However, this survey is a cross-sectional survey, and is only representative at the national level, thus making it impossible study municipal victimization rates, the level at which the DEAMs have jurisdiction. Similar to PNAD, this survey may also suffer from underreporting: 6 percent of respondents reported having suffered from domestic violence, which is much lower than the downward-biased WHO estimate (Larajeira, 2012). The WorldSAFE survey collects data on IPV, however, it was designed with the intent to draw insights and develop hypothesis through cross-cultural comparisons (Runyan, 2000). It is not nationally representative, and covers just three communities selected by research teams for "convenience, comparability and likelihood for future interventions" (Sadowski et al., 2004). Consequently, these data are not optimal for assessing effectiveness of a national policy.

Given these limitations of survey data, we turn to another measure of domestic abuse: the female homicide rate. This measure is a good proxy for most extreme forms of IPV. The *Movimento Nacional de Direitos Humanos* (National movement for human rights, MNDH) estimates that close to 70 percent of murdered

Brazilian women are victims in the sphere of their domestic relations. This figure is not that different internationally: in South Africa, Israel, Canada and the US, 40–70 percent of female homicides are from IPV (Chawla, 2011). Other statistics support the MNDH estimate: 66.3 percent of the accused in homicides against women are their partners (AGENDE, 2007). Of all female murders, 40 percent occur inside the family home or residence, where IPV is most likely to occur (Waiselfisz, 2012). By comparison, the portion of male murders occurring inside the family residence was 14.7 percent.

Brazil is also developing a questionnaire for victims of violence in the health system. This is not yet scaled up nor consistently applied within all hospitals, however, in 2011, of the almost 50,000 women in the database who indicated the identity of an attacker, 70 percent indicated the attacker was a family member. In California, 70 percent of female hospital visits due to aggression are from IPV (Aizer, 2010).

Despite the reporting bias in the PNAD data, discussed above, the answers of those who were willing to voice their experience of abuse also render support to our hypothesis. 70 percent of all perpetrators of aggression admitted by women were a partner, family, or known by the victim. Men, in comparison, are more likely to admit having been a victim of an unknown person; 58 percent of reported perpetrators against men were individuals with whom the man was not acquainted. This discrepancy in identity of the perpetrator by sex of the victim is reflected in the location of the aggressive act. Women are four times more likely than men to admit to an enumerator having been victimized in the home; 45 percent of acts of violence reported by women took place in their residence.

To improve the quality of our outcome variable, we limit the sample to women aged 15–49 years because the fraction of aggressions perpetrated by intimate partners is the highest for this age group (Waiselfisz, 2012). For women beyond the age of 50, while the primary aggressor is still a partner or an ex-partner, children are responsible for over 17 percent of aggressions. Though still considered domestic violence, our analysis is more appropriate to intimate partner relationships. The same age group (15–49) was used in the WHO study (García-Moreno et al., 2005).

Another advantage of using homicide data is the removal of self-reporting bias: it is impossible to self-report (or not) a homicide.

Nevertheless, the chosen metric has multiple limitations. First, it only captures the most violent forms of IPV – those resulting in death of the victim. Our paper does not provide insights on the dynamics of lesser forms of violence. That said, while we are not capturing changes in less-severe IPV with this measure, decline in female homicide due to DEAM expansion may broadly track the lesser forms. In the US, the decline in serious intimate partner assault (including sexual and aggravated assault) between 1993 and 2011 parallels the drop in simple intimate partner assault (Catalano, 2013); female homicides also have a downward trend over this time period. Aizer shows assaults and homicides track for California between 1990 and 2003 (2010).

A second limitation is that female homicides are a noisy measure of intimate partner homicides: although it is well established that a large share of female homicides are due to IPV, there are no precise time-specific estimates of the magnitude of this share. Additionally, there may be misclassification regarding cause of death. For example, the death of a woman pushed down stairs to her death could be misclassified as an accident instead of as a homicide. However, data exploration suggests that, at least in this particular case, misclassification is small. 98.75% percent of municipal-year observations had no female deaths from falling. Even if there is large misclassification, this would suggest our findings are lower bounds. Misclassification of homicides as

accidents would suggest we would be less likely to find an association between women's police station and female homicides. Similarly, our findings can be considered lower bounds if deaths from falls become correctly classified as homicides due to establishing women's police stations.

3.1. Outcome variable: homicide rate per 100,000 women aged 15 to 49 years

Our data come from Brazil's Vital Statistics registry of every death in the nation, *Sistema de Informacoes sobre Mortalidade* (Information System about Mortality, SIM). To create our outcome variable, we consider a death to be a homicide if it is classified as one, or if, in a separate question with more specific delineations of the cause of death as defined by the WHO international classification of diseases, the cause of death is coded to be aggression. The discrepancy is 5 percent.

Data on homicides are also collected by individual states' department of public security, but these are difficult to access. We were able to perform a small data validation exercise, comparing SIM data with homicides records from São Paulo department of public security. Concordance has improved over time, from a 30 percent difference in 1998 to a 4 percent difference in 2005, the most recent year for which the state level data are available. This remaining discrepancy between these numbers and the SIM data base has been recognized as resulting from slight differences in definitions: deaths resulting from legal interventions and some other situations (such as finding corpses) classified as homicides in the health data are not included in the police definition (The World Bank, 2006).

To improve the quality of the data, we limit the sample to municipalities that have been consistently meeting the international standards in quality control, i.e. where no more than 10 percent of deaths remained unexplained within any given year. While in any one year around 1200 of Brazil's 5564 municipalities failed to meet these standards, only 2130 municipalities have been adhering to it consistently during our panel (2004–2009). An additional four municipalities did not have complete control variables in every year. These municipalities in our final sample cover thirty five percent of the population. An additional 5% of municipal-year observations were lost to municipalities not having complete control variables.

We also explore changes in the homicide rate of men in the same age group for two reasons. First, it is plausible that expansion of DEAMs contributed to a reduction in male homicide by intimate partners. Women may kill their partners in self-defense, and measures aimed to prevent domestic violence have been shown to reduce homicide of perpetrators by female victims in self-defense (Aizer and Dal Bó, 2009; Dugan et al., 1999; Miller and Segal, 2014). Second, regressions on the male homicide rate allow us to explore the possibility of an increase in male homicide as a result of substituting women police officers focusing on female homicide for male police officers.

3.2. Policy variable: the presence of a women's police station

Information on the dates when women's police stations were established in each municipality comes from three sources. 104 DEAMs within our municipalities of interest had the dates of establishment listed on a registry provided by the SPM. We found information for an additional 14 municipalities through online sources. These dates were further supplemented by the *Pesquisa de Informações Básicas Municipais* (Survey of Basic Municipal Information, MUNIC), administered by the *Instituto Brasileiro de Geografia e Estatística* (Brazilian Geographical and Statistics Institute,

IBGE). In 2004, 2006 and 2009 municipalities were asked if they had a DEAM. Notably, some of the municipalities that report the presence of a DEAM in the MUNIC survey do not appear in SPM records. For municipalities registered with the SPM, the exact date of establishment is used. For municipalities that only appear in MUNIC data, the year when their presence in a municipality is reported for the first time is considered the year of establishment. We note that this uncertainty regarding the dates of establishment makes for a noisy treatment variable. This implies that our estimates will be lower bounds, as in some years (the years between MUNIC surveys) DEAMs may have been established, but the municipalities are not counted as treated if their establishment has not been identified by the SPM.

3.3. Time frame

Our data forms a municipal level panel spanning 2004 through 2009. The panel begins in 2004, after a law was passed in 2003 which required health professionals to report abuse to the police; this law could affect trends in IPV. Additionally, this is also the first year for which some control variables become available. The panel ends in 2009, as in 2010 MUNIC data was not collected. Although DEAMs were only in 8 percent of municipalities in our sample in 2004, these covered more than 50 percent of women, growing to cover 62 percent of the female population by 2009.

3.4. Control variables

Since homicides due to IPV are a subset of our outcome variable, we include controls that are likely to impact IPV as well as violence more generally, such as street crime. We use data from variety of sources: IBGE, the *Tribunal Superior Eleitoral* (Electoral Superior Tribunal, TSE), the *Ministerio de Desenvolvimento Social* (Ministry for Social Development, MDS), *Finanzas Brasil* (a data base from the National Secretary of the Treasury, FINBRA), and other variables from the MUNIC survey (described earlier).

We include female population in our age group of interest and population density, as the number of homicides depends on the size of the population and the proximity of people to one another. We calculate the percent of population that is female, should scarcity of women influence how they are treated; a significant negative correlation between this variable and the female homicide rate supports this hypothesis. To capture municipal wealth, a variable generally correlated with crime, we include GDP per capita and GDP per capita from agriculture and industry. These variables we accessed from IBGE.

Gender gap in education may affect intra-household bargaining, so we include the ratio of the percent of female voters who have finished primary schooling to the percent of male voters who have finished primary schooling, data from the TSE. Given that voting is obligatory in Brazil for people aged 18 to 70, this is a good proxy for the gender education gap.

Conditional cash transfer (CCT) programs have been shown to affect IPV. The MDS provides information on the number of recipients of Bolsa Familia, Brazil's CCT program and the amount transferred to recipients in each municipality. We combined this with IBGE population data to calculate the fraction of women in a municipality receiving Bolsa Familia, and the municipal per capita transfer from Bolsa Familia.

We include dummies for whether the municipality has a local militia and a Public Safety Council, as these may affect overall crime (from MUNIC). We also include overall per capita municipal spending and per capita municipal spending on civil defense, intelligence, public security (from FINBRA). Similarly, municipal spending on hospital and health (from FINBRA) and a dummy

variable indicating a municipal health council (from MUNIC) reflect capacity that may prevent attempted homicides from becoming deaths. In an effort to take public attitudes into account we include dummy variables for whether the municipality has a human rights council (from MUNIC) and per capita spending on human rights and public communications (from FINBRA).

4. Methodology

To identify the effects of DEAMs on the homicide rate of women aged 15 to 49, we apply a difference-in-difference approach, taking advantage of the variation in the timing of establishment of DEAMs across various municipalities. We use the following specification:

$$Y_{mt} = \beta T_{mt} + \rho X_{mt} + \alpha_m + \gamma_t + \varepsilon_{mt} \quad (1)$$

where Y_{mt} is the outcome variable - homicide rate per 100,000 women aged 15–49 years in municipality m in year t .

T_{mt} is a dummy, equal to 1 if there was a DEAM in municipality m in year t . α_m and γ_t are municipality and year fixed effects. X_{mt} is an extensive set of time variant municipal controls, the coefficients of which correspond to ρ . Each municipality is weighted by the female population in our age group of interest and standard errors are clustered at the municipality level. Unweighted estimations yield similar results.

Our analysis is based on a natural experiment. Our design allows us to control for time trends (year fixed effects), unobserved, time-invariant municipal characteristics (municipal fixed effects), and time-varying municipal controls, but a causal interpretation is not valid if the rollout of the interventions is driven by changes in IPV. Using a smaller subset of municipalities that have DEAMs established during our panel, we check if the lagged homicide rate predicts when and where the services are implemented.

We replicate our main analysis by dividing the sample by city size (capitals and large metropolitan areas compared to smaller cities), age group (15–24 compared to 25 to 49), and by city size and age group. For the group in which we find the largest impact, we consider an assessment of the importance of omitted variables compared to the variables we can control for, following a methodology proposed by (2000) and modified by (Bellows and Miguel, 2009). We derive the estimate of the importance of omitted variables compared to observed controls by examining the changes in the magnitude of β , the effect of the DEAMS in (1), as the controls are added.

5. Results

Summary statistics are in Table 1; we include simple correlations of the right-hand-side variables with the outcome variables.

We limit our sample to municipalities with high quality reporting of deaths from external causes. These municipalities differ in several dimensions from the rest of the country. They are more likely to have had a DEAM by 2009 and are more densely populated. While their overall per capita GDP and per capita GDP from industry is lower than municipalities with low-quality homicide data, they have higher per capita GDP from agriculture. The municipalities with high quality mortality data spend more per capita on municipal health expenditures (hospitals and basic health). They spend less on police: per capita expenditure on civil defense and likelihood of having a municipal police force are lower. The municipalities in our sample also have a higher percentage of women enrolled in Bolsa Familia, and the size of the average per-woman transfer is also higher. These comparisons suggest that our analysis is not representative of all Brazilian municipalities.

Using only municipalities which added a DEAM during the

Table 1
Summary Statistics.

Summary statistics-2009	Mean	Sd	Min	Max	Correlation with	
Female homicide rate per 100,000 women 15–49	7.94	9.31	0	270.51	Female Homicide Rate	Male Homicide Rate
Male homicide rate per 100,000 men 15–49	99.85	69.11	0	459.09		
Women police stations	0.61		0	1	0.044*	0.189***
% Population female age 15–49	0.51	0.02	0.30	0.55	0.065**	0.156***
Population density	0.05	0.21	0	5.32	–0.020	–0.046*
Ratio of % of women voters who finished primary to % of men voters who finished primary	1.14	0.15	0.79	2.13	–0.013	–0.003
Per capita GDP	14.76	11.36	2.05	187.4	–0.024	–0.031
Per capita GDP from agriculture	0.86	1.74	0	62.09	–0.062	–0.150***
Per capita GDP from industry	3.70	4.74	0.16	77.16	–0.010	0.019
Has a human rights council	0.12		0	1	0.021	0.062**
Has a health council	0.98		0	1	–0.015	–0.053*
Has public safety council	0.35		0	1	0.080***	0.164***
Has municipal guard	0.50		0	1	0.032	0.142***
Per capita expenditure on civil defense	3.50	20.31	0	279.77	–0.001	–0.006
Per capita expenditure on public security, information and intelligence	126.08	122.92	0	1377.11	0.004	–0.010
Per capita expenditure on other defense functions	0.25	2.05	0	31.65	0.003	0.018
Per capita expenditure for hospital assistance	3.18	8.38	0	87.48	0.012	0.076***
Per capita expenditure on basic health	133.61	104.59	0	1303.49	–0.068	–0.194***
Per capita expenditure on general health	663.57	299.73	0	3552.61	–0.082	–0.182***
Per capita expenditure on other health	65.40	93.18	0	881.77	–0.021	0.068**
Per capita expenditure on social communication	3.73	6.98	0	106.38	0.001	0.047*
Per capita expenditure on human rights	0.37	2.08	0	72.64	–0.013	0.011
Per capita municipal federal transfer	659.31	303.20	263.68	5244.33	–0.107***	–0.251***
Reals per woman from Bolsa Familia	257.84	197.79	2.62	1134.4	0.015	0.048*
Percent of women (15–49) receiving Bolsa Familia	0.26	0.17	0	0.93	0.021	0.055*

Summary statistics are for the 2074 Brazilian municipalities with high quality mortality data in every year from 2004 to 2009 & complete controls in 2009.

Significant at * 5%, **1% ***0.1%.

Statistics are weighted by the female population ages 15–49.

panel, we find no statistically significant relationship suggesting that previous levels of homicides—of either men or women—influenced the implementation of the DEAMs (Table 2). Results are robust to including municipalities which never had a DEAM.

We find no statistically significant effect of DEAMs on the homicide rate of females aged 15 to 49, but we do find a marginally significant association in the model without controls (Table 3). In both models, the negative signs and fairly large magnitudes (around 15% of the 2004 baseline) are both suggestive of DEAMs reducing female homicides. We do not find any statistically significant effect on male homicide rate; the relative size of the reduction (around 5% of the 2004 baseline) is smaller than its female counterpart. Fixed effect regressions (available upon request) with controls for municipal spending reveal that the establishment of DEAMs is not associated with an increase in any of the various

police spending control variables, suggesting that substitution of male police officers for female police officers is plausible.

The lack of significance in the impacts on the overall population leads us to explore heterogeneities. Table 4 suggests that establishing a DEAM in a municipality located in a state capital or metropolitan area is associated with a reduction in the homicide rate by 1.23 deaths for 100,000 women. This roughly amounts to a 17 percent reduction in average female homicide rate in capital cities and metropolitan areas, equal to 7.33 in 2004. DEAMs appear to have no effect on female homicides in small cities and rural areas, which have a slightly smaller average female homicide rate of 4.9; the analysis also does not detect any impact on men either in metropolitan areas or in small cities.

We then turn to replicate our analysis on different age groups: 15 to 24 and 25 to 49. With neither group do we see any effects of DEAMs, though results are suggestive of a larger impact for younger women (Table 5). However, if disaggregation by age is overlaid with disaggregation by the size of municipality, we detect impacts in the

Table 2
Reverse causality check.

Women's police station established			
Year & Municipality FE		Y	Y
Controls		N	Y
Lagged Female Homicide Rate	Coefficient	0.0032	0.0045
	SE	(0.0070)	(0.0073)
	Adj R2	0.711	0.705
Lagged Male Homicide Rate	Coefficient	–0.0012	–0.0011
	SE	(0.0009)	(0.0014)
	Adj R2	0.719	0.708
		N	117

Municipal –year observations after the first appearance of a DEAM are omitted.

Significance levels: +0.1 *0.05, **0.01.

All regressions weighted by population, with standard errors clustered by municipality.

Sample limited to the 39 municipalities with high quality mortality data who established DEAMs within 2005 & 2009.

Each municipality's time series stops at the first year of a DEAM's existence.

Table 3
Overall impact of women's police stations on homicide rates.

		Female homicide rate		Male homicide rate	
Year & Municipality FE		Y	Y	Y	Y
Controls		N	Y	N	Y
Women's Police Station	Coefficient	–0.9369	–0.8543	–6.6753	–4.3686
	SE	(0.5442)	(0.5776)	(8.1455)	(6.8975)
	Adj R2	0.193	0.193	0.776	0.784
	N	12059	12059	12059	12059

Significance levels: +0.1 *0.05, **0.01.

All regressions weighted by population, male or female ages 15–49, with standard errors.

Clustered by municipality.

Sample limited to the 2126 Brazilian municipalities with high quality mortality data. 697 municipal-year observations have been dropped due to incomplete controls.

Table 4
Heterogeneous effects - city size.

		Capitals & metropolitains areas				Smaller cities			
		Female homicide rate		Male homicide rate		Female homicide rate		Male homicide rate	
Year & Municipality FE		Y	Y	Y	Y	Y	Y	Y	Y
controls		N	Y	N	Y	N	Y	N	Y
Women's Police Station	Coefficient	-2.1125**	-1.3042+	-4.7136	-4.0506	-0.0642	0.1288	-7.9965	-4.8808
	SE	(0.6564)	(0.6804)	(11.5390)	(9.7065)	(0.7494)	(0.9227)	(11.0874)	(8.2175)
	Adj R2	0.532	0.546	0.843	0.859	0.113	0.114	0.703	0.71
	N	916	916	916	916	11143	11143	11143	11143

Significance levels: +0.1 *0.05, **0.01.

All regressions weighted by population, male or female ages 15–49, with standard errors clustered by municipality.

Sample limited to the 2126 Brazilian municipalities with high quality morality data.

697 municipal-year observations have been dropped due to incomplete controls.

Table 5
Heterogeneous effects - ages.

		Age 15–24 years				Age 25–49 years			
		Female homicide rate		Male homicide rate		Female homicide rate		Male homicide rate	
Year & Municipality FE		Y	Y	Y	Y	Y	Y	Y	Y
controls		N	Y	N	Y	N	Y	N	Y
Women's Police Station	Coefficient	-1.9648	-1.9978	-4.2472	-1.3119	-0.3516	-0.221	-8.2149	-7.2211
	SE	(1.6020)	(1.5428)	(11.9428)	(11.3873)	(0.8167)	(0.8540)	(7.4090)	(6.1286)
	Adj R2	0.116	0.118	0.775	0.782	0.122	0.124	0.674	0.683
	N	12059	12059	12059	12059	12059	12059	12059	12059

Significance levels: +0.1 *0.05, **0.01.

All regressions weighted by population, of that age, male or female, with standard errors clustered by municipality

Sample limited to the 2126 Brazilian municipalities with high quality morality data

697 municipal-year observations have been dropped due to incomplete controls.

Table 6
Heterogeneous effects - city size & ages.

Women's police station		Age 15–24 years				Age 25–49 years			
		Female homicide rate		Male homicide rate		Female homicide rate		Male homicide rate	
Year & Municipality FE	FE	Y	Y	Y	Y	Y	Y	Y	Y
Controls		N	Y	N	Y	N	Y	N	Y
Capitals & large met. areas	Coefficient	-7.2424**	-5.5173**	-3.7888	-1.9491	0.8408	1.3012	-6.9316	-8.4395
	SE	(1.4635)	(1.8944)	(17.4971)	(16.7862)	(0.9423)	(1.1043)	(10.2220)	(8.3609)
	Adj R2	0.389	0.408	0.826	0.841	0.382	0.395	0.794	0.815
	N	916	916	916	916	916	916	916	916
Smaller cities	Coefficient	1.9568	2.2974	-4.9189	-4.0121	-1.0605	-0.9339	-8.9841	-5.8135
	SE	(1.8920)	-1.9902	(16.0349)	(13.4823)	(1.0409)	(1.0872)	(10.1875)	(7.7675)
	Adj R2	0.059	0.06	0.651	0.657	0.079	0.081	0.602	0.607
	N	11143	11143	11143	11143	11143	11143	11143	11143

Significance levels: +0.1 *0.05, **0.01.

All regressions weighted by population, with standard errors clustered by municipality.

Sample limited to the 2126 Brazilian municipalities with high quality morality data.

697 Municipal-year observations have been dropped due to incomplete controls.

younger group in capital cities and metropolitan areas (Table 6). For this group, a reduction in homicide rate is 5.57 deaths per 100,000 women, more than a 50% decrease from 2004 levels. In both capitals and metropolitan areas and smaller cities, younger women face a slightly higher homicide rate than older women.

We derive the estimate of the importance of omitted variables compared to observed controls by examining the changes in the magnitude of β , the effect of the DEAMS in (1), as the controls are added. In the case of the young women in larger cities, these unobservables would have to account for at least 3.25 times as much as the observables. While surely there are unobservables we cannot account for, we do not expect these to have so great an impact as our large selection of controls.

6. Discussion

This paper attempts to estimate the impact of DEAMs, women's police stations in Brazil, on one of the manifestations of IPV: homicide rate among women aged 15 to 49 years. The high fraction of deaths in this age group due to IPV makes this indicator the best available proxy for IPV. Given that police stations staffed by women are becoming an increasingly popular element in the national anti-domestic violence policy programs in a number of countries, our study provides quantitative evidence on their effectiveness.

As is inherent to quantitative studies on domestic violence, our study has limitations. We rely on the data on homicides only, so we are unable to discern the effectiveness of the women police stations

with respect to lesser aggressions. The homicide variable is a noisy outcome, as we cannot distinguish intra-familial violence from violence outside the home. Likewise, homicide reporting is a concern in and of itself. We recall that our sample covers only 35 percent of municipalities, those with best practices in data reporting. We cannot say if our results would be applicable to the rest of the country; we are agnostic about how homicide data administration and DEAM effectiveness may be related.

In spite of these limitations, while we only find weak associations between female homicide and establishment of DEAMs on average, DEAMs appear to have strong effects in some groups of women: women living in larger metropolitan areas and among younger women (aged 15 to 24). Notably, the effects are the highest among young women living in metropolitan areas: establishment of a DEAM is associated with a reduction in homicide rate roughly amounting to 70 percent of average homicide rate in that group. Our findings suggest that DEAMs do not affect crime against men: they neither reduce it through greater police presence, nor increase it through substitution of male police officers for female police officers, nor lower likelihood of homicide of the abusers in self-defense.

Qualitative research from a state in North-East Brazil confirms that theoretical channels behind our findings of differences in impacts across groups are plausible in the Brazilian context (Muller et al., 2013). Qualitative data were collected in four municipalities including the capital, in order to better understand actual and expected behaviors related to IPV among different social groups, as well as the knowledge of Maria da Penha law and infrastructure supporting it, including DEAMs. The qualitative study included in-depth interviews with women victims of violence, focus groups and questionnaires with men and women in the general population, and structured interviews with key informants (different types of police officers, coordinators on psychological projects of a service center for victims, public defenders, a judge, and municipal officials from the Ministry of Women).

The interviews are suggestive of three barriers that are more prevalent outside metropolitan areas. First, economic dependence can create situations in which violence may persist (Aizer, 2010; Manser and Brown, 1980). Lack of economic opportunities and an income of their own – or at least an income of their own that would suffice to bring up their children – leaves victims of IPV without viable outside-of-marriage options. Service providers add that not only does income play an important role, but many of the victims are also afraid they would lose other assets such as squatting rights to their house or inheritance privileges.

Secondly, fear of retaliation is particularly strong in communities that are economically strained; budget for the police force is thin, and trust in it is already weak (e.g. some victims indicated the ineffectiveness of restraining orders). Dugan et al., (2003) confirm that more aggressive arrest policy is associated with fewer killings of unmarried intimates, but lack of protective services can lead to an increase in female homicides despite other prevention measures (2003).

A final barrier identified in the interviews is social norms (Jewkes, 2002). Brazilians indicated that norms approve of the toleration of abusive relationships and suggest wives should not separate from a husband once married; searching for an option outside marriage carries social stigma. This is particularly prevalent in rural areas. Women victims feel ashamed for their situation oftentimes, and some even declare themselves to be partially responsible for the abuse, as is confirmed by the WHO finding of rural women 21 percentage points more likely than urban women to indicate a reason that justifies a man hitting his partner (García-Moreno et al., 2005). Culture can promote a separation of private conflicts from the public space, as in the common Brazilian saying,

“In a fight between husband and wife, no one should introduce a spoon,” meaning not to get involved.

All these barriers—economic dependence, social norms, and fear of retaliation—may be harder to overcome outside of metropolitan areas, where economic opportunities are fewer, social norms more traditional, public financial resources less ample, and distances to service centers often farther. Similarly, these barriers may be lower for younger women, whose circles of friends may adhere less to traditional norms, who may not yet have children or have fewer children, thus needing less income to survive, and who may be better able to find employment than older women.

These hypothesized mechanisms behind our results suggest a number of areas of improvement in the administration of DEAMs and policy regarding IPV more generally. To make DEAMs as effective for overall populations as they are for young urban women, measures addressing social stigma and facilitating women's economic autonomy may be needed, as well as making DEAMs more accessible and effective outside urban settings. Policies and programs facilitating economic autonomy of women, such as trainings and productive inclusion programs, could be helpful, and, indeed, a few police stations work in tandem with women's centers which support women's economic autonomy (Braga de Moraes, 2010). Future research can improve data on IPV, acquire more information on additional services that empower women or shift social norms, and examine how these services may have complementarities with DEAMs in reducing women's experience of IPV.

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Appendix. Brief note on the establishment of DEAMs

The initiative to create the first DEAM in 1985 came from the state government of São Paulo, which had been working with the State Council on the Status of Women, an inter-sectoral body, on improving public policies in response to feminist organizations demanding a response to violence. These entities participated in negotiations with the Civil Police to define the mandate and powers of the first DEAM, as well as providing specialized training for police and other activities. Subsequent DEAMs in other municipalities and states had similar feminist support as impetus for their establishment (Jubb, 2010).

More recently, creation of a DEAM tends to be a result of interplay of decisions at the three levels of government— federal, state and municipal, even though DEAMs are created through state decrees and laws and, in theory, states are the responsible ones for implementation and maintenance of DEAMs. The federal government has an influence in the creation of DEAMs through financing. Since 2003, the federal government has been strengthening the service network for victims through the *Pacto Nacional pelo Enfrentamento à Violência contra as Mulheres*. States and

municipalities can adhere voluntarily to the pact, and, by doing so, they commit to implementing the *Maria da Penha* law. The federal government establishes guidelines and standards for services and can provide financial resources - if states and municipalities also contribute financially (Hein de Campos et al., 2009). With these agreements, local governments often become responsible for providing and administering the physical space. Consequently, the need for alignment of initiatives and actions at different levels of government is likely to insert a wedge between the time when an initiative to create a DEAM was proposed and the time of its actual establishment, which may be driven by violence dynamics or other municipal level factors.

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