

# Disentangling “Deterrence” from “Incentive to Report” Effects on Domestic Violence: the Case of the Brazilian DEAM on Duty 24 Hours

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## Abstract<sup>1</sup>

Our paper contributes to the scarce literature on the effectiveness of public policies aimed at reducing crime and/or violence by means of a carefully specified econometric model backed by new empirical evidence, the PCSVDF<sup>Mulher</sup> (Pesquisa de Condições Socioeconômicas e Violência Doméstica e Familiar contra a Mulher), a unique, longitudinal and large data set (more than 10,000 women). We evaluate the impact of a policy that mandate DEAM’s (“Delegacia da Mulher” - Brazilian Women’s Police Station) to be on duty 24 hours per day on domestic violence. As an increase on availability of office hours can have both “Deterrence” as well as “Incentive to Report” effects on domestic violence, we carefully develop a sequential discrete choice model able to mimic the main decision nodes, say, from crime commission up to crime reporting. Our sequential logit model enable us to calculate both conditional and marginal effects on variables of interest. In order to advance some causal explanations, we consider the intricate role of unobserved heterogeneity in our model. We concluded that a “24 hours on duty” policy for DEAM’s have both deterrence (roughly a 3% decrease) and reporting effects on domestic violence (a 8.1% increase on the decision to report – conditional on being a victim; and DEAM presence increases 13% in the decision to report to police – conditional on have decided to report). Our study helps to understand the DEAM’s dual role of inhibiting domestic violence and reducing the “dark figure” of crime.

**Keywords:** Sequential Choice; Domestic Violence; Crime Reporting  
**JEL:** C25; K38; K42

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# 1 Introduction

Violence against women has long been present in society. Women suffer many forms of violence - sexual assault, murder, marital rape, female children malnutrition, forced prostitution, female genital mutilation and sexual abuse of women and trafficking in persons - but the most common and predominant form of violence committed it is through her intimate partner (HEISE et al., 1994).

Regarding to interpersonal violence we find intimate partner violence, in another words, domestic violence, where women are victims of their partner/husband/ex-partner/boyfriend. WHO Statistics in 2005 in 10 countries showed that between 15% to 71% of women reported having physical or sexual aggression, or even both, by the intimate partner at some point in their life (see WHO (2005)). This evidence shows us that there is much to do to reduce gender inequalities.

It has been only in the last decades that the problem of domestic violence has been treated as a matter of women's health and, therefore, as public health (see Schraiber et al. (2002), WHO (2005), Schraiber et al. (2007) and Kiss et al. (July 2012)). There are several consequences for violence, as cited by Moreno, Guedes e Knerr (2012): mental health problems, physical injury, suicide attempt, productivity decrease, alcohol and cigarette consumption, sexual and reproductive consequences, impact on the fetus or child, and many others.

The United Nation (1993) acknowledged the urgent need to universally apply to women the rights and principles related to equality, security, freedom, integrity and dignity of all human beings and defined violence against women as “physical, sexual or psychological suffering for women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public life or in private life”.

In Brazil, according to Martins, Cerqueira e Matos (2015), women's organizations and movements have acted extensively on issues related to work, income, political and social participation, health, housing and the right to a life without violence, while building rights. According to the authors, the implementation of international policies, coupled with the efforts of the Brazilian feminist movement to achieve rights related to a life without violence, have impacted Brazilian public institutions.

In 2006, the promulgation of Maria da Penha Law leveraged, implemented and directed public policies in addressing this cause. This legal device has brought great strides to women's right. Under the care of the Federal and State governments, Federal District (capital of Brazil), municipalities and non-governmental actions, the law creates integrated prevention and care measures ((BRASIL, 2006)). Also, Maria da Penha Law gave subsidy for the creation of public facilities, one of them, in particular, the Women's Specialized Police Station (DEAM).

Even with the increasing availability of these services and the policies aimed to treat the problem of intimate partner violence, there are still a large number of cases of such violence, and in addition, few women seek help to solve this problem that afflicts them. In Brazil, according to WHO (2005)'s data, in 2005 between 29% and 37% of women were victims<sup>2</sup>. Regarding the search for help, in the world context, between 21% to 66% of women never reported on a violent act (GARCIA-MORENO, 2005). In Brazil, the WHO

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<sup>2</sup> Through the database used in this work we detected that 30.5% of women were victims, which means that even after 12 years, that number still remains. Still ahead we will explain more about the domestic violence database used in this current study, the PCSVDF<sup>Mulher</sup>

points out that between 21% to 24% of women do not report the crime<sup>3</sup>. Many cases of domestic violence are even known in the people's social circle, but are not reported (GRACIA, 2004). In this sense, efforts are necessary to understand this problem.

Considering these data, it is fundamental to analyze which factors affect women so they may suffer domestic violence and, consequently, how these factors may explain the decision to report the crime. Looking at the problem more closely we can treat this configuration in a sequence of choices perspective. That is, similarly to a flow or a decision tree. More precisely, we can divide it into three parts. The first step is whether or not the woman has suffered domestic violence. The second decision is whether or not she has reported the crime. The third decision is to whom to ask for help. Unlike current literature on these subjects consider studying the problems separately, we will estimate them simultaneously.

Based on the main factors found in the literature and incorporating new factors not yet analyzed, this present work tries to widen the discussion of this scope analyzing the socioeconomic characteristics, incorporating the victim's rationality through indicators of knowledge about domestic violence, verifying the impact of DEAM's public policy, examining the measures of criminal act severity, beyond other variables that may be able to have a good explanatory power. All these variables will be analyzed throughout the violence tree.

The proposal of this research differs from works already consolidated in three purposes: the first one is by incorporating a sequential structure of the domestic violence flow, the second is to analyze the impact of DEAM as a public policy capable of having two effects, the deterrence effects and the crime reporting, and the third is by using a new empirical database<sup>4</sup> focused on the study of domestic violence. Besides studying other catalysts factors in the flow.

The present study reached the main objectives of the research on understanding the domestic violence flow. The results were very interesting, corroborating with the literature and enlarging it in new ways. In the specific case of DEAM, we detected that it may have a deterrent effect on domestic violence, reducing the crimes commitment. We found positive effects of the DEAM presence in the violence flow, analyzing in a nonconditional structure and in joint structure. Other results, such as the victim's rationality, an innovative issue as far now, have come up with a big factor that can explain the flow.

The work is divided into 5 sections. The first section presents this introduction. The second describes a literature review on crime reporting for crimes in general and then for crimes related to domestic violence, elucidating the main factors that the literature emphasizes, based mainly on the authors' work Gottfredson e Gottfredson (1988) and Felson et al. (2002). In this section we will also discuss the DEAM's possible impacts in all transitions on violence process. The third section consists of describing the database used in the research, as well as discussing how scarce the availability of data on this topic is. In the fourth section we will present the methodology used in this study, using the Buis (2015) 's theoretical framework in modeling a logit sequential model, as well as its implications and implementations. In the fifth section we will discuss the main results found, corroborating and contrasting with the theoretical reference, besides pointing out the new findings. In the last section we accomplish the work with conclusions, discussions, and consequences of the impact of variables under hypothesis in a widen understanding of

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<sup>3</sup> In the database on domestic violence used in this study almost 61% of women did not ask for help.

<sup>4</sup> PCSVDF<sup>Mulher</sup>

the subject.

## 2 Literature Review

### 2.1 Crime reporting

“If the victim decides not to report a crime to the police, the probability of a sanction’s being imposed upon the offender is reduced to nearly zero”, (GOTTFREDSON; GOTTFREDSON, 1988).

One of the first essays and contextualization on the problem of crime reporting ( “*the dark figure*”) was the Skogan (1976)’s work. The author suggests that the determinants can be divided into three factors: the first factor would be related to the individual characteristics, the second factor is centered on the relationship between the victim and the aggressor, and the last factor is focused on the severity of crime. On his work, the author shows that the individual characteristics were weakly related to report the crime and the main factor was the severity of victimization. In addition, the author suggests that the act of reporting can come from a rational choice.

The issue of victim rationality is extensively discussed in many criminal studies. According to Gottfredson e Gottfredson (1988) there are three decisions the victim can take: the first is to define<sup>5</sup> behavioral action as a criminal act; the second, someone must decide that the act is the justice responsibility, and the last decision is to invoke criminal justice. The authors commented that the victim is the main gatekeeper of any judicial process and elucidated the rational factors that influence the victim on making that decision.

According to the authors Gottfredson and Gottfredson, in the decision scope to communicate to the justice, the victim exposes a desire of state obligation due to the increase of problem in its life. Another encouraging factor that impacts the victim’s decision is the solution to an immediate crisis, where the victim seeks a peaceful solution to stop victimization.

Still according to the authors, in case of communication to the police, based on data from the *National Crime Survey* in 1981, the authors point out that the main reasons for not reporting to the police are “ nothing could be done ” and “ unimportant crime ”, and for other types of crimes, “ private issue ” and “ fear of reprisal ” and were the ones that had the greatest highlights. Regarding to reporting a crime to the police, the authors reinforce that there are three dimensions that can impact: the nature of the offense, the victim’s characteristic, and attitudes toward the police. Confirming Skogan’s findings, the more serious the crime (personal injury or financial loss), the greater the likelihood of police knowledge. Similarly, it is also not evident that the victims attributes (or characteristics) are correlated with the act of reporting a crime.

To reinforce these hypotheses, MacDonald (2001) using British data in the period 1994 and 1996, divided the variables into four groups: socioeconomic (age, sex, race, etc.), specificity of the incident (cost x benefit), police attitudes (belief in the police) and crime (Involvement with drugs, for example). The author found out that economic factors (employee/jobless) and specificity of the incident had more weight in the decision to report residential theft (or property crime). Also, the author reinforces that economic

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<sup>5</sup> The definition can be made by some citizen (victim or witness) or the police

cycles impact the decision of the victim. In an wide analysis, the authors [Tarling e Morris \(2010\)](#) using the same British data for the period 2007/08, considering as variables the domicile/individual characteristics, aspects of violence and characteristics of the aggressor, confirmed that the severity of the violent act still remains the main reason for reporting a crime.

There is also a literature that focuses on evaluating if the police image impacts on victim's decision, such as on [Garcia e Herrero \(2006\)](#) and [Boateng \(2016\)](#) work. For example, [Boateng \(2016\)](#) examined the effects of the victim's perception regarding the police, in crimes of robbery, sexual crime and general crimes in the country of Ghana. The author points out that police attitudes positively impact the victim in reporting the crime. That is, victims who have high confidence in the police and are satisfied with their work in the neighborhood are more likely to report the crime.

## 2.2 Reporting Domestic Violence

It is not a trivial issue to analyze the factors that impact a woman's decision to make domestic violence public, ensure [Felson et al. \(2002\)](#). Analyzing the literature we find that the reasons differ from those considered "traditional" crime. For example, abused women try to adopt ways to maximize their safety and their children, as pointed out by [Moreno, Guedes e Knerr \(2012\)](#). The authors state that the fear of retaliation, economic dependence, concerns about children, love and hope that the partner will change are reasons that explain the permanence of woman in a violent relationship. In this sense, we understand that the decision to report or not this kind of crime takes into account other factors.

Most domestic violence cases are not reported. Therefore, only part of the problem is known when confronted with prevalence data [Gracia \(2004\)](#). Between 21% to 66% of women never reported on violent act [Garcia-Moreno \(2005\)](#). Regarding to Brazil, data available from the WHO report that between 21% to 24% of women did not report the act [WHO \(2005\)](#). Therefore, it is important to go beyond the observation of a high prevalence, seeking to understand the rational structure that impacts the woman to report or not a violent act of her intimate partner.

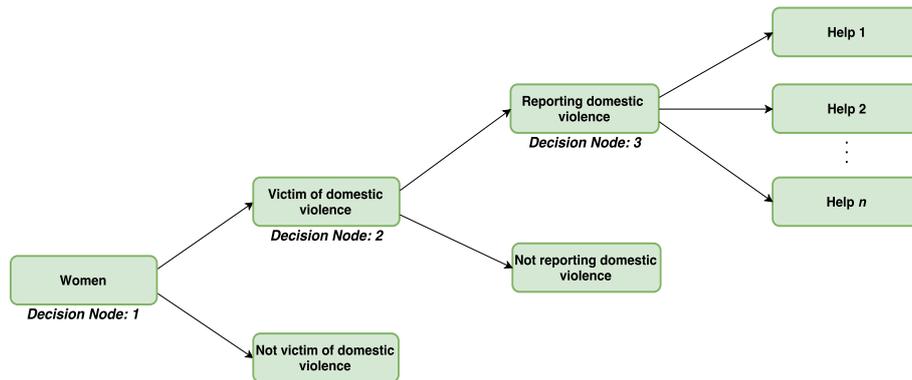
The work developed by [Felson et al. \(2002\)](#) is one of the main theoretical frameworks to explain the decision to report a crime of domestic violence. The authors expand the understanding of reporting a crime from the perspective of a rational choice (based on [Gottfredson e Gottfredson \(1988\)](#) work). They consider the paradigm of benefits and costs associated with victim choice to report or not the crime. From the rational structure, victims report a crime when benefits are greater and costs are low. The authors point out that the private issue, fear of reprisal and desire for protection of the aggressor are factors that impact on not reporting to the police. On the other hand, self-protection and severity are factors that explain police communication.

Other works deal with the socio-demographic question such as violent act characteristic (use of guns, intensity of the act and others), partner characteristic, and presence of child. These factors can explain this phenomenon. There is no concrete evidence that socio-demographic characteristics such as age, education and income have an association with the act of crime reporting, see [Kaukinen \(2004\)](#), [Akers e Kaukinen \(2008\)](#), [Bonomi \(2006\)](#) and [Kiss et al. \(July 2012\)](#). Analyzing the work of these authors there is a consensus that severity is a crucial factor in explaining this phenomenon. Severity can be use of weapons, physical damage, repetition of violent act and others that impact on woman's

life. As data from WHO (2005) reinforce, one of the main reasons a woman seeks help is the severity of violence and the impact on the child.

It is not only fundamental to understand what determines a woman to report the act, but it is important to evaluate the entire decision-making structure of domestic violence. That is, we can treat the crime + communication structure as a flow (see figure 1). In the first moment the woman suffers or not the domestic violence; in the second moment, since she has suffered a violent act, she decides to report or not the act; in the third moment of decision the woman decides whom to ask for help. Then, let's understand the main factors that impact on the violence tree<sup>6</sup>.

Figure 1 – Violence tree



Through this configuration we are able to understand how factors influence the passage between transitions and also capture the effect in a final result. For example, evaluate the woman's final decision to achieve the crime communication result. To achieve this, we can incorporate effects integrated into the last decision nodes through the effects weights in the previous transitions. We will discuss this issue further in the section 4.

Basically, the problem that starts from committing a crime until reporting officially go through two other layers. From the behavioral point of view it cannot be aggregated, we need to differentiate the impacts on each layer by disaggregating it into a sequential configuration. As we will see later, many papers that address these issues focus on studying the problem by analyzing only one of the layers separately, not taking into account the joint effects.

### 2.2.1 Evaluate police strategies in the study of domestic violence

The recent work from the authors Ellsberg et al. (2015) makes a long literary review on programs and interventions to combat violence against women and girls. One of the interventions cited is the creation of specialized police stations to combat this violence. The authors note that these stations increase both visibility and reporting, but there is still little evidence of its effectiveness. Thus, few studies have analyzed the effectiveness of these services. Therefore, evaluating them is still very recent in the literature.

According to Kerley e Dantzker (2005) program evaluations need to answer some questions, for example: 1) does the benefits overcome the costs?; 2) has the program reached the population?; 3) can the results be used in theoretical hypotheses?; 4) have

<sup>6</sup> The nomenclature of violence tree, the structure of violence and the violence flow have the same meaning in this study, that is, they are all meant to describe the path, from the violent act to the search for help

followed mandatory guidelines, regulations and standards?. Still according to the authors, policing programs are criticized for the lack of theory and, in many cases, the evaluation revolves around crime rates and feelings of fear as policymakers get under pressure and choose primary measures of results. As the author emphasizes, in the last decades there is a change in the way of evaluating. Researchers are now more interested in evaluating the process. One of the main reasons in the process evaluation is the maturation and consolidation of the program, therefore, having a time horizon to evaluate is fundamental.

In addition to the aspects that are intimately related to the victim, government programs can act as a source of positive externality in order to curb violence and impact on the violence flow. An example of such programs are the coping networks. [SPM \(2011\)](#) defines coping network as “ the articulated action among governmental/non-governmental institutions/services and community, aiming at the development of effective prevention strategies and policies that guarantee the empowerment of women and their human rights, the accountability of perpetrators and qualified assistance to women in situations of violence”.

There are several specialized services that make up the network<sup>7</sup>. In this work, we will analyze the impact of the Women’s Specialized Police Station (DEAM) in the violence flow, from its inhibiting impact of violent crime to the impact of crime reporting. But first we will briefly discuss the institutional development of DEAM’s.

The DEAM’s functions between 1985 and 2002 were limited to services aimed at crimes against women, provided for in the Criminal Code (CP). Domestic violence was incorporated into the CP, under the protection of the Law, in 2004. The DEAM functionality began to be consolidated after the promulgation of the "Maria da Penha" Law. Following the adoption of this Law, substantial changes have taken place in the judicial system in favor of recognition and treatment of these violent acts against women ([PASINATO; SANTOS, 2008](#)). This Law has strengthened the creation and implementation of DEAMs. In addition, it has been an articulated joint work among Federal and State governments, Federal District (capital of Brazil), municipalities and non-governmental actions to curb domestic violence.

A DEAM is aimed to handle issues related to domestic and family violence with a preventive and repressive character, and must carry out prevention, verification, investigation and legal framework ([SPM, 2011](#)). According to the Law 11.340/2006, art. 11º, it differs from a traditional police station. The police authority at DEAM may adopt appropriate legal measures to ensure police protection, forward to the hospital or health post and the Medical Legal Institute, sending emergency protective measures up to 48 hours and many other actions.

The first DEAM emerged in the 1980s, in São Paulo, and today the DEAMs are concentrated in several municipalities in the Brazilian territory. According to [Martins, Cerqueira e Matos \(2015\)](#), in 2013 there were 362 municipalities with DEAM.

There is very few research on Women’s Specialized Police Station ([Pasinato e Santos \(2008\)](#) and [Perova e Reynolds \(2017\)](#)). Still according to Pasinato, there are no national studies that allow us to know the trajectory traced by women seeking institutional help to overcome the situation of violence. In this sense, Women’s Specialized Police Station are still the main public policy to combat domestic violence against women.

Recently, [Perova e Reynolds \(2017\)](#) analyzed the impact of DEAM on the number

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<sup>7</sup> The full list can be seen at [SPM \(2011\)](#)

of female homicides (as a proxy for IPV). The authors used panel data between 2004 and 2009 from 2,074 municipalities. As a result, they found out that DEAM has a negative impact on the number of homicides in metropolitan areas. However, the data are aggregated and it does not take into account characteristics at the individual level. [Martins, Cerqueira e Matos \(2015\)](#) used another type of methodology, making a correlation on the number of units to combat domestic violence available in the micro region<sup>8</sup> and the homicide rate of women in their household, the authors did not find any effect. Yet it is not a study that specifically evaluates DEAM. Generally, Brazilian studies analyze DEAM through bulletin numbers, crime rates, and there are others, such as [Souza e Cortez \(2014\)](#), which analyze aspects of its functioning.

The proposal of this research differs from the already consolidated works in three dimensions: the first one is to incorporate a sequential structure of violence flow, the second is to analyze the impact of DEAM and the third is to use an unpublished database for the study of domestic violence.

The first objective is to understand the decision flow of victims and aggressors from their origin up to the choice of where to report violence. We will show how the control variables behave in the violence tree and which have the greatest impact on the flow. To achieve this success we will use a sequential logit econometric model. The sequence structure has a flow form. Let's propose the following sequence structure:

1. Woman has suffered partner violence or not
2. Given that she has suffered violence, the woman decides whether to report the act or not
3. Finally in the third decision node, since she has decided to report, what kind of help to look for. Here we will restrict for seeking police help (military police or DEAM) or seeking other types of help<sup>9</sup>

We must emphasize a first contribution of the present work in the attempt to explain the whole process from the origin of violence to the decision making of woman in the police sphere. This fact is not seen in the literature. Many papers in the literature analyze each step of the process separately, that is, estimate the three steps alone by making constraints on the sample. Let's look at some examples:

1. Regarding the first step there are many complex studies with wide discussion, for more details see for example [Bachman \(1994\)](#), [Basu e Famoye \(2004\)](#), [WHO \(2005\)](#), [Sambisa et al. \(2011\)](#). For [Heise et al. \(1994\)](#), there are four interrelated factors that are causing violence: cultural, economic, legal and political.
2. The second stage is focused on the study of crime reporting or dark-figure. Generally, in the second stage are estimated logistic regressions and their variants (see [Felson et al. \(2002\)](#), [Bonomi \(2006\)](#) and [Akers e Kaukinen \(2008\)](#)).
3. and in the third stage the studies are oriented towards Help-Seeking, some authors treated this stage through ordinal or multinomial models (see [Kaukinen \(2004\)](#), [Barrett e Pierre \(2011\)](#) ).

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<sup>8</sup> Define micro region as a grouping of counties

<sup>9</sup> In the section 3.3 we will discuss how we create the variable that will describe the flow

The second purpose is to analyze the impact of DEAM on the whole violence flow. As we have seen in the literature, surveys evaluate DEAM through regional/municipal female homicide data, not necessarily victims of domestic violence. These evaluations present problems: not all homicides are the result of domestic violence (femicide) and the dark-figure effect is not captured. We can evaluate DEAM on two fronts, the first is the effect of curbing violent acts, that is, we want to test if DEAM is a factor that helps to reduce domestic violence crimes, and the second is to analyze the effect of reporting these acts.

And the third contribution is the use of a database specifically designed to study the phenomenon of domestic violence. The application of this study is possible due to the originality of the database collected in Brazilian territory. The Survey of Socioeconomic Conditions and Domestic and Family Violence against Women (PCSVDF<sup>mulher</sup>) supplies the shortage of a consolidated database that allows the study of violence.

It is worth noting that we know the importance of studying each layer separately, where different factors impact exclusively on each layer. An example of this is to analyze the why or the motivational factors that induce woman to report the act. Such fact is characteristic of the second and third stages of the process, something that is not decisive for woman to be a victim of violence. Taking this fact into account, we decided to analyze a set of factors that impact the three layers at same time and thus we can understand the behavior of the variables between transitions. The only exception we will make is to incorporate the type of violence or the severity of the act, since it is a consolidated factor in literature, and in this case we cannot neglect to exclude it from the model. Therefore, the only difference in the variables from the first layer for the following is the severity variables, the rest remains the same<sup>10</sup>.

### 3 Database in the study of violence

#### 3.1 Historical context of databases on domestic violence

The lack of data in Latin American countries makes understanding criminalization an arduous task. Information on frequency, absolute numbers or rates, when disclosed, are made without any correlation or evidence that may explain the crime phenomenon. According to Lima (2008) the applicability of criminal statistics is not used as a way of thinking of public institutions in Brazil, there are no centers of study that can give interpretation to the data. Still according to the author,

“ the analysis of Brazilian criminal statistics reveals that data exist and are part of the country’s criminal justice system history, but it does not turn, even after redemocratization, into information and knowledge. The increase in the amount of data produced, resulting from the technological modernization of the state, in turn, causes the opacity of overexposure and allows transparency discourses to be assumed but does not provoke changes in the rules and practices of government (what’s the use of having millions of records available if the non-specialist user does not know what they mean or translate?).”

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<sup>10</sup> We can also treat inside the model that the same variables set is considered between flows, it is sufficient to consider in the first step that the coefficients of the severity variables have the value constraint equal to 1

This phenomena of quality and disclosure of criminal data is an issue in Latin America, as pointed out by [Alvarez \(2014\)](#). The lack of appropriate information leads to inadequate security measures, there is no standard methodology in Latin America that enables comparability. In the context of Latin America, as pointed out by [Baliki \(2014\)](#), the last surveys were applied in 2009-2010 by LatinoBarometre and between 2000 and 2008 by the ICVS, the surveys were not focused on the issue of domestic violence.

There is scarce data on domestic violence in Brazil. According to [Alves, Dumaresq e Silva \(2016\)](#), the discussion on violence against women as a public issue rather than a private one is new. Still according to the author, the studies already carried out are difficult to guide the diagnosis on domestic violence. Policies and analyzes of this theme are based on incomplete data, which can be accessed in the notification system from the Ministry of Health and the National System of Statistics of Public Security and Criminal Justice from the Ministry of Justice. [Andrade et al. \(2016\)](#) on their work use these data from the health system, SINAN, to study the prevalence of violence against women, as well as the characterization of the victims, in the state of Minas Gerais.

As we can see, there is no condenser or a policy that consolidates this information in a consolidated way. That is, there are no research centers that are equipped with current data so that there is a diagnosis of the problem. As noted [Perova e Reynolds \(2015\)](#) (The World Bank), there is no national survey that can raise issues related to domestic violence in the country. As the authors point out, there is a great challenge in getting this information.

The latest research on victimization in Brazil was in 2012, [SENASP \(2013\)](#). The survey includes 12 types of crime, stealing (1) and cars theft (2), stealing (3) and motorbikes theft (4), stealing (5) and theft (6) of objects or goods, kidnapping (7), frauds (8), traffic accidents (9), assaults (10), sexual offenses (11) and discrimination (12). Regarding information on violence against women, according to the survey 24.3% of women suffered sexual harassment in their homes. About the identity of the offender 6.7% reported on their current mate, 6.7% were former mates. Regarding the report of sexual act, 37.8% did not report the act, 33.4% informed relatives and 28% reported to friends<sup>11</sup>.

There are countries that already have surveys capable of collecting information regularly to further understand the nature of crime, expanding the knowledge gained from official sources of public safety. For example, in the USA there is the National Crime Victimization Survey (NCVS) whose data are collected since 1973 and currently, every year, a sample of 90,000 households, where 160,000 people are interviewed.

As noted, the most recent research is limited in analyzing effects of violence against women, much less in analyzing domestic violence. Therefore, a database is needed that contemplates and expands the issue on domestic violence at the individual level. As well as the creation of a database is essential, as in other countries, monitoring and collecting data on victimization is, especially related to domestic violence.

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<sup>11</sup> Perhaps the only longitudinal database on victimization in Brazil is the survey carried out for the city of São Paulo in 2003, 2008 and 2013, [CPP-Insper \(2013\)](#). The research covers the topics of theft, robbery, aggression and larceny crimes. Regarding physical and verbal aggression, in 2013, 32.9% and 12.3% of the victims recorded the incident, respectively. In the executive summary, specifically, it was not possible to obtain information on cases of aggression against women.

### 3.2 PCSVDF<sup>MULHER</sup> Database

This study is part of the PCSVDF<sup>MULHER</sup> (Survey of Socioeconomic Conditions and Domestic and Family Violence against Women<sup>12</sup>). A total of 10,094 women, aged 15-49, were interviewed, distributed in all nine capitals of Northeastern Brazil. This research has interdisciplinary characteristics whose objective is to study domestic violence, the health of women and children, the household relationship between woman and man.

For the research proposal, there were some restrictions on the 10,004 women in the total sample. The first selection criterion is to consider women who have or had partner(s) over a lifetime<sup>13</sup>. The second restriction is to consider those women who agreed to respond to the section about partner violence acts. Considering these restrictions and the missing information from the variables used in the econometric model, we get 4,862 observations.

### 3.3 Measures

#### **Dependent variable:**

The dependent variable consists of three transitions: 1) woman suffered or not domestic violence, 1 = Yes and 0 = No; 2) since she suffered violence the woman reported, 1 = Yes and 0 = No; 3) woman have decided to seek help from the police/DEAM, 1 = Yes and 0 = No. The first variable was created to verify if the woman received any violent, emotional, physical or sexual act during her whole life. The second variable describes if woman reported for some of the 16 options in the table 4. Finally, the third variable was created considering only choices 1 or 2 from the table, that is, the woman sought help from the police, DEAM or both<sup>14</sup>. It is interesting to mention two additional information:

1. the first is the difference between reporting and speaking. The act of speaking to someone is not necessarily an act of reporting, and it is not being considered in this work. In this study we use "to report" in the sense that the woman went to a place or someone's place to get help.
2. the second observation is about the variable of the third layer, we are considering that the woman went to the police/DEAM, regardless whether she went to other places or other people's place, since she has gone to make the communication of the act to the police, or DEAM, or both.

#### **Control variables:**

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<sup>12</sup> The main motivation for the PCSVDF<sup>Mulher</sup> was to develop a unique, longitudinal data set that would allow the study of domestic violence, resource allocation and the distribution of bargaining power at home, health outcomes and children's cognitive-emotional development through an interdisciplinary approach. The group of scientists in charge of the first two waves (2016-2017) of PCSVDF<sup>Mulher</sup> was: José Raimundo Carvalho (CAEN/UFC and LECO/CAEN, Brazil - Principal Investigator and Study Coordinator), Heidi Collieran (Max-Planck-Institut für Menschheitsgeschichte, Germany), Thierry Magnac (University of Toulouse, France), Miriam Muller (World Bank, USA), Elizaveta Perova (World Bank, USA), Victor Hugo de Oliveira (IPECE and LECO/CAEN, Brazil), Climent Quintana-Domeque (University of Oxford, UK), Eva Raiber (University of Toulouse, France), Paul Seabright (Institute for Advanced Study in Toulouse, France), and Jonathan Stieglitz (Institute for Advanced Study in Toulouse, France).

<sup>13</sup> The question of cohabitation does not matter. Women may (or may not) be/have lived in cohabitation.

<sup>14</sup> Information for the reader: joint use of the police/DEAM is due to the confusion of many people by the practical use of the term "going to the police" being interpreted as "going to the police station". That is, there is in some cases a certain intersection of the use of concepts. So we decided to use "seek for the police/DEAM" concurrently as a final decision of the victim

– *Demographic variables:*

Based on the literature, the characteristics of the victims should be analyzed. Thus, **Age** is a variable with values between 15 and 49 years. **Education** is numerical where the value 1 represents no schooling and the value 9 represents graduate.

For the socio-demographic binary variables we have: **Woman's religion** classified as 1 = Catholic and 0 = Non-Catholic; **Woman's race** encoded as 1 = White and 0 = Not white; **Bolsa Família** 1 = Yes and 0 = No; **Woman smokes currently** 1 = Yes and 0 = No; **Woman drinks currently** 1=Yes and 0=No; **Woman is mother** 1 = Yes and 0 = No;

– *Knowledge variables:*

The current research explores the woman's knowledge on intimate partner's violent acts, based on the prerogative that the victim is a rational agent in choosing to report a crime or not, that is, there is a cost x benefit. To understand women's knowledge, the research includes three domains:

1) The first domain tries to understand if the victim knows that the act practiced by her partner is a violent act, that is, she may be a victim, but for her the act is not condemned by justice, then it is treated naturally by the victim;

“The Maria da Penha Law was enacted in 2006 and brought many important changes to help fight DOMESTIC VIOLENCE. However, it is not clear if all women know what the law defines as DOMESTIC VIOLENCE. I will now read some sentences and ask you if you consider each to be an act of DOMESTIC VIOLENCE.”

2) The second domain analyzes that the woman understands that the action of her partner is an act of violence, however she does not know the law contents, therefore the act is susceptible of legal intervention;

“Please, listen carefully to each item and then answer if you agree that it is addressed by the "Maria da Penha Law", that is, considered by it:”

3) The third domain seeks to understand the victim's knowledge about the programs and services offered to victims. Since the victim may know that the act suffered by her partner is violence, knows that it is legally supplied, but may not know that there are such benefits.

“Now we would like to know more about what you know about women's rights and the different services available to support women who experience domestic violence. I will read out the name of a few laws, programs and available services to women. How often would you say you have heard about...”

4) The fourth domain is related to the acceptance of woman before man's violent acts. That is, man's violent acts may be justifiable in reaction to a woman's behavior. The following question deals with this subject:

“In your opinion, do you agree to be justifiable for a husband / partner to give slaps, punches, shoves, kicks or any other act of physical violence on his wife / partner in the following situations:”

For the first and second domains we have 6 (six) questions for each, whose answer option is a scale from 1 to 5, where 5 represents total agreement and 1 represents total

disagreement where the question is about a violent act. For the third domain we have 7 (seven) questions whose answer option is a scale of 1 to 3, where 1 represents “Never”, 2 represents “A little” and 3 represents “Many times”. And finally, in the fourth domain there are 5 questions whose answer varies between 1, total agreement, and 5, total disagreement. Questions can be seen in the table 5.

To create the scale, the sum of the answers among the questions that compose the domain was made for each domain. Then for all scales we standardize in the interval<sup>15</sup> 0 to 10. So for the first, second and third domains the higher the scale value the larger the knowledge about domestic violence. For the fourth domain, the greater the scale value the less the woman will accept that it is justifiable that a man attacks her for some of her behavior.

– *Violence experience:*

Three binary variables, emotional, physical and sexual violence, make up this section. These variables will only be considered in the 2nd and 3rd layer of the violence flow. It is considered emotional violence the following actions: insulting, depreciate in front of family or other people, intimidating, threatening to hurt the woman or someone. Physical violence is considered when: slapping, kicking, dragging, beating, pushing, threatening/using a gun or a weapon against the woman. Sexual violence is considered as the following actions: forcing sexual relations, forcing something degrading or humiliating, having relationships for fear of the partner’s reaction.

– *Additional information:*

The  $PCSVDF^{MULHER}$  has a range of questions that are able to go beyond what is already measured in the literature. One of the questions is if the woman **tolerates/accepts physical violence** to keep the family together. This question has five options of answer, between strongly agree and strongly disagree. For those who answered “agrees a little” and “strongly agree” we codified 1 and for other answers, “neither agree nor disagree”, “disagree a little” and “strongly disagree” as 0.

Another question is about violence acts in **social circle**. It is asked if in the last 12 months some woman in her social circle has been victim of exclusively physical violence perpetrated by the partner. The variable has only the answers 1 = Yes or 0 = No.

– *Police Information:*

We mentioned the importance of analyzing the impact of **DEAM** on the violence flow. We consider two variables for this purpose. The first binary variable refers if the DEAM service is available in the city where woman resides. The only capital that does not have a DEAM is Aracaju/SE, receiving value 0, and the other eight capitals received a value of 1. The second binary variable is if the capital has an **DEAM on duty 24 hours**. Only the capitals<sup>16</sup> Recife and Salvador receives a value 1, other capitals the value 0. Finally we added a binary variable that corresponds to **presence of the police in the neighborhood** where 1 = Yes and 0 = No.

In the table 1 we present the descriptive summary of the predictor variables of the

<sup>15</sup> The intention to apply such procedure is to simulate the score obtained in a knowledge test. As usual, most evaluative tests range from 0 to 10.

<sup>16</sup> It is emphasized that Fortaleza’s DEAM is an on-call center since September 2016, right after the  $PCSVDF^{MULHER}$  data collection

model. Analyzing the table we note that: the average age of women was 33 years; in vast majority, 76% are white; there is some balance in women's religion, almost 50% are Catholic and 50% are non-Catholic; the average education was 4.7, considering the original scale, this woman has high school; few smoke; 40% ingest alcohol, and 42% of women currently work; many are mothers. Regarding to knowledge about domestic violence, many have obtained high values in the knowledge scale: about domestic violence acts, the average was almost 90; about acceptance, the average was 95, showing that many women disagree that it is justifiable for women to suffer violence based on their behavior; we had satisfactory result regarding the knowledge about the Maria da Penha Law; however, a median result on the knowledge of services and programs offered to women in situations of violence. In Other Information section: few women tolerate domestic violence; an expressive number of 31% of women know women from their social circle who are victims of physical violence. In the police information section 85% of women perceive the police presence. In the last section we describe the data distribution regarding domestic violence: the most prevalent violence in data was the emotional, 26%.

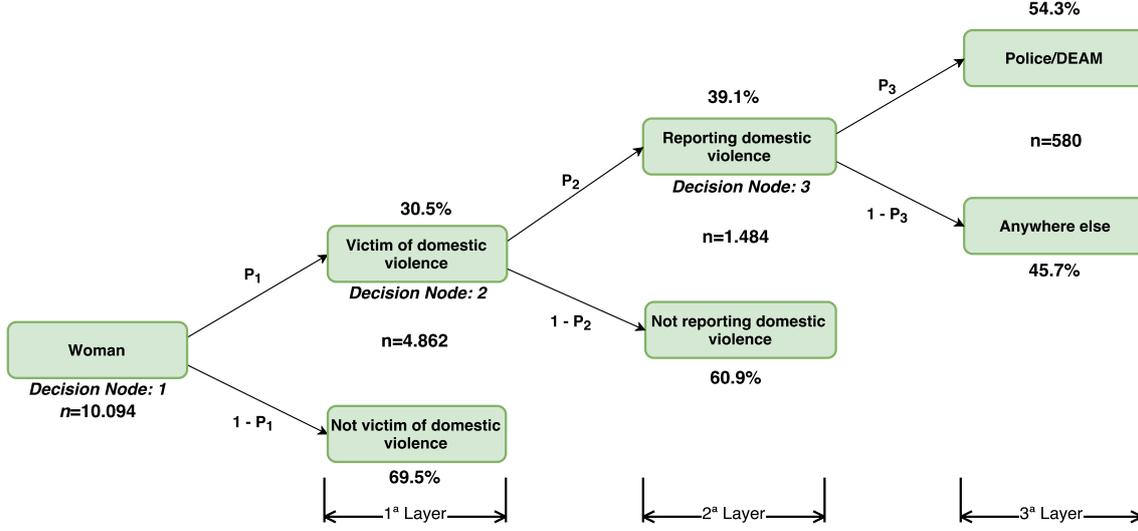
Table 1 – Variables description and their statistical summaries in 2016 (n=4.862)

Variables	Description	mean ( $\pm$ SD)	Min	Max
<b>Socio-economic</b>				
Age	Age in years	33.10 ( $\pm$ 9.38)	15	49
White	Woman's race	0.76 ( $\pm$ 0.43)	0	1
Catholic	Woman's religion	0.51 ( $\pm$ 0.50)	0	1
Education	Woman's education	4.71 ( $\pm$ 1.90)	1	9
Bolsa Família	Woman received Bolsa Família	0.20 ( $\pm$ 0.40)	0	1
Work	Woman works currently	0.42 ( $\pm$ 0.49)	0	1
Smoke	Smoke currently	0.08 ( $\pm$ 0.27)	0	1
Drink	Drink alcohol currently	0.39 ( $\pm$ 0.49)	0	1
Woman is mother	Woman is mother	0.72 ( $\pm$ 0.45)	0	1
<b>Knowledge</b>				
Domestic violence	Scale of knowledge about domestic violence	8.91 ( $\pm$ 2.01)	0	10
Maria da Penha Law	Scale of knowledge about Maria da Penha Law	8.06 ( $\pm$ 1.51)	0	10
Programas and services	Scale of knowledge about programas and services	6.37 ( $\pm$ 1.52)	0	10
Acceptance	Scale of knowledge about acceptance of violence	9.52 ( $\pm$ 1.37)	0	10
<b>Others informations</b>				
Victim at Social network	Woman has victim(s) from her social network	0.31 ( $\pm$ 0.46)	0	1
Tolerate physical violence	Woman tolerate physical violence	0.02 ( $\pm$ 0.15)	0	1
<b>Police informations</b>				
DEAM	Presence of DEAM in city	0.90 ( $\pm$ 0.30)	0	1
DEAM 24h	DEAM on duty 24 hours	0.25 ( $\pm$ 0.44)	0	1
Police presence	Police presence at neighborhood	0.85 ( $\pm$ 0.36)	0	1
<b>Violence experience</b>				
Emotional violence	Suffered emotional violence	0.26 ( $\pm$ 0.44)	0	1
Physical violence	Suffered physical violence	0.17 ( $\pm$ 0.37)	0	1
Sexual violence	Suffered sexual violence	0.07 ( $\pm$ 0.26)	0	1

## 4 Econometric Model

The flow and process of violence can be seen more widely by the following figure 2. Most current studies in the area of domestic violence and crime reporting (general or domestic violence) consist of determining the factors that explain each layer of this structure separately. However, in our model we understand that there are three paths to be studied in the topic of domestic violence.

Figure 2 – Empirical violence tree



The proposal of this research is to extend the empiricism of the violence study considering a structure of violence. We want to explore the effects of predictor variables along the tree. We want to determine which factors have the greatest impact on the probability of transition tree. To achieve this goal, the Logit Sequential Model is applied.

#### 4.1 Logit Sequential Model

Differently from traditional methodologies the proposal of the current research is to estimate the entire violence flow. To achieve this goal we will apply the Logit Sequential Model (MADDALA, 1983). This model has the characteristic of describing a sequence of decisions or steps. Another feature of this model is that it can be estimated through separate logistic regressions at each transition of sub-sample (BUIIS, 2015).

The logit sequential can be seen as:

$$P_1 = P(\text{violence} = 1 | \mathbf{X}) = \Lambda(\mathbf{X}\beta_1)$$

$$P_2 = P(\text{report} = 1 | \mathbf{Z}, \text{violence} = 1) = \Lambda(\mathbf{Z}\beta_2), \text{ if suffered violence}$$

$$P_3 = P(\text{police} = 1 | \mathbf{Z}, \text{report} = 1) = \Lambda(\mathbf{Z}\beta_3), \text{ if decided report}$$

$\Lambda()$  function is the logistics function,  $\Lambda(.) = \frac{\exp(.)}{1+\exp(.)}$ . It is observed that we have two sets of data,  $\mathbf{X}$  and  $\mathbf{Z}$ . The conditional probability that women go through transition  $k \in P_k$ . Then, for example,  $\beta_{1k}$  is the effect between the first variable  $x_{1k}$  and the probability to pass the transition  $k$ . As discussed previously, the only difference we will have in  $\mathbf{Z}$  is the insertion of three severity indicators.

As Buis (2015) points out, this model has two main characteristics. The first is to estimate the relationship between the variables/factors of interest and the probability of going through transitions. The second is to explore the effect of these variables on achieving the highest flow result, through the weighted sum of these effects between transitions (see Buis (2015)).

Our model has three final paths, namely:

1. Woman suffered violence
2. Woman suffered violence & decided to report the crime
3. Woman suffered violence & decided to report the crime & decided to ask for help from the police/DEAM

Looking at the figure 2, we can treat these paths through the probabilities:

1.  $P_1$
2.  $P_1 \times P_2$
3.  $P_1 \times P_2 \times P_3$

Through this type of probability structure we can calculate, for example, the marginal effects of the variables considered in this study on the total probability of woman being a victim, then decide to report the crime and then go to the police/DEAM, that is,  $P_1 \times P_2 \times P_3$ . The marginal effect, say  $x_j$ , on each final result consists of a weighted sum of log-odds effects of  $\beta_{jk}$  at each transition, for details see Buis (2015). The weights are calculated as follows:

i) the proportion of people at risk of going through transition. Transition gets heavier if more people go through it.

ii) indicator variable variance to go or not through the transition. Transition gets heavier if the probability of going through is close to 50%.

iii) difference between the expected outcome between those who passed and the one who did not. Transition takes on more weight if individuals earn more in the transition.

As we can find in Buis (2010), the weights are the product of the risk ratio, the variance, and the expected gain:

$$\frac{\partial \text{outcome}}{\partial x_j} = \sum (\text{at risk}_k \times \text{variance}_k \times \text{gain}_k) \beta_{jk}$$

In addition to calculate these two characteristics, the author developed a sensitive analysis in the model whose objective is to analyze the non-observable effects. On his work Buis (2011) proposes a tool that can help in the investigation of the unobserved heterogeneity problem comparing and simulating different scenarios. The author addresses several ways to incorporate the unobserved effect. In our model we will not study this problem in depth, analyzing each situation or scenario. In the current research we will analyze the case where we assume that the unobserved quantity is constant between transitions, having a standard normal distribution. This effect not observed in our model can be visualized in the following configuration:

$$\begin{aligned}
 P_1 &= P(\text{violence} = 1 | \mathbf{X}) = \Lambda(\mathbf{X}\beta_1 + \beta_u u) \\
 P_2 &= P(\text{report} = 1 | \mathbf{Z}, \text{violence} = 1) = \Lambda(\mathbf{Z}\beta_2 + \beta_u u), \text{ if suffered violence} \\
 P_3 &= P(\text{police} = 1 | \mathbf{Z}, \text{report} = 1) = \Lambda(\mathbf{Z}\beta_3 + \beta_u u), \text{ if decided report}
 \end{aligned}$$

where  $u$  is the standardized non-observed variable having a distribution  $N(0, 1)$ , while  $\beta_u$  is the common feature between transitions. We can see this problem in another way. According to Buis (2011),  $v = \beta_u u$  may be understood as a random error or nonstandard random variable. Note that  $v$  has standard deviation  $\beta_u$ , so it is an unobserved non-standard variable.

## 5 Results

The following results consists of three parts. The first is the analysis of predictor variables throughout the sequential model, in this model we will analyze the effects produced by them between transitions, in the second part, we estimate the total effects of the variables on the final result, finally we will discuss a little about the unobserved effect.

A logit sequential model was estimated to analyze the variables behavior in the violence tree, the results can be seen in Table Tabela 2. In the following table, the coefficients are in the form of marginal effect, that is, it is the effect on the result probability. The first model examines the effects of predictor variables on the probability of women suffering domestic violence, in the second one, we analyze the effect of these variables on the probability of reporting violent act (since she was a victim), and finally, in the third decision, we analyze the behavior of these variables in communicating to the police/DEAM (since she was victims and decided to report). In all models we have socioeconomic variables, knowledge, police and DEAM presence, and violence variables. However, it is worth remembering that the severity of violence will be analyzed in the last two decisions.

### Effects on Domestic Violence

Considering the first stage, we find some results that may explain the violence phenomenon. We highlight initially the effect of Bolsa Familia, where it increases by 5% the likelihood of suffering violence, confirming with literature findings in the Moreira et al. (2016) work. Being Catholic reduces the likelihood of suffering violence by approximately 10%. Being a smoker has a very significant value on being a victim of violence at 14%. A woman who got the maximum score, 10, of the questions related to Maria da Penha Law reduces by 10% of suffering violence. Women who have in their social circle other women who have been victims of physical violence by the partner are 17% more likely to be victims by their partner, that is, if woman is inserted in a social environment where this kind of act is common, then there is a high association that she will be the victim of her partner. Join to this, besides the woman being inserted in this context, if the woman tolerates violence to keep the family together, she will be 27% more likely to be a victim. One of the analysis points in our research is to observe the DEAM effect as a public policy against domestic violence. It is observed that the 24-hour DEAM has an inhibiting effect of violence, that is, in numbers, the 24-hour DEAM reduces by 3% the probability of woman suffering violence. Another factor that may impact on the reduction of violence is the police presence in its neighborhood, which has an inhibiting effect of reducing the probability of a woman to be victimized by 3%.

### Effects on crime reporting

Regarding the decision to report the violent act by the partner, we find interesting results that corroborate with the findings on literature. The first of them goes to the

Table 2 – Summary of the Logit Sequential Model, n=4.882

Variable	Violence vs no violence	Report vs no report	Police/DEAM vs no police/DEAM
<b>Socio-economic</b>			
Age	0.001 (0.001)	0.002 (0.001)*	-0.002 (0.002)
White	0.010 (0.015)	-0.006 (0.017)	-0.077 (0.044)*
Catholic	-0.096 (0.013)***	-0.006 (0.015)	-0.053 (0.039)
Education	-0.014 (0.004)***	0.000 (0.004)	-0.015 (0.011)
Bolsa Família	0.049 (0.017)***	0.014 (0.018)	0.023 (0.043)
Work	0.014 (0.013)	0.002 (0.015)	0.064 (0.039)
Smoke	0.143 (0.026)***	0.026 (0.023)	-0.081 (0.047)*
Drink	0.088 (0.014)***	0.004 (0.015)	0.027 (0.039)
Woman is mother	0.061 (0.015)***	0.007 (0.019)	0.179 (0.050)***
<b>Knowledge</b>			
Domestic violence	0.000 (0.033)	0.006 (0.041)	-0.009 (0.113)
Maria da Penha Law	-0.010 (0.042)**	0.005 (0.051)	0.051 (0.143)***
Programas and services	0.004 (0.043)	0.010 (0.052)**	0.050 (0.131)***
Acceptance	-0.001 (0.047)	0.016 (0.060)***	0.017 (0.157)
<b>Others informations</b>			
Victim at Social network	0.171 (0.015)***	0.017 (0.015)	0.022 (0.037)
Tolerate physical violence	0.275 (0.046)***	-0.002 (0.032)	-0.083 (0.070)
<b>Police informations</b>			
DEAM	0.029 (0.021)	-0.024 (0.027)	0.134 (0.055)**
DEAM 24h	-0.030 (0.015)**	0.081 (0.020)***	-0.056 (0.041)
Police presence	-0.031 (0.018)*	-0.014 (0.020)	0.021 (0.046)
<b>Violence experience</b>			
Emotional violence	-	0.112 (0.015)***	-0.038 (0.059)
Physical violence	-	0.178 (0.014)***	0.226 (0.037)***
Sexual violence	-	0.044 (0.017)**	0.096 (0.041)**

Signif. codes: '\*\*\*' 0.01 | '\*\*' 0.05 | '\*' 0.1

Coefficients are the marginal effects and between parentheses are the standard errors

UThe STATA software was used through the package *seqlogit*

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literature on the theme of communicating the act, socioeconomic variables are not able to explain this decision, only age had a mild positive effect on reporting, older people tend to report more, as pointed out Skogan (1976) and MacDonald (2001). About the level of knowledge, we had good explanatory power in the variable knowledge of programs and services in care of women, women who scored a maximum of 10, increase the likelihood of reporting by 10%. The severity of violent act continues to be the variable that most impacts on the probability of reporting the crime, as the literature points out. The size of the effect was quite significant, women who suffered some of the types of physical violence have almost 18% more probability in reporting the crime, those who suffered some kind of emotional violence have 11% reporting, and finally, experiencing some sexual violence is the lowest with 4.5%. Regarding the DEAM effect, we observed the immediate effect of a 24-hour DEAM. Cities that have an 24-hour DEAM positively impact 8% on the likelihood of women deciding to report the crime.

### Effects on requesting help for the police/DEAM

In the last phase of decision we have the woman's choice to go to the police/DEAM. Similar to the second decision, few socioeconomic variables were significant. For women who are mothers, there is a high probability of nearly 18% of them reporting their partner's

violent act to the police. Faced with this, woman tries to protect her children from the contact of violence, maximizing her search for help (MORENO; GUEDES; KNERR, 2012). White women have a negative impact on seeking help for the police whose probability reduction is about 8%. Again, in the knowledge variables we had good effects, considering the knowledge of the Maria da Penha Law and the services and programs, both increase by 5% the probability of seeking help to the police/DEAM. The severity variables also continue in this decision as the variables that have greater explanatory power. Having suffered physical violence impacts 22% on the probability of seeking help to the police, having suffered sexual violence increased by 10%, but having suffered sexual violence there were no significant results. We found positive results in the physical presence of DEAM where woman lives, the existence of a DEAM impact 13% in the increase of probability to report for women victims of domestic violence.

### **Joint effects on the probability of the final result**

We will now discuss the results achieved in explaining how the variables behave to achieve the final outcome of the flow. The final result is three, the first result is to be a victim, the second is to be a victim and decide to report and the third is to be a victim, to report, and to ask for help for the police/DEAM.

It is worth mentioning the attempt to explain the total effect within the flow. As we pointed out, there is no research in the domestic violence area that takes into account the entire flow from the 1st layer to the 3rd layer. Researchers restrict themselves to analyzing each step separately. We estimate the entire flow and now we will look at the joint effects highlighted in the section 4.

The table 3 has these three total effects. It is easy to see that the first total effect is actually the first layer effect of the 2 table, so we will not comment on those results, since we have done before.

Let's observe the second total result, which is "being a victim and reporting the crime". First, it is observed that there are now many significant results, unlike what was observed in the table 2. A second point to note is the small effect size of the severity variables. "Being Catholic" represents almost 8% in reporting crime, educational level has significant and positive effect. Note the 3% negative effect of the Bolsa Familia on reporting the crime, women who receive Bolsa Familia are more likely to be financially dependent on the partner by making the woman remain silent, corroborating with the literature. So is the fact that the woman is mother, the negative effect of almost 5% on reporting the crime. Another important factor is due to the social circle of the woman, if woman is inserted in an environment where domestic violence is common, then she has less 13% probability of not reporting the crime, we can understand that because it is something present in the woman's daily life, for her perhaps there is no solution for this type of conflict with her partner. Looking at this conjecture, the woman who accepts physical violence has less 22% reporting the act to someone else. Regarding the victim's rationality, the only significant one was the Maria da Penha Law, with 10% reporting the crime.

In our study we are mainly interested on DEAM effect. Verifying these effects still in the second final result, we noticed that the presence of DEAM was negative of 3%, this fact can be justified by the reverse effect. In fact what can be happening is a reduction in the crimes numbers, since the report decreases. Regarding the 24-hour DEAM effect, the results show a positive effect, the availability of the 24-hour operation impacts on the

Table 3 – Total effect of the violence flow

Variable	Violence vs no violence	Suffer violence and Report a crime	Suffer violence Report and go to the police/DEAM
<b>Socio-economic</b>			
Age	0.001 (0.001)	0.000 (0.001)	0.000 (0.000)
White	0.010 (0.015)	-0.010 (0.013)	-0.005 (0.004)
Catholic	-0.096 (0.013)***	0.075 (0.012)***	-0.014 (0.004)***
Education	-0.014 (0.004)***	0.011 (0.003)***	-0.002 (0.001)**
Bolsa Família	0.049 (0.017)***	-0.035 (0.015)**	0.009 (0.005)*
Work	0.014 (0.013)	-0.011 (0.012)	0.006 (0.004)
Smoke	0.143 (0.026)***	-0.103 (0.023)***	0.010 (0.007)
Drink	0.088 (0.014)***	-0.069 (0.012)***	0.011 (0.004)***
Woman is mother	0.061 (0.015)***	-0.046 (0.014)***	0.018 (0.004)***
<b>Knowledge</b>			
Domestic violence	0.000 (0.033)	0.002 (0.029)	0.000 (0.010)
Maria da Penha Law	-0.010 (0.042)**	0.010 (0.037)***	0.003 (0.013)**
Programas and services	0.004 (0.043)	0.000 (0.039)	0.005 (0.013)***
Acceptance	-0.001 (0.047)	0.006 (0.042)	0.003 (0.015)**
<b>Others informations</b>			
Victim at Social network	0.171 (0.015)***	-0.131 (0.013)***	0.020 (0.004)***
Tolerate physical violence	0.275 (0.046)***	-0.224 (0.042)***	0.014 (0.012)
<b>Police informations</b>			
DEAM	0.029 (0.021)	-0.030 (0.018)*	0.010 (0.005)*
DEAM 24h	-0.030 (0.015)**	0.049 (0.013)***	0.004 (0.004)
Police presence	-0.031 (0.018)*	0.020 (0.016)	-0.003 (0.005)
<b>Violence experience</b>			
Emotional violence	-	0.037 (0.005)***	0.014 (0.004)***
Physical violence	-	0.059 (0.004)***	0.042 (0.004)***
Sexual violence	-	0.015 (0.006)**	0.013 (0.004)***

Signif. codes: '\*\*\*' 0.01 | '\*\*' 0.05 | '\*' 0.1

Coeficientes são os efeitos marginais e entre parênteses estão os erros padrões

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immediate decision of woman. Therefore the 24-hour DEAM may be an encouraging effect for woman to decide to report the crime. Dilution of severity levels is also apparent.

Observing the total effect of the third result, that is, suffering violence, reporting and going to the police/DEAM, we noticed that the Bolsa Familia and being a mother effects have now been positive. We can understand that the woman decision goes against the hypothesis of [Gottfredson e Gottfredson \(1988\)](#) in the sense that woman demands the mandatory and intervention of the state to a situation that is no longer under her control. Similarly, when a woman has victims in her social circle, she increases by 2% to go to the police/DEAM. Regarding the severity indicators, there was a reduction in these effects when compared to the separate logistic regression, continuous physical violence keeps the greatest effect on the total probability. On the DEAM presence the effect was positive close to 1%.

### Unobserved heterogeneity

The proposal to add an unobserved heterogeneity diagnosis is to evaluate how sensitive the results may be. The strategy is to create multiple scenarios and analyze the unobserved effects degree. Our main variable in observation is the Women's Specialized Police Station (DEAM). We analyze how this variable behaves under a random effect of a standard normal distribution, varying in a range of -3 to 3. Since the variable 24-hour DEAM was significant only in the first and second layers of the table 2, we will analyze the effect in these layers, the same happens with the DEAM where we obtain results only of the third layer. The graphs of these effects can be seen in figure 3. In the graphs we present the Odds-Ratio effects, due to the computational practicality, the use of Odds-Ratio will not change the interpretation of the effect direction. We can interpret this unobserved effect as per-capita spending on public security, or as spending on advertising and others, variables used in the work of [Perova e Reynolds \(2017\)](#). The results were not satisfactory, there is a dubiety in the unobserved effect. For example, if there is a shock of 1 standard deviation for more or less in the unobserved heterogeneity, then this shock has an equal impact on the model in the three comparisons we are considering.

## 6 Discussion and Conclusion

Works that analyze the whole domestic violence flow through the sequential structure of aggressor and victim decisions do not exist in the criminological literature. Much of the literature estimates the flow stages restricted to the sample, limiting itself to studying only one decision. The present work extends the scope of this theme applying a sequential model in the theme. This model has some interesting features. One of them is to understand how the variables behave between transitions, we can analyze which of them has greater explanatory power in the transitions passage. Another interesting point of this model is the ability to analyze the total effect for a final result. In our study we had three possible final results: the woman was victim of her partner, the woman is victim and decided to report, and as last result the woman is victim and she decided to report and sought for help in the police/DEAM.

We note that there are few international studies that specifically study crime reporting when domestic violence is the problem. In Brazil, there are almost no studies that can go beyond simple prevalence reports, perhaps the only work that addresses this theme of crime reporting is [Kiss et al. \(July 2012\)](#). In this way, there is an ignorance of factors that can impel and direct public policy agendas, both for crime prevention and policies that can encourage women to seek help in such situations. In addition to extending the discussion and understanding of this problem, the present work incorporates in the Brazilian and world literature a study of the Women's Specialized Police Station (DEAM) impact.

As the authors [Moreira et al. \(2016\)](#), [Ellsberg et al. \(2015\)](#), [Pasinato e Santos \(2008\)](#) and [Perova e Reynolds \(2017\)](#) reinforce there is still much to study about public policies capable of facing one of the great problems of the 21st century, the domestic violence. In our work we have capitalized on two public policies. We highlight the DEAM role as a catalytic source to inhibit and/or report more crime. And also in a superficial or indirect way we analyze a government program, the Bolsa Família Program<sup>17</sup>. The Bolsa Família effect brings an aspect of social vulnerability to which the woman is inserted. We found out that women in this context are more likely to be victims of domestic violence.

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<sup>17</sup> The Bolsa Família program is a direct income transfer program, aimed at families living in poverty and extreme poverty throughout the country.

DEAM obtained plausible effects in both the sequential model structure and the total effects. Our study helps to understand the DEAM role in inhibiting and communicating the act, contributing to the scarce literature on the effectiveness of public policies in police programs. In fact, observing the first estimate, table 2, it is highlighted that the DEAM has an inhibiting effect on acts prevention of domestic violence, specifically if DEAM is 24-hour we can reduce the likelihood of intimate partner violence by 3%, and we found robust values in the explanatory power to communicate, increasing by almost 8.1% the probability. In short, 24-hour DEAM impacts on inhibition and communication. Still observing the same table, the DEAM presence increases by almost 13% in seeking police help. These numbers are quite encouraging if we treat the estimates separately, restricting the sample. But with total probability we find another interesting result, table 3. We observed that the DEAM presence has a negative impact on the second result. Such explanation can be attributed to the reduction of crimes, so with few crimes, less reports occurred. Finally, the DEAM impacts on increasing the likelihood by 1% in the joint domestic violence event, reporting and seeking help to police/DEAM.

Another interesting point of this work is to treat the variables effect in the form of marginal effect on probability. Practically all studies taken as reference use Odds Ratio. In the current research we chose to use the average partial effects (APE). This effect calculates the marginal effect of the variable of interest for each observation and then calculates the sample mean of that variable, that is,  $APE = E_x \left[ \frac{\partial E[y|x]}{\partial x} \right]$  (GREENE, 2011). Using APEs we facilitate the interpretation of the results, since we measure this effect controlling other variables.

We emphasize in our theoretical reference on the importance of victim’s rationality. We deal with it by inserting questions related to the victim’s knowledge about this topic. We made an analogy to an evaluative instrument whose score ranges from 0 to 10. We incorporate this rational structure through these knowledge indicators: about the Maria da Penha Law, on the actions of violence perpetrated by the partner and knowledge on services and programs to support women. We highlight mainly the knowledge about the Law. As we observe in the results, knowing about the Law impacts both on suffering violence and on communicating the crime. We found an increase effect on 10% in the probability of communicating. Therefore, it is useful to carry out and maintain governmental policies capable of bringing to discussion and knowledge about Maria da Penha Law to the social environment of women.

It is emphasized that we estimate the total probabilities in a sequential structure. Something that was not done before in the literature. Using this model, we find some results that were not previously captured in the literature. One of them is about the women socioeconomic characteristics. Analyzing the total effect of the second layer, participating in Bolsa Família and being a mother had negative effects on the probability of reporting the crime to someone. What we can explain about Bolsa Familia is because these women live in an unfavorable social environment and are dependent on their partners financially, this negatively impacts on communicating the violent act, as it ensures Basu e Famoye (2004) and Moreno, Guedes e Knerr (2012). The negative effect of woman being a mother can be explained by the question of trying to resolve the conflict internally, there is a private issue behind this fact as we have seen in the work of Gottfredson e Gottfredson (1988), or even a hope that the partner will change, as commented by Moreno, Guedes e Knerr (2012). We find that the greatest effect in this passage, in absolute terms, was related to the social circle and the tolerance for physical violence, but they have a negative impact.

When we analyze the severity variables effects on the total probability we find a certain controversy regarding its size. Initially, its effects were much larger in the logit sequential model, moreover, it is the variables that have the greatest explanatory power, especially when the violence was physical. However, when this same effect is analyzed from a perspective of a joint probability this effect has decreased dramatically. So when we restrict our sample we tend to overestimate some of our parameters. In this way, analyzing the effects on the chain makes it necessary. Possibly, inserting other motivational/rational variables into this sequential model we may have a greater explanatory power than the physical violent act. We see in the second total result a point that opposes the difference between suffering violence and accepting physical violence. The woman may suffer physical violence, but she may tolerate violence to keep the family together and therefore reduces the effect of the physical act. So it is not enough that she suffers the physical act, there is the tolerance factor that goes against the act. Therefore, campaigns that seek encouragement and mainly the mobilization of confrontation networks with a catalyst to reduce this tolerance. The work of the [Moreno, Guedes e Knerr \(2012\)](#) clearly summarizes the consequences of this violence, where one of them is mental health. Driving efforts to change this paradigm is critical.

The results and contributions of this study were only possible through the use of an unpublished database in Brazil, using an exhaustive methodological rigor in producing information with high quality. According to the [Loney et al. \(1998\)](#) ranking, the PCSVDF<sup>Mulher</sup> would reach the maximum score in quality.

We do not incorporate variables that can capture the offender characteristics, also, we do not incorporate variables that capture the level of the relationship between the couple, for example, one of the possible variables to measure would be the conversation level of the couple, that is, how often the couple talks about their daily lives. Another variable could be the discussion level of the couple, or even a variable that captures if the woman has already suffered domestic violence in other relationships, how aggressive the woman is to people. All of these indicators can be catalysts. Therefore, there is still much to be studied on the subject.

Future research may further enhance this work. One of them is to increase the sequential structure allowing another flow structure. In some cases the woman tends to remain in the private circle seeking subsidies and support from friends and family or other sources of help, then the woman decides to go on a legal quest and state intervention in the current problem. Other factors of the victim's rationality are able to explain the decision to seek help, such as fear of dying, fear of revictimization, fear of retaliation, child protection, and many others that will have strong explanatory power. As we pointed out, these factors are strongly correlated in the 2nd and 3rd layer.

## 7 Anexo

Table 4 – Places/people to get help because of domestic violence

Option	Description
1	Police
2	Women's police station (DEAM)
3	Service center for battered women
4	Special prosecutor's services / Public defender office of domestic violence
5	Brazilian's woman house
6	Dial 180
7	Hospital or health centre
8	Social services
9	Legal advice centre
10	Shelter
11	Local leader
12	Women's organization
13	Priest/Religious leader
14	Friends and family
15	Integrated center for women's support (CIAM)
16	Anywhere else

Table 5 – Issues that set the four areas

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**DOMESTIC VIOLENCE**

- 1- He belittles or humiliates her in front of others.
- 2- He does things to intentionally scare or intimidate her (for example, by yelling or smashing things).
- 3- He threatens to hurt her or someone that she care about.
- 4- He insists on having sex with her even after she initially refused his request.
- 5- He threatens to publish intimate photos or videos of her on the Internet?
- 6- He looks for calls/messages on her mobile phone, or he checks her email/social network account without her permission?

**PROGRAMS AND SERVICES**

- 1- The Maria da Penha Law
- 2- Women’s Specialized Police Station (DEAM)
- 3- Brazilian Women’s Shelter
- 4- Court of Domestic and Family Violence against Women / Prosecutors Office of domestic violence
- 5- Integrated Center for Women Support (CIAM)
- 6- Bureau of Policies for Women (SPM) / Bureau of Human Rights (SDH)
- 7- Dial 180

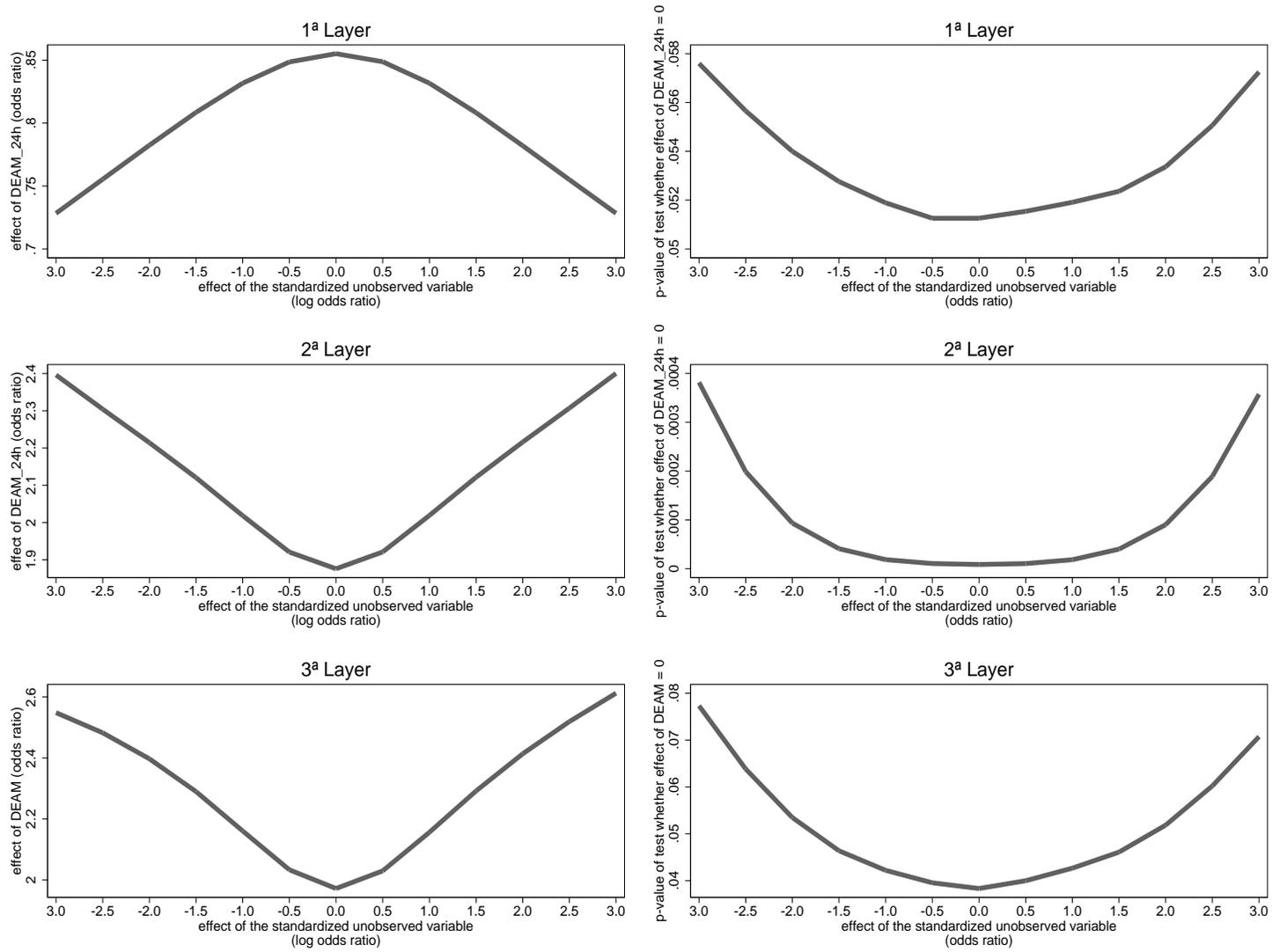
**MARIA DA PENHA LAW**

- 1- It is a law to punish the perpetrator for committing domestic violence
- 2- Under that law, only the victim can report the offender
- 3- Under that law, after reporting the aggression, a woman in some cases can not withdraw her complaint
- 4- The Maria da Penha Law applies equally to lesbians, transvestites, transsexuals and heterosexuals
- 5- The Maria da Penha Law applies to cases of violence perpetrated by ex-husbands/expartners/ ex-lovers
- 6- Female victims of domestic violence who can’t afford to hire an attorney can go to Specialized Women’s Police Stations

**ATTITUDES/NORMS ABOUT GENDER RELATIONS**

- 1- If she has many male friends?
  - 2- If she neglects the children of the couple?
  - 3- If she argues/fights with him?
  - 4- If she refuses to have sex with him?
  - 5- If she cooks bad food, doesn’t cook on time or doesn’t do laundry or other domestic chores?
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Figure 3 – Unobserved heterogeneity effect on DEAM and 24-hour DEAM



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