MESTRADO EM MEDICINA LEGAL E CIÊNCIAS FORENSES
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FATAL INTIMATE PARTNER VIOLENCE AGAINST WOMEN IN PORTUGAL

A Forensic Medicine National Study

Ana Rita Lopes Pereira
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A Forensic Medicine National Study

Thesis for the academic degree of Master of Legal Medicine and Forensic Sciences, under the scientific supervision of Teresa Maria Salgado de Magalhães (MD, PhD) and co-supervision of Duarte Nuno Vieira (MD, PhD)

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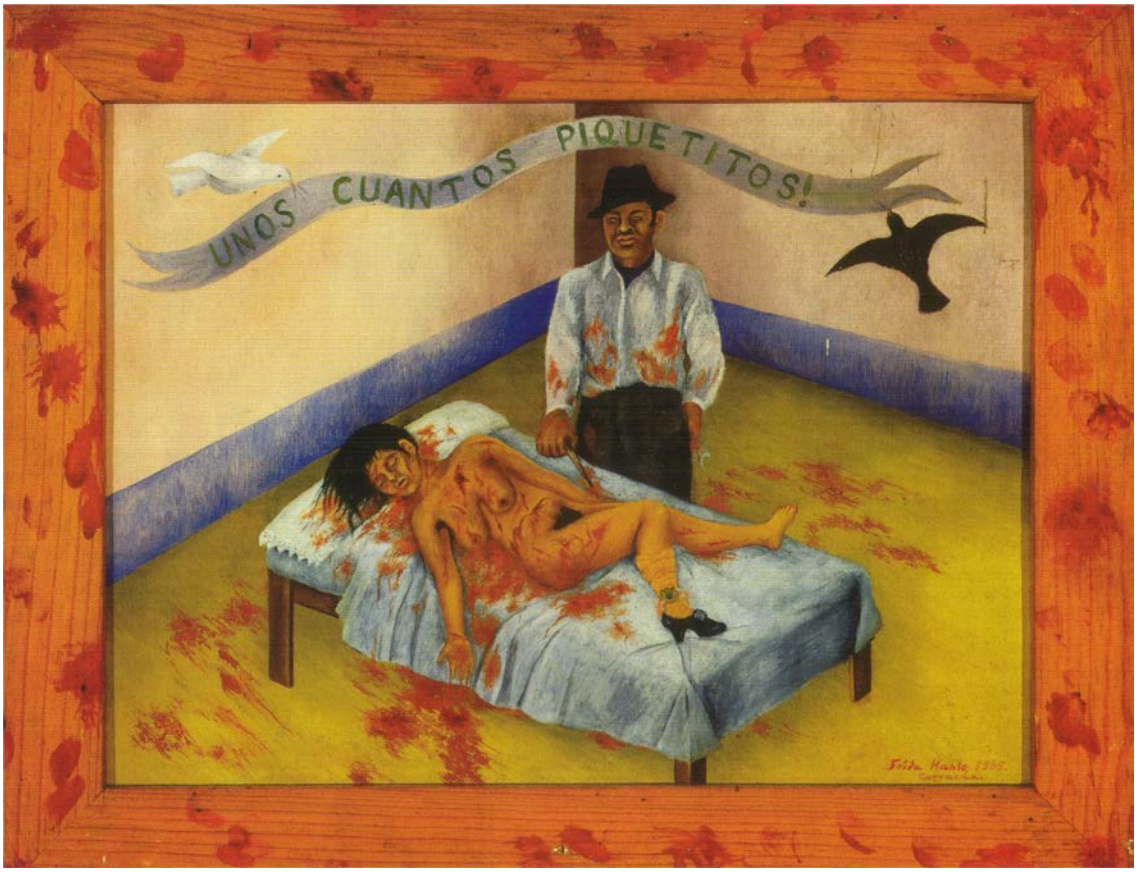
CORRIGENDUM

PAGE	LINE	
iv	20	Where reads: “important part of forensic autopsies’ case load” Should read: “important part of the alleged homicide autopsies’ case load”
iv	24	Where reads: “history of previous IPV (79%)” Should read: “history of previous IPV (78%)”
iv	35	Where reads: “(49%), with multiple fatal injuries” Should read: “(48%), with multiple fatal injuries”
vi	25	Where reads: “autópsias médico-legais (13%)” Should read: “autópsias médico-legais de alegados homicídios (13%)”
vi	29	Where reads: “história prévia de VRI (79%)” Should read: “história prévia de VRI (78%)”
vii	5	Where reads: “(49%), envolvendo múltiplas lesões” Should read: “(48%), envolvendo múltiplas lesões”
vii	25	Where reads: “e (f) Reconhecimento” Should read: “e (e) Reconhecimento”
10	6	The sentence is incomplete: “Until now, no research” Should read: “Until now, to our knowledge, no research”
12	Figure 1	Above the Figure 1, add the sentence: “1st data source (autopsy reports)” Where reads: “1st data source (autopsy reports)” Should read: “2nd data source (judicial decisions)”
15	25	Where reads: “The cause of death fatal injury patterns” Should read: “The fatal injury patterns”
23	Table 5 (line 8)	Where reads: “Thermal trauma” Should read: “Heat trauma”
25	5	The sentence is incomplete: “anal area (n=6)” Should read: “anal area (n=6), without any positive result”
33	3	The sentence is incomplete: “In case only” Should read: “In case where only”
38	30	Where reads: “average length 16 years” Should read: “average length 21 years”
39	7	Where reads: “In this latter study, is was found” Should read: “In this latter study, it was found”
40	23	Where reads: “within a year of separation (44%)” Should read: “within a year of separation (58%)”
45	27	The sentence is incomplete: “died before the trial and” Should read: “died before the trial or before the conviction and”
46	8	Where reads: “55% - with or without” Should read: “38% - with or without”
51	13	Where reads: “important part of forensic autopsies’ case load” Should read: “important part of the alleged homicide autopsies’ case load”
51	23	Where reads: “victim and perpetrator (40%)” Should read: “victim and perpetrator (43%)”
51	30	Where reads: “(49%), with multiple fatal injuries” Should read: “(48%), with multiple fatal injuries”



Unos Cuantos Piquetitos | **Apasionadamente enamorado**
[A Few small nips |Passionately in love]
Frida Kahlo | 1935
Collection of Dolores Olmedo Patiño | Mexico City, Mexico

PREFACE / ACKNOWLEGMENTS

The present study constitutes an attempt to reach the real number of women killed by their men-intimate partners in Portugal, aiming to reinforce the idea that it is a current phenomenon which still persists with significant relevance in our society, as elsewhere in the world.

During her forensic daily work, the author contacted with cases of fatal and non-fatal intimate partner violence, which aroused her scientific curiosity and enabled a starting point for this study and very likely, for further research.

During the work process, some difficulties were revealed, including some related to data collection and respectively analysis, but were all overcome, which would not have been achieved without the full and bright support of her supervisor, Professor Teresa Magalhães.

At the end of this investigation, the author believed she has reached the main goals established in the beginning and felt very rewarded to carry out this scientific research.

In this sense, the author is indebted and extremely grateful to the following:

Professor Teresa Magalhães and Professor Duarte Nuno Vieira for their critical advices and encouragement during the study period.

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Family, friends and colleagues for all the support during this process.

Lastly, Maria Rita and Bruno for the lost time.

ABSTRACT

Violence against women is a widely spread phenomenon that still persists in actual societies, being currently recognized as a violation of human rights. Most of the times, it occurs within the family (domestic violence) and more specifically, within abusive intimate relationships - intimate partner violence (IPV). Considered as a priority in the political and national setting, many policies have been defined to prevent IPV.

IPV is an important cause of women´s health problems, being the most extreme one the victim's homicide. The role of forensic pathology in these cases is crucial, constituting a priority in scientific research. Accordingly, the main objective of this study was to contribute to a better knowledge on fatal IPV in Portugal, concerning a forensic medicine perspective.

This first national retrospective autopsy-based and judicial-proved study was based in fatal cases of women due to IPV-related homicide perpetrated by intimate partners and was conducted, based in the statistics of the *National Institute of Legal Medicine* (which covers 83.4% of the total Portuguese population), between 2005-2007.

The main findings of this study were:

1. At least 62 women were killed by current or former men-intimate partners, corresponding to an IPV-related female mortality rate of 0.44 per 100.000 women aged 15 years old or older;
2. Fatal IPV constitutes an important part of forensic autopsies' case load (13%), representing the most common type of women's homicide (61%);
3. The typical Portuguese victim is a young adult woman, employed, killed by a current husband in a long-term relationship, usually with offspring in common and most of the times with a history of previous IPV (79%);
4. The typical Portuguese perpetrator is a man, older than the victim, employed, usually with a history of substances abuse and psychiatric problems, owning a firearm and without criminal records;
5. Most fatal events took place in the summer, during the weekend, in homes shared by the victim and perpetrator and were triggered mostly by a context of separation (39%) or jealousy (32%);
6. Some perpetrators attempted (23%) or committed suicide (24%) afterwards, other multiple victims occur as 2 attempted and 6 consummated homicides and 21% of the events occurred in the presence of minors;
7. Most women were killed by gunshot trauma (45%), especially in the thorax (49%), with multiple fatal injuries (55%) and 57% also presented non-fatal IPV-

related injuries (including defense wounds in 73%), particularly due to blunt trauma (63%);

8. Only some victims presented positive toxicological exams for alcohol (17%) and abuse drugs (7%) while all DNA samples which were collected in suspected sexual assault cases (15%) were negative;
9. Perpetrators, who did not die, were prosecuted and convicted of murder in 98% of the cases.

Despite the absolute number, and also the correspondingly mortality rate of IPV-related homicide of women being low (when compared with published data), the respectively prevalence among women´s homicides is high. Discrepancies among national and international prevalence are mainly explained due to the use of distinct definitions of intimate relationships and different research methodologies. The lack of some information on the victims, perpetrators and results of the criminal investigation, found in this study, obligates to a better search during the forensic medicine approach.

Our analysis and those of others suggest that: (a) Detecting timely high-risk IPV situations (which allow DV protective measures to be applied); (b) Preventing alcohol abuse; (c) Improving mental health care services; (d) Controlling access to firearms; and (f) Recognizing previous IPV, should have a positive impact in decreasing and preventing IPV fatal outcomes.

This work also emphasizes the need to deepen the research on this issue, adopting standard comparable definitions and eventually to create a national homicide database, with the final aim of preventing both fatal and non-fatal cases IPV-related.

Key-words: Intimate Partner Violence, Homicide, Women, Forensic Medicine

RESUMO

A violência contra a mulher é um fenómeno universal que ainda persiste nas sociedades actuais, sendo actualmente reconhecido como uma violação dos direitos humanos. Geralmente, este tipo de violência ocorre no contexto familiar, correspondendo a uma situação de violência doméstica, mais especificamente no contexto de relações íntimas abusivas - violência nas relações de intimidade (VRI). Considerada uma prioridade no contexto político nacional e internacional, várias medidas têm vindo a ser implementadas para prevenir a VRI.

A VRI é uma importante causa de problemas de saúde nas mulheres sendo a sua consequência mais extrema a morte da vítima por homicídio. Nestes casos, o papel da Patologia Forense é crucial, tornando este tópico uma prioridade em termos de investigação científica. Assim, o principal objectivo deste estudo foi contribuir para um melhor conhecimento sobre a temática dos casos mortais de vítimas de VRI em Portugal, segundo uma perspectiva médico-legal.

Trata-se do primeiro estudo nacional e retrospectivo de autópsias médico-legais de mulheres vítimas de homicídio no contexto de uma relação de intimidade, perpetrado por parceiros homens, comprovados judicialmente e com base na casuística do *Instituto Nacional de Medicina Legal* (que abrange 83.4% da população Portuguesa), entre 2005-2007.

As principais conclusões deste estudo foram:

1. Pelos menos 62 mulheres foram mortas no seio de uma relação de intimidade (actual ou passada), correspondendo a uma taxa de mortalidade de mulheres por VRI de 0.44 por 100.000 mulheres com idade igual ou superior a 15 anos;
2. Os casos mortais de VRI constituem uma importante fracção de todas as autópsias médico-legais (13%), representando o principal tipo de homicídio nas mulheres (61%);
3. O perfil mais habitual da vítima Portuguesa é o de uma mulher adulta jovem, empregada, numa relação conjugal de longa-duração, geralmente com filhos em comum e maioritariamente, com uma história prévia de VRI (79%);
4. O perfil mais habitual do perpetrador Português é o de um homem mais velho que a vítima, empregado, geralmente com história de abuso de substâncias e problemas psiquiátricos, detentor de arma de fogo e sem registo criminal;
5. A maioria dos eventos fatais ocorreram no Verão, durante o fim de semana, nas casas das próprias vítimas e perpetradores e foram desencadeados num contexto de separação (39%) ou ciúme (32%);

6. Posteriormente, alguns perpetradores tentaram (23%) ou consumaram o suicídio (24%); concomitantemente ocorreram 2 tentativas de homicídio e 6 homicídios consumados; 21% dos eventos foram presenciados por menores;
7. A maioria das mulheres foi morta por arma de fogo (45%), sobretudo no tórax (49%), envolvendo múltiplas lesões (55%) e 57% apresentavam lesões associadas não fatais produzidas por VRI (incluindo 73% com lesões de defesa), especialmente por traumatismo contundente (63%);
8. Apenas algumas mulheres apresentaram exames toxicológicos positivos para álcool (17%) e drogas de abuso (7%) enquanto todas as amostras colhidas de ADN nos casos suspeitos de abuso sexual (15%) foram negativas;
9. Os perpetradores que não morreram antes do julgamento, foram acusados e condenados de homicídio em 98% dos casos.

Apesar do número absoluto e da correspondente taxa de mortalidade de mulheres por VRI ser baixa (quando comparada com a literatura publicada), a respectiva prevalência em relação ao total de homicídios de mulheres é alta. As discrepâncias nas prevalências encontradas em estudos nacionais e internacionais podem ser explicadas, sobretudo, pelas distintas definições de relações de intimidade e diferentes metodologias usadas. A informação em falta detectada durante o estudo, sobretudo relacionada com as vítimas, perpetradores e investigação criminal, suscita que se atribua uma maior atenção no que se refere à obtenção de informação circunstancial durante a intervenção médico-legal.

A nossa análise e a de outros sugere que a: (a) Detecção atempada de situações de VRI de alto risco (que permitam a oportuna aplicação de medidas de protecção de vitimas); (b) Prevenção de abuso de álcool; (c) Melhoria dos serviços de saúde mental; (d) Acesso controlado a armas de fogo e (f) Reconhecimento de história prévia de VRI, podem ter um impacto positivo na diminuição e prevenção dos casos mortais nas relações de intimidade.

Este estudo enfatiza, ainda, a necessidade de uma investigação mais profunda desta problemática, com adopção de definições comparáveis e eventualmente, a criação de uma base de dados nacional de homicídios, com o objectivo final de prevenir ambos as situações de VRI fatal e não fatal.

Palavras-chave: Violência nas relações de intimidade, Homicídio, Mulher, Medicina Legal

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INTRODUCTION

The women tasks in society have strongly been changing, especially in the last century. The redefinition of gender roles, as well as the progression towards equality between men and women, in the pursuit of a fairer and more balanced society has happened due to many factors, including the pressure from feminist groups, technical and scientific progress, birth control and greater participation of women in social life. [1] But even thought there has been a marked evolution of the civilization, which goes side by side with a stronger social conscience and citizenship, and a more evident widespread women's emancipation, violence against women persists, with many repercussions both in family and social scopes, but also, in the cultural and religious spheres [1]. Therefore, we may state that on the one hand there are individual, socio-cultural and criminal factors linked to violence against women, and on the other hand there are elements such as economic, political and gender progress which have an impact on violence against women [2,3].

Intimate partner violence

The phenomenon of violence against women is a widely spread phenomenon that persists in all societies, with similar features in culturally and geographically distinct countries and affecting the majority of the social strata and age groups. Consequently, according to the *Declaration on the Elimination of Violence against Women*, adopted by the *United Nations*, it should be considered as an important public health problem, a violation of human rights and a form of discrimination against women [2,4,5].
Violence against women takes different forms including domestic violence (DV), sexual offenses, human trafficking and forced prostitution, violence in armed conflict and cultural harmful practices [4].

However, most of the times, violence against women occurs within the family, in their own home which may be recognized as a DV situation. According to the *World Health Organization* (WHO), the concept of DV is considered as a kind of interpersonal violence. It is broadly defined as a pattern of abusive behaviors in the domestic context, which includes violence between intimate partners – Intimate partner violence (IPV) - and other forms of family violence, such as child abuse and abuse of the elderly. [2,5,6] This current definition is consistent with the Portuguese legislation, which states that DV not only affects couples, but also, children, the elderly, the dependent and the disabled in a familiar or similar context [6-8].

International studies demonstrate that women continue to be the most affected group by DV, which in this context is assumed as gender-based violence [6,7]. Given its essentially private nature and due to a number of different factors, violence depending on the gender and IPV also reflect the historical asymmetry of power relations between men and women [3,6]. The concept of IPV is currently used in preference to the concept DV, because it is more specific within the context of abusive intimate relationships [2,5].

Intimate partner violence is defined by the WHO as all forms of violence perpetrated by a current or former intimate partner, regardless of the involved genders and cohabitation [2,7,9]. This includes different types of intimate relationships as, cohabiting marital and common-law couples, dating couples, hetero and homosexual couples, and intimate partner outside of a committed relationship [2,5,6,10].

Although largely underestimated, facts shows us that the overwhelming majority of IPV is perpetrated against women, performed by a male partner or ex-partner [2].

This type of violence is rarely embodied in a single incident, often leading to a behavioral pattern of abuse of power over the victim, including acts of physical, psychological and sexual abuse, and various controlling behaviors [5,6].

Since this phenomenon is considered as an important global problem with significant economic impact and social costs [5,11], the health consequences on women victims of IPV have been extensively researched [12]. The immediate and long-term adverse effects on women's health may include trauma injuries, organic pathologies, mental disorders and reproductive or sexual-related problems [5], however, the most extreme outcome is the killing of the victim, which is often the culmination of extended periods of abuse [5,9,11-16].

Furthermore, it may also affect children exposed to IPV (who witness inter-parental violence), designated as vicarious violence [5]. Also, it may generate situations in which the victim's homicide is followed by the perpetrator's suicide, with even worse family and social consequences [14,17].

Fatal intimate partner violence

Worldwide data suggest that IPV accounts for a significant number of deaths by homicide among women and constitutes a large proportion of all homicides. Worldwide statistics presented by the WHO reveal that, up to 70% of women's homicides are perpetrated by intimate partners, frequently during a current abusive relationship which strongly contrasts with similar violence against men [5]. Available data for Europe shows that 35% of the female victims are killed by intimate partners [5]. Many studies point out

that up to 45% of the perpetrators of the female victims commit suicide afterwards [14,17-19] despite the fact that intimate femicide-suicide phenomenon is mainly studied according to a homicide-suicide approach rather than an intimate partner approach [17].

Much effort has been made in the research of this topic mainly in developed countries, such as the United States of America (USA), Canada or the United Kingdom, while there is an almost complete absence of information from developing settings. For the latter, an exception should be made for South Africa, which is a particular country among developing ones, showing a singular interest in publishing on this theme. Probably, the most similar countries to Portugal are Spain and Italy, either in socio-cultural aspects or in terms of intentional homicide's rates (Portugal 1.2, Italy 1.0 and Spain 0.9 per 100.000 inhabitants) [11], but only a few published studies were found, not enabling comparisons.

Portuguese *Justice Statistics* show that the proportion of male convictions of marital homicide in Trial Courts was 12.5% (2007-2010) [20]. Additionally, according to a Portuguese study, held by the Portuguese *Commission for Citizenship and Gender Equality* (CIG) together with the *Prison Services,* referent to all men and women serving a prison sentence for homicide against his/her current partner, marital homicides represented 16.4% of all homicides in 2006 (88% perpetrated by men) and the total number of IPV related homicide convictions increased compared to previous years [21]. Also, the Portuguese non-governmental organization *Women's Collective Alternative and Answer* (UMAR), whose figures are based in newspaper records, states that the number of women killed per annum in the context of IPV, in Portugal, was since 2005 to 2010, respectively: 31, 32, 20, 40, 28 and 40 [22]. This means a mortality rate per 100.000 women 15 years and older of respectively: 0.67; 0.69; 0.43; 0.85; 0.60 and 0.85.

The relative share of fatal violence within intimate relationships varies according to the overall number of homicides. Therefore, in countries where there is a low homicide rate, as it is the case of Portugal, a higher proportion of fatal IPV is committed, homicide-suicide tends to be more common and consequently, women become more predominant among victims. [11,18,23,24]

On the other hand, according to Western studies, the absolute rates of intimate partner homicides are declining or have been roughly stable over the last decades, which appear to coincide with the general homicide trends [11,25,26]. Interestingly, fatal IPV figures are affected by the underlying tension in society and by IPV risk factors [11].

Different risk factors are associated with a man's risk for abusing his intimate partner, such as individual, relationship, community and society factors [5]. According to Campbell [13], risk factors that predict fatal IPV against women result from a combination of risk factors for homicide in general and specific characteristics of intimate relationships. Furthermore, Abrahams states that fatal IPV can better be understood as an extension of the IPV phenomenon than within the scope of general homicide, in terms of patterns of mortality and prevention [12]. The fatal IPV's characteristics in distinct countries depend on cultural factors and the availability of weapons [5].

This knowledge on risk assessment is essential to identify women at high risk for IPV lethality and thus intervene, with DV protective measures, for example; to help the criminal justice system; and to develop safety plans with the aim of preventing this form of women's mortality [13,27]. Despite the magnitude of the problem, non-fatal IPV is far more studied than fatal IPV, having as a consequence, the lack of high quality data on this specific type of mortality [11,12].

This does not exclude the necessity of the implementation of IPV prevention initiatives, stronger female education and gender equality, women protection in higher risk periods, the adoption of social measures and specific policies, with the aim of gradually decreasing this phenomenon [11].

Policies and legislation

The growing visibility of DV, including IPV, as a result of a greater critical awareness and public exposure by the media, has led the world's political powers, along with some of the most prestigious international organizations - WHO, *United Nations*, *Council of Europe* and *European Council*, among others - to define policies to fight and prevent this type of violence. Consequently, nowadays, DV, more specifically women's death in IPV context, is considered to be a political and public issue and has become a priority in many political and media campaigns. [2,11,28]

Globally, several policies have been developed in order to improve the approach on these cases, such as: specific prevention and rehabilitation programs for victims and perpetrators, police and legal system reforms, and specific actions on health settings, schools and communities [5]. A concerted action between security forces, judicial and health system, social networks, non-governmental organizations and civil society is being implemented in some European countries [7]. The most recent European

campaigns were "*Task Force to Combat the Violence against Women, including the Domestic Violence 2006-2008*", and "*Equality between Women and Men 2006-2010*" [6,29].

As a member State of the *European Union*, *Council of Europe* and *United Nations*, Portugal signed distinct conventions and protocols in order to protect women's rights. As a result, there have been several initiatives in Portugal to intervene on violence against women, with a special focus on DV and IPV, but probably the most important one has been the implementation of consecutive *National Plans against Domestic Violence* [6,7]. They are structured based on five areas of strategic intervention and planned by the CIG, which is a specific service that mainly articulates itself with non-governmental organizations, under the administration of the State [6,29]. Both *I National Plan* (1999-2003) and *II National Plan* (2003-2006) have emerged mostly to support political action on prevention and intervention on DV. The *III National Plan* (2007-2010) (whose measures were accomplished in 89.3%) and the actual *IV National Plan* (2011-2013) were designed towards a consolidation of prevention and fighting policies against DV. [6,30,31]

Bearing in mind this issue, additional measures in the national strategy setting have been developed, including: (a) Prevention programs with awareness campaigns in the community and civil society; (b) Psychosocial and legal procedures (namely the *Law 112/2009 of 16th September*) to support the victims and to empower their rights, provided both by government authorities and social networks; (c) Standards for perpetrators to assure wider protection of the victims and to prevent recidivism and re-victimization, such as prohibition to use and carry weapons, prevent contact with the victim, making use of electronic surveillance devices or other restraining measures, and obligation to attend specific programs for DV prevention; (d) Specific training of police officers and Public Prosecutors; (e) Creation of networks between multidisciplinary services such as security forces, judicial workers, healthcare professionals, social and education workers and experts from non-governmental organizations; (f) Creation and reformulation of specific laws in order to increase the penalties of the perpetrators and speeding-up judicial procedures; and (g) Promotion of research on this topic. [6,7,29]

Recently, in 2007, the Portuguese *Criminal Code* was revised, bringing a significant improvement on to the legal framework of these violent-related crimes. As a result, the crime of DV was introduced as an autonomous crime (article 152º), detached of

offenses against physical integrity, and established as a typified crime, punishable by 1 to 5 years of imprisonment [7,8,29].

Being a public crime since 2001, it means that if the Public Prosecutor Office knows a situation that can configure such a crime, an investigation must be carried on. Additionally, according to the *Procedural Criminal Code*, all police force officers and public servants are obliged to inform the Public Prosecutor Office, if they know of such cases in the sequence of their professional activities.

This new crime covers all infliction, whether repeatedly or not, of physical or psychological mistreatment, including corporal punishment, restriction of freedom and sexual offenses to: partner, ex-partner; person of the same sex or different sex, with whom the perpetrator has or has had a relationship analogous to that of partners, even without cohabitation; progenitor of a common descendant in first degree; person who is vulnerable due to age, deficiency, sickness, pregnancy or economic dependence, living with the perpetrator.

The penalty of this crime is raised whenever the crime occurs in the presence of minors, in a shared household or in the victim's home and if the result is the death of the victim. Fatal outcome in the context of IPV can be considered as the following crimes: offense against the physical integrity aggravated by the result; DV aggravated by the result and different types of murder. [6-8]

The role of forensic medicine

Forensic medicine, a branch of human, social and forensic sciences, sets itself as the interface between medicine and law and it has legal purposes such as assisting the Court and contributing to the preparation, review and implementation of legislation, allowing a more suitable application of the laws to the human being in his/her bio-psycho-socio-contextual [32,33]. In addition to these human and legislative components, forensic medicine presents a medical and social key role in the formulation of timely medico-legal diagnosis, therapeutic situations, and in the promotion of the prevention, protection, rehabilitation and reintegration of the victim and his/her family.

Intimate partner violence subject is not enclosed in a particular medical specialty [10], which means that victims of IPV may contact with different organized structures throughout their lives, including the forensic medicine system, either by clinical forensic medicine (non-fatal violence) or forensic pathology (fatal violence). Forensic pathology, which is a substantial branch of forensic medicine, deals with the examination of the dead [32] and for that reason, is an important setting to observe and record the outcome

of human life. Forensic medicine is concerned with the correct identification of evidence; hence it provides valuable information that allows a better understanding of these fatal cases in the IPV context. Forensic medical evidence is generally considered as being of primary importance to the Courts, as it renders the only corroborating evidence in most of the cases. The forensic medical doctor who performs the autopsy is in a unique position, being a neutral examiner documenting and collecting evidence for a third part, usually the Courts.

The medico-legal structure in Portugal has its framework on the *National Institute of Legal Medicine* (INML). According to the Portuguese regulation (*Law 45/2004 of 19th August*), as in most countries, there is a medico-legal and forensic system for the investigation of suspicious deaths. This means that as a rule, in all judicial-ordered forensic examinations of violent deaths, it is mandatory to perform a complete forensic autopsy which is conducted by forensic pathology departments of the INML [34]. As a result, an autopsy will be carried out in all deaths where there is a suspected criminal involvement and it will take place in accordance with the national procedures that, in turn, comply with the rules of the *European Council of Legal Medicine* [34-36]. According to the statistics of the INML, 6518 autopsies were performed per annum on average (2005-2007), 2.4% of which were alleged homicides.

Reasons and aims of the study

The reality of women killed by an intimate partner is progressively becoming more evident on a worldwide scale, mainly because of relevant incidence and mortality rates, which make this type of violence a priority in scientific research [2].

However, at the international level, the fragmentation of information and the lack of crime databases with statistics and information on the victim-perpetrator relationship, partly explains the difficulty of obtaining global numbers. It also highlights the need of a better multidisciplinary coordination among different sectors - governmental and non-governmental - in order to understand fatal IPV against women as a whole and to elucidate the real extent of this violence [11,12,37]. According to the *Global Study on Homicide 2011* held by the *United Nations Office on Drugs and Crime* (UNODC), more accurate data on lethal violence affecting women can be produced through the compilation of appropriate information about homicides [11].

If the studies are only based in medico-legal samples, we cannot asseverate that the cases correspond to a fatal IPV-related crime and we cannot consider the type of

crime; the medico-legal proof is important but it is only one among others that the Courts must take into account.

So, in order to understand this reality and to fill in the gaps and confirm the information, it is fundamental to know the judicial decisions related to the autopsies homicide [38], which represent the proved cases, despite it could result in an underestimated number.

Until now, no research had been done in Portugal concerning the prevalence of fatal IPV, based on the autopsied cases and its legal outcomes. Similarly to other countries, reliable data on fatal forms of violence against women in Portugal is limited and the existing published studies are so far insufficient.

The general objectives of this study are to contribute to a better knowledge and understanding of fatal IPV-related cases of women perpetrated by male intimate partners in Portugal, according to a forensic medicine perspective, providing information to:

a) Improve forensic approach in terms of medico-legal assessment and prevention of similar situations;
b) Raise awareness for early intervention by the professionals in this area – law enforcement, health and social professionals;
c) Promote strategies for multidisciplinary networks and coordination between different sectors involved in this phenomenon, appropriated to the Portuguese reality.

With respect to more specific objectives, this study took under consideration different variables such as socio-demographic, family, forensic medical and legal aspects, regarding these women's violent deaths, with the aim to:

a) Study the population with calculation of mortality rates and prevalence and further comparison with other published data
b) Describe the victim and perpetrator profiles, and their intimate relationship;
c) Characterize the circumstances surrounding the death;
d) Identify patterns of fatal and non-fatal injuries;
e) Characterize legal case progression and outcomes.

MATERIAL AND METHODS

Data sources and case selection

A national retrospective autopsy-based study was conducted, referring to a 3-year period, on fatal IPV against women perpetrated by current or former men-intimate partners, in Portugal. We focused only on this specific kind of violence because it represents the great majority of IPV cases throughout the world: male partners abusing or killing women [2].

Forensic autopsy cases were selected according to the following preliminary inclusion criteria:

a) Women submitted to autopsy aged 15 years or older;
b) Violent deaths (excluding suicides and accidents);
c) Autopsies performed in the INML;
d) Between January 2005 and December 2007.

According to the criteria described above, all autopsy reports and other attached documents - primary data source - concerning these deaths (alleged homicide of women) were identified (n=102), both from a manual and a computer search (Figure 1). After analyzing this information, cases where there was a suspicion of an intimate relationship between the victim and the perpetrator, were identified. Cases with unproved intimate relationship were initially included, while recorded cases of clearly no intimate relationship were excluded at this stage.

After reviewing the correspondingly judicial decisions - second data source - which were obtained from Public Prosecutors Offices, Trial and Higher Courts, the totality of cases was classified into 3 groups (Figure 1):

a) Cases related with an intimate relationship (*IPV cases*) - n=63;
b) Cases non related with an intimate relationship (*Non-IPV cases*) - n=32;
c) Cases in which an intimate relationship was not proved (*Unproved intimate relationship cases*) - n=7.

For the study, only 62 cases of the *IPV cases* group were retained and submitted to a more detailed analysis and a statistical study (*IPV proved cases*) because in 1 case the suspected was acquitted (Figure 1).

The *Non-IPV cases* correspond to those where the alleged perpetrators were not intimate partners of the victims, resulting in convictions or filing.

The *Unproved intimate relationship* cases include those in which the victim-perpetrator relationship was still unknown or unidentified after consulting the available information; these cases represent the following situations: prosecution filed because the alleged perpetrator remained unknown (n=3) and prosecution filed due to lack of evidence (n=4).

Both latter groups (*Non-IPV* and *Unproved intimate relationship cases)* were excluded from further analysis.

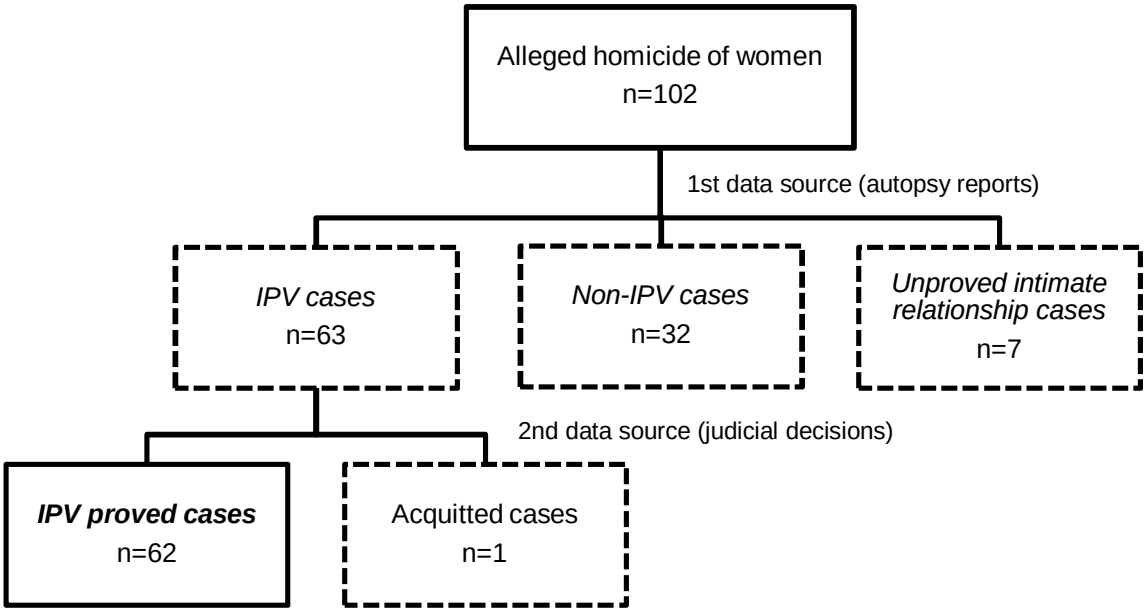

Figure 1 – Diagram of the selected cases (n=62) among all alleged homicide of women

Analysis of the forensic autopsy reports and legal case outcomes

Autopsy reports, including clinical and social information, genetic and toxicological analysis, and other documents, (such as the police records and available relevant newspaper articles), regarding the deaths from the *IPV proved cases* (n=62) were reviewed in a more detailed way, as well as their legal case progression and judicial outcomes.

Thus, the information from the two data sources, was collected together by the same investigator, initially into a data collection questionnaire (with 93 questions) and then applied in a digital database (using the computer software *Excel 2007 - Microsoft*®), both built specifically for this purpose.

The following data was collected and divided according to different sections:

a) Identification and generic information of the case;
b) Victim and perpetrator's profiles including socio-demographic aspects, civil status, personal background characteristics, abuse of substances, psychiatric history, criminal records and weapon possession, at the time of the fatal event;
c) Characteristics of the victim-perpetrator intimate relationship, such as type, status, length of the relationship, length of the separation period and known history of prior IPV (including physical, psychological, emotional and/or sexual abuse);
d) Characteristics of the circumstances surrounding the death, as the moment, location, possible motive and existence of other mortal victims;
e) Autopsy findings including conclusions (cause of death) fatal IPV-related injuries (type, patterns, location and number), method or weapon used, additional non-fatal injuries, previous (non-recent) IPV injuries, toxicological and biological exams;
f) Legal case progression and judicial outcomes regarding type of crime in the final sentence.

Analysis and statistical study of data

It was possible to calculate overall mortality rate and prevalence of fatal IPV against women using population data from the *Census* collected by the Portuguese *National Statistics Institute* and official's statistics from the INML.

It was performed an exploratory analysis of data concerning the *IPV proved cases* using descriptive statistical measures and tables to summarize and to represent data. Mains findings were compared with trends from the rest of the world.

Cluster analysis was performed to allocate perpetrators and victims into homogeneous groups (*clusters*) according to common characteristics, in order to identify natural groups. Hierarchical agglomerative method was used. The measure of similarity used was the *Gower coefficient* and the criterion of aggregation was complete linkage.

Data analysis was performed using the statistical software *R, version 2.14.0.*

Definitions and justification of the methodology

In Portugal, all violent deaths, including the criminal ones, are submitted to forensic autopsy in the INML. By doing a national study based in all autopsies performed at the INML, instead of a regional study, we did not want to obtain an estimated number but

instead we wanted to assess, as close as possible, the real number of women killed by their partners in Portugal.
All medico-legal branches and respective offices of the INML, operating in 2005, were included in this study, in a total of 28 departments, which covered 83.4% of the total population of Portugal, at that time.

The study years (2005-2007) were defined to make sure that the criminal investigation and forensic autopsies were already completed and the judicial decisions were also concluded, at the time we started our data collection in 2009.

We took 15 as the youngest age, to allow data comparison with other studies (Portuguese and foreign) and *Census*. Furthermore, below 16 years old it is not legal to marry, according to the Portuguese law and below 15 years old usually very few women have serious intimate relationships [12].

Thus, we assume that the method used in this study - retrospective analysis of all autopsy reports and their legal outcomes, related to alleged homicide of women, performed at the INML - is one of the most consistent means in the current Portuguese scenario, to assess the real prevalence of fatal female victims of IPV.

Therefore, if we consider that our country situation, in terms of demographic, social and economic aspects, did not change significantly during the past 4-years and assuming that this study portrays data as recent as possible, we may admit that our investigation represents and characterizes the actual population of fatal IPV victims and perpetrators in Portugal. This idea is also supported by international literature that states that, over time, rates of IPV homicide remains fairly constant [9,11].

For the purpose of the present study, IPV was considered as all forms of violence between the victim and alleged opposite-sex perpetrator within a current or past intimate relationship. IPV-related injuries included fatal and additional non-fatal injuries, physical and/or sexual, both produced at the time of the fatal event.
Non-recent IPV-related injuries found during autopsy examination were considered as being produced before (previous IPV), but not during the fatal incident. These latter are related to a known history of IPV perpetrated by the same person who committed the alleged homicide.

Intimate partner relationships were categorized into different categories, such as:

(a) Marital relationships, involving marriage and cohabitation;
(b) Common-law relationships, involving civil union and cohabitation;

(c) Dating, girlfriends and boyfriends without regular cohabitation;
(d) Extramarital relationship, relation outside of a committed relationship without regular cohabitation.

Situations as married couples not divorced but separated and no cohabitating were considered in the category of past marital relationship. Divorced or separated couples which were still cohabitating were considered in the group of current marital or common-law relationship.

The length of the relationship was calculated by establishing the period of time from the beginning until the end of the relationship, in other words, in former relationships until its *terminus* and in current relationships up to the victim's death. The length of separation is defined as the timeframe that the couple had been separated when the alleged homicide occurred.

It was established that the:

(a) Alleged perpetrator was the person whom the criminal police investigation team identified as being the principal suspect of the crime;
(b) Defendant was the person accused of the crime;
(c) Perpetrator was the person legally responsible for the crime.

Attempted or completed suicide of the perpetrator was considered within a week after the homicide incident. [9,17,39].

The month of the fatal event is relatively easy to establish, even when the corpse is found some time after the crime took place (in our study, we had only 1 case of a decomposed body). But on the other hand, it is less easy to determine the exact day of the week, so we assume in these cases the day established by the criminal investigation.

The cause of death fatal injury patterns and the cause of death were established based on the pathological description of injuries, location of injuries and wound dimension, using the classical criteria for types of injuries and standard international wound descriptions guidelines. The number of injuries was accounted as the number of blows, as for, sharp, gunshot and blunt trauma while all thermal burns and asphyxia injuries (suffocation, manual and ligature strangulation) found in this study were counted as 1 fatal injury.

According to ethic principles for scientific research, it was ensured that personal information concerning victims and perpetrators was protected, confidential and

anonym [40]. Therefore, when gathering data, the link between different data sources was made by the *Single identification criminal case number* (NUIPC) and the participant's identification was deleted from the questionnaires and databases.

Ethical approval for the study was granted by the *Ethics Committee of the Faculty of Medicine* of the *University of Coimbra*.

RESULTS

The following results are related with the 62 cases of autopsied women in the INML services and judicial-proved to be killed by current or former men-intimate partners, during 2005 to 2007, in Portugal. This number corresponds to a mean mortality rate of 0.44 per 100.000 women aged 15 years or older per year, with no significant variation during the 3-years study period.

Characterization of the victims and perpetrators

Information on socio-demographic aspects about victims and perpetrators are described in table 1.

The average age of victims was 43.8 years old (minimum [min.]=17, maximum [max.]=82, Standard deviation [SD]=17.3) although almost 50% aged 20 to 40 years old.
Perpetrators were 49.3 years old on average (min.=20, max.=78, SD=15.7). Men aged 40-50 years-old was the most prevalent age group.

Most of the victims were born in Portugal while 11.3% (n=7) were immigrants from Brazil, African countries of Portuguese official language and European countries. All women were living in Portugal (except 1 Portuguese emigrant killed while on vacations in Portugal) and half of them in the 2 major cities: 30.6% in Lisbon (n=19) and 19.3% in Porto (n=12).

Most victims were married to the perpetrator (48.4%).

At the time of the death, comparable proportion of women (35.5%) and men (33.9%) were actively working whilst more than one quarter of the men (25.8%) was not working (unemployed plus retired).

There is a paucity of information related to abuse of substances and psychiatric history, both for victims and perpetrators. In spite of that, it was confirmed a history of substance abuse (alcohol and/or drugs) in 6.5% of victims and 17.7% of the perpetrators, and a psychiatric history in 9.7% and 16.1% of victims and perpetrators, respectively.

In the cases where the information was available (n=31), in 29 cases (93.5%) the men owned a firearm, either with a legal possession (including 3 police officers) or without a legal possession (of these, 2 had been police officers).

Also, information about perpetrators' criminal history was known in 37 cases and of those, 11 cases (29.7%) had criminal records or previous convictions (including only 1 case related to IPV).

Table 1 - Characteristics of the victims and perpetrators

		Victims n (%)	Perpetrators n (%)
Age (*years old*)	]10,20]	2 (3.2)	0 (0.0)
	]20,30]	14 (22.6)	7 (11.3)
	]30,40]	15 (24.2)	12 (19.4)
	]40,50]	11 (17.7)	16 (25.8)
	]50,60]	10 (16.1)	8 (12.9)
	]60,70]	4 (6.5)	8 (12.9)
	]70,80]	4 (6.5)	8 (12.9)
	]80,90]	2 (3.2)	0 (0.0)
	Unknown	0 (0.0)	3 (4.8)
Marital status	Married to each other	30 (48.4)	30 (48.4)
	Single	15 (24.2)	12 (19.4)
	Divorced	9 (14.5)	14 (22.6)
	Widowed	4 (6.5)	1 (1.6)
	Married to another person	3 (4.8)	3 (4.8)
	Unknown	1 (1.6)	2 (3.2)
Employment status	Employed	22 (35.5)	21 (33.9)
	Unemployed	1 (1.6)	7 (11.3)
	Retired	9 (14.5)	9 (14.5)
	Student	4 (6.5)	2 (3.2)
	Housekeeper	14 (22.6)	0 (0.0)
	Unknown	12 (19.4)	23 (37.1)
Substance abuse history	Yes	4 (6.5)	11 (17.7)
	No	8 (12.9)	2 (3.2)
	Unknown	50 (80.6)	49 (79.0)
Psychiatric history	Yes	6 (9.7)	10 (16.1)
	No	5 (8.1)	3 (4.8)
	Unknown	51 (82.3)	49 (79.0)

Characterization of the intimate relationships

At the time of the fatal event, 59.7% of the relationships were current (n=37), 40.3% were former (n=25) and half of the victims (n=31) cohabited with the perpetrator (table 2). In 11.3% a dating relationship (former or current) was at stake (Table 2). The proportion of perpetrators who were current intimate partners was higher than former partners for all types of relationships, except for dating (Table 2).

The average length of all relationships was 15.7 years (SD=14.9). The average length of current relationship was 21 years (SD=15.7) and the average length of the former ones was 8.7 years (SD=10.4). The proportion of short-term relationships was higher for former relationships, with half of them (52%) lasting 5 years or less (Table 2).

From the known cases (n=19), in 57.9% of the former relationships, women were killed in the first year after its *terminus* (Table 2). The length of separation until the fatal event was 19.5 months on average (SD=34.5) and in 2 outlier cases the elapsed time was nearly 10 years and 8 years.

Table 2 - Characteristics of the intimate relationships

		Total (n=62)	Current (n=37)	Former (n=25)
		n (%)	n (%)	n (%)
Nature	Marital	34 (54.8)	23 (62.2)	11 (44.0)
	Common-law	15 (24.2)	8 (21.6)	7 (28.0)
	Dating	7 (11.3)	1 (2.7)	6 (24.0)
	Extramarital	6 (9.7)	5 (13.5)	1 (4.0)
Length (*years*)	]0,10]	22 (35.5)	9 (24.3)	13 (52.0)*
	]10,20]	9 (14.5)	5 (13.5)	4 (16.0)
	]20,30]	7 (11.3)	5 (13.5)	2 (8.0)
	]30,40]	3 (4.8)	2 (5.4)	1 (4.0)
	]40,50]	4 (6.5)	4 (10.8)	0 (0.0)
	]50,60]	1 (21.6)	1 (2.7)	0 (0.0)
	Unknown	16 (25.8)	11 (29.7)	5 (20.0)
Length of separation (*years*)	0-1	-	-	11 (44.0)
	> 1	-	-	8 (32.0)
	Unknown	-	-	6 (24.0)

* All these relationships lasted 5 years or less

The victim and the perpetrator had offspring in 33 cases (53.2%), being this information unknown in 5 cases.

Excluding the unknown cases (n=25), 78.4% of the victims had a history of prior IPV perpetrated by the same man who killed them.
Three of them had had contact with the judicial system, before being killed, and were observed by the clinical forensic medicine departments of the INML, while in 58 cases (92.1%) this information was unknown.

Characterization of the circumstances surrounding the death

During the 3 years of the study (2005-2007), the number of cases revealed a roughly stability: 23, 23 and 16, per year, respectively.

More than two thirds of the incidents (69.4%) occurred during the spring and summer months, particularly, in early spring (30.6% related to April and May) and late summer (29.0% related to August and September) (Table 3).

Almost half of the deaths (48.4%) occurred over the weekend period, above all, on Fridays and Sundays (37.1%); Tuesdays and Sundays had the same number of occurrences (17.7%) (Table 3).

Table 3 – Moment of the death

		n (%)
Month	January | February | March	2 | 5 | 3 (16.1)
	April | May | June	9 | 10 | 2 (32.3)
	July | August | September	4 | 8 | 10 (37.1)
	October | November | December	4 | 4 | 1 (14.5)
Day of the week	Monday	8 (12.9)
	Tuesday	11 (17.7)
	Wednesday	8 (12.9)
	Thursday	5 (8.1)
	Friday	12 (19.4)
	Saturday	7 (11.3)
	Sunday	11 (17.7)

From the known cases (n=54), in 21 cases the crime was triggered in a context of separation of the couple (38.9%), including threats, attempts or actual separations (Table 4). Of these, 5 cases corresponded to current relationships where the victims tried to end the bond, but eventually died before accomplishing it. In the remaining 16 cases (all concerning former relationships), victims had just separated or were about to separate from their intimate partners, who did not accept the *terminus* of the relationship.

An important motive for the crime was related to jealousy (31.5%), including cases where the perpetrator suspected of victim's infidelity or the existence of a new intimate partner of the victim (Table 4).

In some cases, men's declarations were found such as "*If I can't have you, nobody can"*, "*The day you leave me, I will kill you*" or "*If you are not mine you won't be anyone's else either".*

Other alleged motives were related to conflicts, as marital, familiar, parental and/or financial (22.2%) (Table 4).

In 1 particular case, compassion was the motive of the killing of a 79 years-old woman - *mercy killing* - who was suffering a painful disease and who was bedridden for 1 year. She was killed with a dagger by her husband, a retired army captain, who afterwards slashed his own wrists but in the end, he survived.

In another case, a husband was unfaithful and had an affair so he proposed the divorce to his wife; she threatened to commit suicide and so, he decided to hire someone to kill her. After the woman was dead by cervical blunt trauma, the hit man himself was also killed by a gunshot perpetrated by the husband and concealed in fresh cement.

In a third case, a man was dating a prostitute for 14 years, despite paying her for sex; after having done a favor to her, in exchange for free sex, she decided to stop seeing and avoided him; as a result he chased and shot her to death.

From the known cases (n=40), most events occurred in private residences (61.6%), usually in homes shared by the victim and perpetrator (Table 4). More than 1 third of the deaths (35.0%) occurred in public places, including 1 case that happened in the victim's workplace (Table 4).

Only 29% of the victims (n=18) were found dead at the scene (including 1 decomposed corpse) while 71% (n=44) died immediately after upon arrival to the health care services or survived longer, even though none of the victims was submitted to surgery.

Table 4 - Characteristics of the circumstances surrounding the death

		n (%)
Motive	Separation / threat of separation	21 (38.9)
	Jealousy	17 (31.5)
	Conflicts	12 (22.2)
	Others	4 (7.4)
Place	Home shared by victim and perpetrator	26 (43.3)
	Other residence	11 (18.3)
	Public places	21 (35.0)
	Others	2 (3.3)

Regarding suicide of the perpetrator after committing homicide, 24.2% (n=15) consummated this act and 22.6% (n=14) attempted to their life.

In 8.1% of the cases (n=5) there were other 6 mortal victims (beyond the women who were the IPV victims and the 4 men who committed suicide immediately after the homicide) namely, an ex-mother-in-law, a 3 years-old son, a 8 years-old son, a 11 years-old ex-stepson of the perpetrator and 2 neighbors.

In 3.2% of the cases (n=2) there were 2 attempted homicides: (a) 1 man after shooting his ex-extramarital partner, who he had dated for almost 10 years, tried to shot his 24 years-old ex-stepdaughter, injuring her in the upper limbs; (b) 1 man who after shooting his ex-girlfriend, also tried to kill her new boyfriend.
In 13 cases (21.0%) the homicide was perpetrated in front of a minor and of those, 1 ex-stepson and 2 sons of the perpetrator were killed.

Forensic autopsy findings

All 62 women from the *IPV proved cases* were submitted to a forensic autopsy, according to the geographical distribution of the INML departments: 27 (43.5%) in the South; 19 (30.6%) in the North; and 16 (25.8%) in the Center.

Characteristics of fatal and non-fatal IPV-related injuries are summarized in table 5.

Fatal injuries, in order of frequency, were due to:

a) Gunshot trauma (45.2%) involving mainly shotguns (n=15) but also, rifles (n=2) and handguns (n=11);
b) Sharp trauma (27.4%) including knives/razors/daggers (n=15) and axes (n=2);
c) Blunt trauma (14.5%) implicating blunt objects (n=5) or bodily force (hands, fists or feet) (n=4);
d) Manual strangulation in 3 cases;
e) Thermal trauma with heat burns in 2 cases.

Three cases involved a combination of multiple methods: gunshot associated with blunt trauma (handgun plus stone); bodily force and manual strangulation; and 2 types of asphyxia combined (ligature strangulation (rope) associated to suffocation (pillow)).

The most frequent area wounded by fatal trauma was the thorax (48.4%), followed by the head (40.3%), neck (30.6%) and face (21.0%).

More than half of the victims (54.8%) was fatal multiple wounded.

Table 5 – Fatal and non-fatal IPV-related injuries according to type of method, anatomical location and number of injuries

		Fatal (n=62) n (%)	Non-fatal (n=35) n (%)
Method	Blunt trauma	9 (14.5)	22* (62.9)
	Sharp trauma	17 (27.4)	13* (37.1)
	Gunshot trauma	28 (45.2)	0 (0.0)
	Thermal trauma	2 (3.2)	0 (0.0)
	Manual strangulation	3 (4.8)	0 (0.0)
	Multiple methods	3 (4.8)	0 (0.0)
Location*	Head	25 (40.3)	10 (28.6)
	Face	13 (21.0)	16 (44.7)
	Neck	19 (30.6)	15 (42.9)
	Thorax	30 (48.4)	17 (48.6)
	Abdomen	10 (16.1)	10 (28.6)
	Upper limbs	2 (3.2)	26 (74.3)
	Lower limbs	2 (3.2)	6 (17.1)
Number	1	28 (45.1)	2 (5.7)
	2 - 9	26 (41.9)	22 (62.9)
	10 or more	8 (12.9)	11 (31.4)

* Categories are not mutually exclusive (not adding up to n=62, n=35 or 100%)

In 35 cases (56.5%) there were non-fatal IPV injuries contemporaneous with the fatal wounds and in only 1 case, the corpse was so decomposed that that it was impossible to determine if non-fatal injuries were present (table 5).
Non-fatal IPV injuries were produced by blunt force (62.9%) and sharp force (37.1%). The most affected anatomical area was largely the upper limbs (74.3%) at the expense of self-defense wounds, followed by the thorax (48.6%), face and neck. Almost all victims (94.3%) had more than 1 (multiple) non-fatal IPV injuries.
Among all victims, in 30.6% defense wounds (n=19) related to the fatal incident were presented, mostly in the upper limbs.

Crossing both fatal and non-fatal IPV data, we verify that most blunt and sharp-related deaths (78.0% and 88.0%, respectively) had additional non-fatal injuries, while only 29.0% of the gunshot deaths had them (table 6).

Table 6 – Non-fatal IPV-related injuries according to type of fatal IPV methods

		Non-fatal IPV injuries (%)
Fatal IPV methods	Blunt trauma	77.8
	Sharp trauma	88.2
	Gunshot trauma	28.6

Only 1 woman (1.6%) presented injuries in the healing stage (non-recent green bruises in the left arm), compatible with a history of prior IPV.

Also, it was not found any case with suggestive injuries of sexual assault.

Ancillary exams were performed in almost all autopsies: (a) toxicological (n=48; 77.4%) (Table 7); (b) genetics (n=22; 35.5%) (Table 7); (c) exams performed in gunshots deaths, including analysis of gunshot residue (GSR), ammunitions and/or firearms (n=21; 33.9%); (d) forensic imaging (n=7; 11.3%).

Toxicological exams revealed positive results for: (a) alcohol (16.7%, n=8); (b) abuse drugs (6.5%; n=2); (c) prescribed drugs (31%; n=9).

Evidence collection for genetics exams (which did not include reference samples), in 72.7% of the cases were performed underneath the fingernails of the victims (Table 7).

In these cases, results were positive in 4 cases (25.0%), which mean they contained biological material other than the victim.

Among all victims, in 9 cases (14.5%) sexual assault, contemporaneous to the fatal incident, was suspected and genetic DNA samples were collected including: clothing (n=1); pubic hair (n=2); oral cavity (n=4); genitalia (n=9) and anal area (n=6) (table 7).

Table 7 – Ancillary exams performed

		n (%)
Toxicology* n=48	Alcohol	48 (100.0)
	Abuse drugs	31 (64.6)
	Prescribed drugs	29 (60.4)
Genetics* n=22	Clothing	9 (40.9)
	Blood/hair/body surface	7 (31.8)
	Underneath the fingernails	16 (72.7)
	Oral cavity	4 (18.2)
	Genitalia	9 (40.9)
	Anal area	6 (27.3)
	Weapons	4 (18.2)

* Categories are not mutually exclusive (not adding up to n=48, n=22 or 100%)

Legal case progression and judicial outcomes

We've obtained all of cases correspondingly judicial decisions (Figure 2).

From the total of 62 *IPV proved cases*, 72.6% were prosecuted and 27.4% were filed by the Public Prosecutor Office.

The 17 cases filed by the Public Prosecutor Office were due to death of the defendant before the trial (88.2% by suicide and 11.8% by unknown manner of death) (Figure 2). However, even though the prosecution was filed, in these cases there was enough evidence that the perpetrator was indeed the current or former intimate partner of the victim.

From the remaining cases who were prosecuted (n=45), 93.3% of those were convicted (95.2% with prison sentence) while the remaining (6.7%) was filed because the defendant died during protective custody before being convicted (Figure 2).

From the total of conviction cases (n=42), 42.9% (n=18) were at the Trial Court, 19.0% (n=8) at the Court of Appeal and 38.1% (n=16) at the Supreme Court.

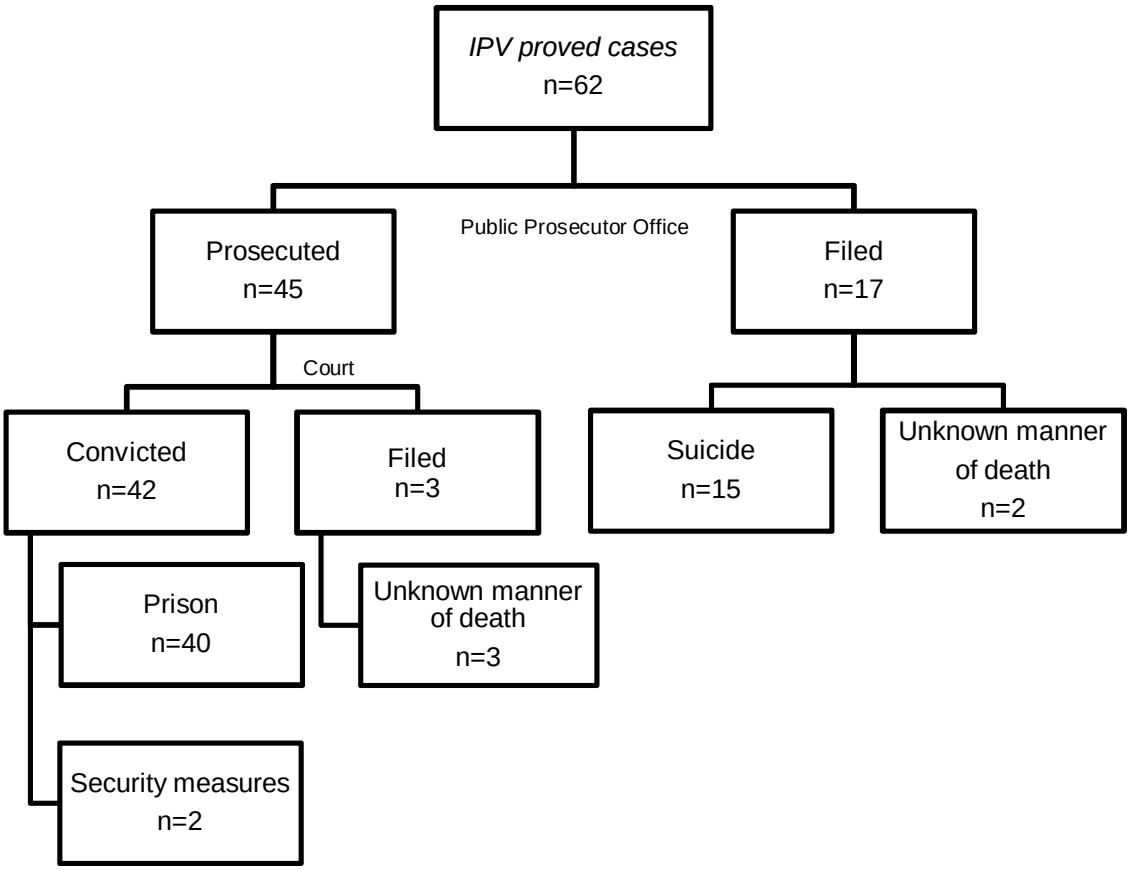

Figure 2 – Legal case progression and judicial outcomes

From all perpetrators who were prosecuted and convicted, 33.3% (n=14) had been subjected to a psychiatric evaluation during the trial (24 cases without information on that). Of these, 2 perpetrators (14.3%) were sentenced to security measures, which means that they were not considered guilty by reason of insanity (Figure 2).

The remaining perpetrators (n=40), in 97.7% were convicted by the crime of murder () (Table 8). In 42.9% there were convictions by other crimes, namely, theft, illegal weapon possession, offenses against the physical integrity, maltreatment, corpse's desecration and murder of other victims.

The average prison sentence was 15.5 years (min.=8, max.=23.3, SD=3.6). Most of the perpetrators (75%) were sentenced between 10 to 20 years in prison, including 30% between 16 to 18 years in prison (Table 8).

The average time elapsed between the autopsy performance and the Trial Court sentence was 13.7 months (min.=9, max.=26, SD=4.2). The great majority of the Trial sentences (95.2%) were concluded before the end of the second year after the autopsy was performed (Table 8).

Table 8 – Judicial decisions

		n (%)
Criminal convictions n=42	Qualified murder	13 (31.0)
	Simple murder	10 (23.8)
	Qualified murder plus other crimes	12 (28.6)
	Simple murder plus other crimes	6 (14.3)
	Offenses against the physical integrity	1 (2.4)
Prison sentence (*years)* n=40	]8,10]	4 (10.0)
	]10,12]	5 (12.5)
	]12,14]	7 (17.5)
	]14,16]	5 (12.5)
	]16,18]	12 (30.0)
	]18,20]	5 (12.5)
	]20,22]	1 (2.5)
	]22,24]	1 (2.5)
Time elapsed between the autopsy performance and the Trial Court sentence (*years*) n=42	≤ 1	19 (45.2)
	]1-2]	21 (50.0)
	> 2	1 (2.4)
	Unknown	1 (2.4)

Cluster analysis of the victims

The clustering results applied to the victims are shown in figure 3 and suggest 10 homogeneous groups, distributed from the left to the right.

We observe that most victims from 3 different clusters (*Cluster 1, 3 and 4*) were mainly killed by gunshot trauma and did not present non-fatal IPV injuries. Thirteen women were assigned in cluster *1*, mean age 42.8 years (SD=9.5), all killed with 1 single fatal

wound, in general, because of jealousy. *Cluster 3* (n=7) represents the youngest women (33.7 years, SD=11.4), all killed by former intimate partners by gunshot (2-9 wounds). *Cluster 4* (n=7) includes the oldest women (65.4 years, SD=16.4), all killed by current partners with 1 single fatal shot wound, motivated mainly by conflicts.

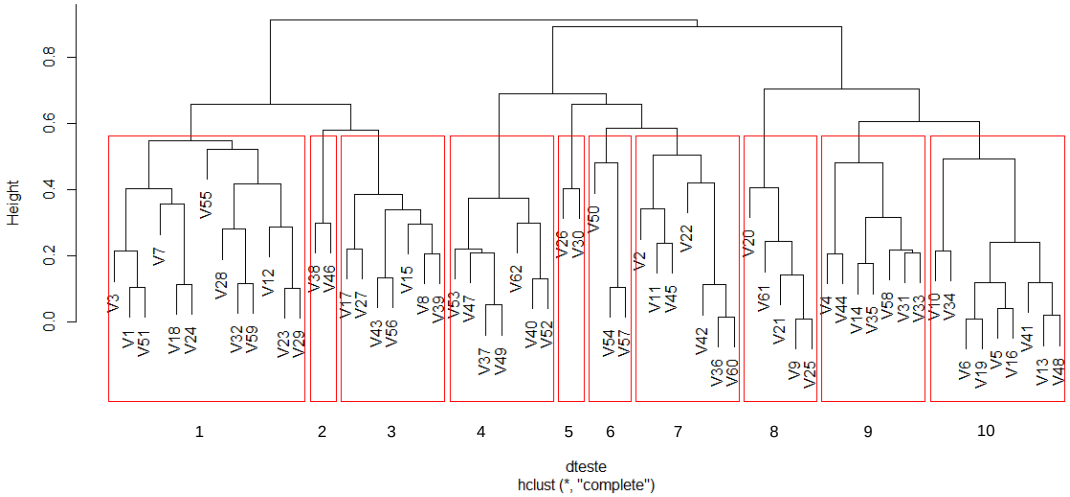

Figure 3 – *Cluster* dendrogram of the victims

The two victims from *group 2* (28 and 44 years old) were both killed by fire burns, with no non-fatal injuries, because of jealousy felt by the ex-husband and the current common-law partner, correspondingly.

Group 5 includes two women within a current extramarital relationship; 1 was 32 years-old and was strangulated and the other was 34 and died due to infliction of blunt trauma.

Victims from 3 distinct clusters (*Cluster 6, 8 and 10*) were killed mainly with a sharp weapon. The oldest victims (mean age 77.6, SD=3.4) from *group 6* (n=3) were all within current long-term marital relationships, most of them were killed by 2-9 sharp blows. Almost all victims (n=9) (mean age 34 years, SD=7.2) which constitute *group 10* were employed, had 2-9 sharp fatal injuries plus non-fatal injuries and were killed by cohabitating intimate partners due to jealous. Younger women (average age 26.6 years, SD=13.9) represented the *groups 8* (n=5), almost all killed by 10 or more fatal sharp wounds by a jealous ex-boyfriend (short-term relationships), also presenting other injuries due to non-fatal IPV.

Victims from *group 7* (n=7) were on average 42.9 years (SD=9.5), most of them killed with different weapons or methods by current husbands (relationships lasting on average 19 years), due to conflicts and all victims presented non-fatal injuries.

Cluster 9 (n=7) assigned victims with 50.4 years-old on average, with a great variety of ages (SD=20.2), most of them died due to blunt force trauma perpetrated by jealous current husbands and all of them presented also, non-fatal IPV injuries.

Cluster analysis of the perpetrators

The perpetrator's dendogram reveals 8 distinct groups of individuals (Figure 4).

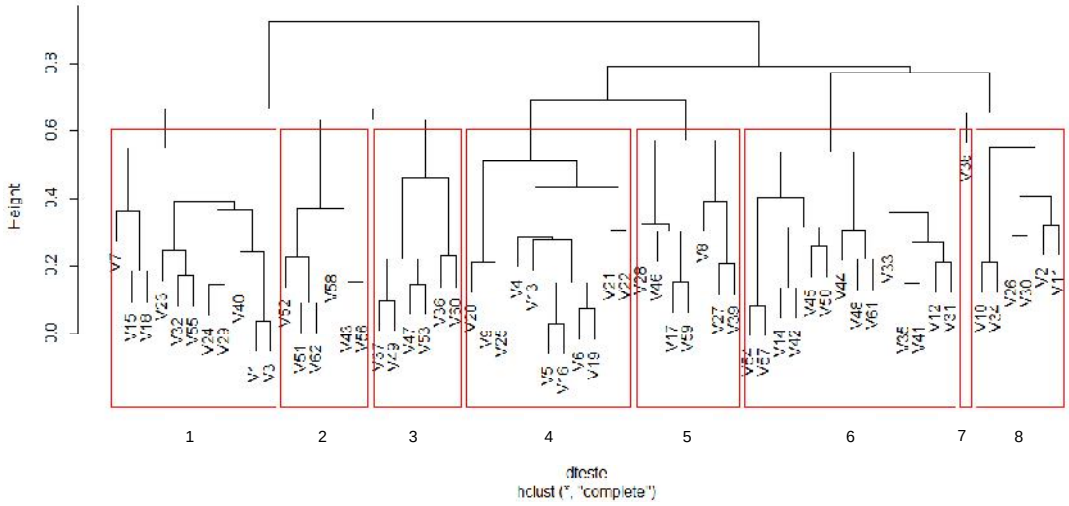

Figure 4 – *Cluster* dendrogram of the perpetrators

All 23 men assigned in the *clusters 1, 2 and 3* possessed firearms and killed their intimate partners by gunshot trauma. *Group 1* (n=11) included the youngest men (mean age 49.6 years, SD=10.5), employed (64%), jealousy was the chief motive, most of the deaths were due to a single fatal injury (91%) without any non-fatal injuries (64%) and 55% were convicted of *qualified murder*. *Group 2* (n=6) had older men than the former group (57.7, SD=8.9), all committed suicide, 50% killed other people, victim's deaths included 1 fatal injury (50%) or 2-9 injuries (50%), without non-fatal violence (64%), all convicted of *simple murder*. *Group 3* (n=6) represents the oldest men (69.8, SD=12.5), most of them retired, within long-term current marital relationships (average length 33.2 years, DP=17.1), half of them committed suicide, the majority were convicted of *simple murder* and most deaths were due to 1 fatal wound

because of conflicts. Most perpetrators from *group 5* (n=7) also killed their victims with a firearm (2-9 fatal wounds), mean age 43.2 (SD=17.9), within medium-term former relationships (8.4 years, SD=9.7), typically marital relationships, most of the times because of jealousy and the sentence was *simple murder* in 71%.

Group 4 (n=11) includes very young perpetrators (36.5 years, SD=11.9), employed (73%), all jealous, who killed their short-term (4.8 years) past intimate partners by sharp trauma in 82%, with 2-9 (55%) or more than 10 blows (36%), all victims without non-fatal IPV. They were convicted of *qualified murder* in 82%.

Fourteen men were assigned in *group 6*, mean age 54.5 (SD=16.8), almost all were in long-term current marital relationships (31.7 years), who killed their partners, mostly, with a sharp instrument or using blunt force and who were convicted of simple murder in the majority of cases.

Group 8 had young men (41.7, SD=9.5), half of them with criminal records, all in current relationships (50% marital and 33% extramarital), who killed their intimate partners by hand strangulation, blunt trauma or combined methods, with similar distribution and almost all were judged for *qualified murder*.

Only 1 man constitute the *cluster 7*, 45 years-old, employed, who killed his current common-law partner with fire (heat burns), without other type of injuries, and who was convicted of offenses against physical integrity aggravated by the result (prison sentence 8 years).

DISCUSSION

To our knowledge, this is the first national study, held in Portugal, based in forensic autopsies and judicial decisions, with focus on IPV against women perpetrated by men-intimate partners. The present study allowed us to determinate the mortality rate related to IPV, also providing an overview of the different aspects which characterize these types of occurrences, namely the most common methods or weapons used and the associated patterns of fatal and non-fatal IPV-related injuries.

Population study

The mortality rate found in this study was 0.44 per 100.000 women aged 15 years or older whereas the overall intentional homicide rate reported for Portugal is 1.2 per 100.000 inhabitants [11] (Table 9).

Comparatively, Portuguese IPV-related female mortality rate is far below the ones presented by the USA [14] or South Africa [12] but these numbers must necessarily be appreciated according to the intentional homicide's rates per 100.000 inhabitants of each country (Table 9).

Mortality rates from others countries are not fully comparable because they are reported with different based-methodologies, for example, IPV-related mortality rates calculated per inhabitants [18], per inhabitants age 14, 15 or 16 years or older [9,12,26], not disaggregated by sex of the victim [18], or female mortality rates calculated only in the familiar context [41].

Table 9 – Comparison of intentional homicide rates and IPV-related female homicide rates

Country	IPV-related female mortality rate**	Intentional homicide rates*
Portugal (present study)	0.44	1.2
South Africa [12]	8.8	33.8
USA [14]	3.46	5.0

* Rates per 100.000 inhabitants; data obtained from *Global Study on Homicide: trends, contexts and data (UNODC)* [11]
** Rates per 100.000 women 15 years old or older (except for South Africa, 14 years old or older)

Furthermore, this investigation has only studied 3 consecutive years of the Portuguese reality, therefore not allowing us to reach a conclusion about trends. On the other hand, if we considerer that this study portrays the actual population of victims and

perpetrators involved in this phenomenon, with data as recent as possible, we may admit that the number of victims detected per annum revealed a slight fluctuation, with only small variations over time.

This finding is in agreement with time-series data from other countries, such as the USA or Canada, that shows a certain stability or even a slight decline of intimate partner homicides over time [11,25,26].

This study also shows that the absolute number of women killed in an IPV setting is 20.7 women per year on average. This number can be considered low but we must always be aware that we are speaking about human lives in a country with not so many homicides. Furthermore, it constitutes a relevant proportion (13.3%) of the alleged homicide autopsies' case load (Table 10). Among all the alleged homicides of women, 60.8% are the result of violence between intimate partners, which makes fatal IPV the most common form of alleged homicide of women in Portugal (as expected, because Portugal has a low intentional homicide rate) (Table 10) [11].

A comparison of prevalence was made between different sources on IPV-related homicides of women, among all alleged general homicides and among all alleged homicide of women (Table 10). We verify that our prevalence results are, globally, in accordance with others numbers from *Justice Statistics* (USA), *Home Office* (England and Wales), *Australian Institute of Criminology*, Statistics Canada and scientific articles from northern Europe (Denmark), Seville (Spain), North Carolina (USA), Dominican Republic, Australia or South Africa (Table 10). Also, our findings fall into the prevalence numbers presented by WHO studies compiled from Australia, Canada, Israel, South Africa and the USA that show that 40-70% of female murder victims were killed by their husbands or boyfriends, but also, from available data for Europe which shows that 35% of female victims were murdered by intimate partners [5,11].

The relative discrepancies in the prevalence of fatal IPV among different countries around the globe may be attributed to some aspects, among others:

a) Distinct definitions of intimate relationships (narrow *versus* broad) and consequently, the inclusion of different types of relationships in homicide studies may explain some variances; the most questionable ones are dating, extra-marital and homosexual relationships;
b) Distinctive research methods such as the establishment of the victims' minimum age (15 years old in almost all studies [14,18], including ours, with an exception for South Africa which considered the minimum age as 14 [9,12] or 13 [17] years old);

c) Different sources of information such as police-based data, forensic reports, Justice-sector data, media reports, population-based data and/or national homicides databases [38]. In case only alleged homicide cases are analyzed, results can be overestimated because some of them can be poorly evaluated. On the other hand, findings can be underestimated in studies based solely in convicted cases because: (a) the principle *in dubio pro reu*, which means that the defendant may not be convicted if there isn't enough or robust evidence to convict; (b) the impossibility of identify the alleged perpetrator; and (c) some perpetrators who die before the trial is completed, are not convicted (32% in our study); the best solution seems to be crossing studies using different data sources;
d) Homicide statistics not disaggregated by sex, in some countries;
e) Socio-cultural-gender-economic factors which are very difficult to take into account in different statistics and studies.

Table 10 – Comparison on prevalence of IPV-related homicides of women among all alleged general homicides and all alleged homicides of women

Country	IPV-related homicides in general homicides (%)	IPV-related homicides in homicides of women (%)
Portugal (present study)	**13**	**61**
Northern Europe [18]		45
England and Wales [16,42,43]	15	37-52
Spain [41]		63
USA [14,37,44]	11	33-50
Canada [25]	15	50
South Africa [12]		50
Dominican Republic [38]		70
Australia [45]		53

Comparison between different data sources in Portugal

As a rule, all research studies and official statistics have a margin of error. As expected, the prevalence of fatal IPV obtained from our study and other collected from distinct data sources in Portugal show slight differences.

Because both official statistics considered marital homicide when the crime was perpetrated against a current opposite-sex spouse or cohabitating partner, in this sense and to allow roughly comparisons, our prevalence, at this point, is presented including only current marital and common-law partners (n=30) (Table 11), corresponding to 6.6% of all alleged homicides - date obtained from autopsy reports (2005-2007) and confirmed by judicial decisions (Table 11).

Comparing our results with two official sources (Table 11), we verify that our numbers are lower than the:

a) 12.5% reported at a national level by the *Justice Statistics,* compiled from male convictions (in Trial Courts) of marital homicide (both attempted and consummated) during 2007-2010 [20];
b) 14.4% reported by a national study held by the CIG together with the *Prison Services*, compiled from all males serving a prison sentence for marital homicide in Portuguese prisons during October 2006 (with exclusion of prisoners convicted of security measures) [21].

The prevalence achieved in the present study is lower comparing to other sources mainly because quite different methodologies and samples were used: women's deaths subjected to autopsy *versus* male convictions or serving convictions, among others which are detailed below.

In fact, until 2010, in terms of *Justice Statistics* violence between intimate partners was considered only when the victim was a spouse or a cohabitating partner of the perpetrator, but after 2010 (consistent with the reform of the criminal system in 2007) the concept has been extended to dating, homosexual and ex-intimate partners. Thus, before 2010, these non-conservative types of relationships were not counted as fatal IPV cases for statistical purposes [20,21] which is the case in both official sources (*Justice Statistics* and CIG/*Prison Services*) .

Instead, in our study we adopted broader definitions, including all those relationship's types, except the homosexual ones; according to the WHO [2], the use of conservative and narrow definitions of intimate relationships has an effect on results, probably underestimating rather than overestimating the true prevalence of IPV.

Also, Justice data only includes cases processed through the legal system, which most of the times do not represent the totality of cases [38]. Furthermore, our results accounted perpetrators both convicted in Trial and Higher Courts (including the perpetrators sentenced to security measures) whilst in *Justice Statistics*, only

convictions in Trial Courts were accounted while in the CIG/*Prison Services* study convictions of security measures were excluded.

In addition, we studied all cases of consummated homicides while both attempted and consummated homicides were explored in *Justice Statistics*.

Table 11 – Comparison on prevalence of IPV-related homicides of women among all (alleged) homicides

	Present study*	*Justice Statistics***	CIG/*Prison Services***
Average proportion	6.6%	12.5%	14.4%
Reported years	2005-2007	2007-2010	2006
Data source	Autopsy confirmed with Courts decisions	Convictions in Trial Court	Convicted serving a prison sentence

** Prevalence was calculated including only current marital and common-law partner (n=30) **Both official sources considered marital homicide when the crime is perpetrated against a current opposite-sex spouse or cohabitating partner*

Comparing our findings with the ones reported by UMAR, for the same period of time (2005-2007), we verify that, according to UMAR, the total number of women killed is 92, being 83 IPV-related cases. Regarding our study, the total number is higher for all alleged homicides of women (n=102) but lower if we only consider IPV-related cases (n=63) (Table 12).

Table 12 – Comparison on prevalence of alleged homicide of women IPV-related *versus* non-IPV-related (average for 2005-2007)

	Present study* n (%)	UMAR** n (%)
IPV-related cases	63 (61.8)	83 (90.2)
Non-IPV-related cases	32 (31.4)	8 (8.7)
Unproved intimate relationship cases	7 (6.9)	1 (1.1)
Total	102	92

** Autopsies performed per annum of alleged homicides of women ** "Homicides" of women per annum based in newspaper records*

This overestimation as IPV-related cases by UMAR may be explained because it is based exclusively in media data (alleged cases), while in our study we based in the

number of autopsies confirmed by judicial outcomes. Newspapers accounts are an important source of information to follow up on gaps in information, particularly when official statistics are difficult to obtain, however, they may reflect misinformation and myths about IPV and homicide [38].

To sum up, the differences found among our prevalence and other Portuguese data sources may be explained chiefly due to distinct definitions of intimate relationships and different research methodologies used.

One of the strengths of our study is the adopted methodology: cases were selected through the medico-legal system (INML) complemented with some follow-up analysis of police records and newspapers records, and afterwards confirmed by judicial outcomes (obtained from Public Prosecutor Office and Courts).
Literature states that medico-legal structures have excellent resources for identifying victims of alleged homicides because cases are categorized not considering the motivation or the type of crime involved, but the forensic findings suggesting a certain manner and cause of death [38]. Besides, unlike data sources based exclusively in convictions, the use of that research method allows an accurate selection of IPV cases, ensuring that even the cases not pursued by the criminal justice system are included [38]. Namely, those cases that are not judged or neither convicted, in other words, filed cases due to death of the defendant, proved to have been the perpetrator of the crime.

In spite of all limitations, we believe that the methodology used in the present study is by far one of the most reliable method with which these cases can be identified and studied in the current national context, since our selected *IPV proved cases* are all cases of IPV confirmed by judicial decisions.
In addition, and despite few characteristics of the victims and perpetrators remain unknown, and in comparison with other sources, our approach and data sources gave us access to a more complete set of information on these cases, particularly in what concerns the forensic medical aspects of these deaths.

Characterization of the victims, perpetrators and their intimate relationships

Our data did not allow a full exhaustive characterization of the victims and perpetrators, as expected, because much information occasionally was not documented (e.g., history of substance abuse, psychiatric problems and prior IPV, firearm ownership and criminal records, which were unknown in a large number of cases). Despite that, the

available information allowed a better characterization of the victims rather than the one of the perpetrators.

Young adult victims (20-40 years old) were the most prevalent in this study (47%) (Table 1), which may suggest that younger women are at greater risk, fact that is supported by previous research [12,14,18].

We also found that most perpetrators (45%) were aged 30-50 years old (Table 1), which is also similar to literature [18]. On average, perpetrators were 5.5 years older than the correspondingly victims which shows a trend that is in accordance with different studies which refer that there is higher risk of IPV homicide for age discrepant couples [46]. Other study states that young/middle-aged women are at higher risk of being killed when their partners are more than 10 years older than them [47].

A relevant number of victims (11%) were immigrants, which constitute a risk factor for IPV and IPV-related homicide [48].

Most women were employed (36%) or housekeepers (23%) (Table 1). In opposition to our results, a Scandinavian study showed that a higher proportion of the victims were not employed (52% *versus* 36% employed victims) [18].
Near 26% of the perpetrators were not working at the time of the homicide which is considered a risk factor for both fatal and non-fatal IPV [11,13].

In our study at least 7% of the victims had a history of chronic consumption of alcohol and/or drugs.
According to autopsy findings, 17% had alcohol in the blood, which is far below rates presented in other studies [14,18,49]; 7% tested positive for abuse drugs. So, in spite of the lack of information about previous consumptions, we found that a certain number of victims consumed before the homicide, which may be considered a potential risk factor, as it has been previously reported, specially for alcohol [11,13,18,49-51]

It was not possible to completely understand trends on substances abuse or history of psychiatric disorders for perpetrators, but still, 18% had history of alcohol and/or drug abuse and 16% history of psychiatric disorders, both being considered high-risk factors for fatal IPV [11,13,18,49,50,52]. Many studies show that alcohol abuse of the perpetrator is associated with a twofold increase risk of attempted or consummated homicide of females and men with some personality disorders are more likely to perpetrate an intimate homicide [53].

Previous arrest for DV is considered to be protective against fatal IPV [13] but on the other hand, previous arrest/conviction for any type of crime has been found to constitute a risk factor for future offending, including IPV [54]. In our study we found 30% of the perpetrators with criminal records while only 1 related to IPV.

The present study revealed that women were mostly killed by their marital partners (61%), including husbands and ex-husbands, rather than by non-marital partners (39%), with (ex)common-law or (ex)dating partners (Table 2).
On the opposite, internationally data of USA, South Africa, Canada and Australia, show that in comparison to marital partners (28-46%) there is a stronger likelihood of non-marital partners (54-73%) committing homicide [12,14,15,55,56]. Statistics from Canada show that homicides committed by non-marital partners have been increasing over the past years, with a rate of homicide in current common-law relationships nearly 8 times higher than the rate in current marital relationships (adjusted to types of union in the Canadian population) [55].
These worldwide trends on homicide due to IPV may be explained by demographic shifts, marriage/cohabitation tendencies and changing relational lifestyles across the population, bearing in mind that Portuguese people, in comparison with others, are still considered a very conservative and traditionalist society.
Also, some researchers argued that childlessness is associated with higher risks of physical and sexual domestic violence [57]. But this interpretation in not in accordance with our study, where most couples (53%) had shared children.

At the time of the event, most victims (60%) were in current relationships and 50% were living with the perpetrator while 21% had never cohabitated with the partner who killed them (Table 2). According to Campbell, situations in which the intimate partners had never lived together were protective [13] and in fact, globally, the lowest shares of intimate homicides are related to dating relationships (11% in our study and 19-28% in foreign studies) [12,13,26]. Also, women in non-cohabitating relationships, theoretically, have less opportunity to be killed because there is a decreased availability to their partners and ex-partners to get in touch [47].

Current relationships lasted more than the former relationships (average length 16 years *versus* 9 years). A Chicago's study demonstrated that the length of the couple's relationship influences the risk of intimate partner homicide and 50% of the victims were in a relationships for 2 years or less, at the time of the homicide [50]. Another study demonstrated that longer marriage durations and marital partners who confessed

having had an extramarital relationship were both associated with higher risks of recent IPV [57].

Almost 79% of the analyzed victims in our research (excluding cases without available information on that) had a history of prior IPV perpetrated by the killer partner, as a resemblance to what happens in other countries: 59% in Australia [15] and even more in USA, near 67% [14].

In this latter study, is was found that perpetrators were more likely to be former partners, to have criminal records and to have consumed alcohol and less likely to have attempted suicide afterwards (compared to cases without a history of IPV) [14].

Most literature suggests a progression from non-fatal violence to fatal violence within intimate relationships, while previous history of IPV is considered a primary risk factor, functioning as a precursor to female partner homicide. [5,9,11-16].

Only a single victim presented physical healing injuries at the forensic autopsy, suggestive of non-recent IPV.

Additionally, from all women with a history of prior IPV, 3 had been observed for IPV-related assaults at the clinical forensic medicine departments of the INML, before being killed, while the information regarding this relevant aspect was missing in 92.0% of the cases.

This finding does not exclude the fact that, probably, other women had also been victims of previous IPV, which is understandable because, generally, diagnostic signs of physical or sexual violence specific within intimate relationships are difficult to established and most of the times do not leave physical sequelae [58]. In this sense, according to the last version of the Portuguese *Criminal Code*, the crime of DV may be established, even in those cases, where there is not any evidence or proof of previous IPV.

Data from USA shows that nearly 37% of victims contacted with law enforcement for IPV-related incidents during the year before death [14]. This finding shows that is fundamental to seriously evaluate the risk on these cases, so adequate DV protective measures could be timely implemented, in order to avoid or reduce fatal outcomes in these settings [27]. This also calls for the importance of reporting suspected IPV cases, even if the victims themselves remain in silence, bearing in mind that since 2001, DV is a public crime.

Unfortunately, unreported cases represent the majority, not only in Portugal but also in other countries, because victims do not disclose and health professionals do not report it [2].

Nowadays, links between deaths and prior comparable violence cannot be easily made [38], so it is crucial to develop additional studies based on IPV death reviews, considering this aspect.

Characterization of the circumstances surrounding the death and forensic autopsy findings

Most incidents occurred during summer season (37%) and 48% during the weekend (Table 3), which is totally in accordance with recent studies from northern and southern hemispheres that reported a homicide peak in summer months and during the weekend [41,59,60]. This may be related to social, psychological and biological factors including seasonal and circadian cycles of violent deaths but also, longer periods of time socializing and higher alcohol and drug consumptions during the weekend [59].

Concerning the homicide's motivation (Table 4), our results show that separation or threat of separation was the most frequent alleged reason (39%), particularly in former relationships (76%). The fact that a woman is leaving, attempting or suggesting to leave a relationship is considered, by several researchers, to be a high-risk factor for the potentially lethal IPV [11,13,45,50]. Similar shares were presented previously in others studies, namely, 38% in Chicago [50].

The present study showed that in a relevant number of cases (40%), the victim was within a former relationship, which means that a high risk persists even after the couple's separation. This rate is higher than the one found in other studies (32% in USA and 37% in Australia) [14,15].

Also, most women were killed by ex-partners within a year of separation (44%). Others studies showed shorter length of separation: 47% were killed within 2 months of separation and 91% within a year [61]; 52% had a time period of less than 1 month [62]. However, like in our study (2 deaths happened 8 and 10 years after the separation), previous research shows that the homicide can occur months but also, years after separation [63].

Furthermore, the second most common homicide motive was jealousy (32% in the present study comparing to 36% in Denmark) [18]. Researchers argue that a large majority of intimate homicides against women were precipitated by jealousy (in particular morbid jealousy), due to proprietariness, possessiveness and sexual jealousy, including accusations of the victim's sexual infidelity [63].

A very similar case as our *mercy-killing* case was also reported in Denmark [18].

The majority of victims were killed in private residences, usually their own homes, as in earlier studies (Table 4) [14,18].

Penalties of IPV-related crimes are raised whenever the event is perpetrated in a shared house or in the victim's home, according to the article 152º of the Portuguese *Criminal Code.*

Most victims (71%) did not die immediately and survived for some time. Also, most corpses (98%) were well preserved, which is very close to results (86%) from another study [18].

In 47% of the fatal events, perpetrators attempted or committed suicide. Our prevalence of consummated suicide (24%) is comparable to numbers which had been internationally reported: 19% in South Africa [9]; 23% in USA [14] and 25% in Denmark [18]. Our share of attempted suicides (23%) is relatively high comparing with others: 7% in Canada [63] or 3% in the USA [14].
Even though we did not have data to reach the same conclusions, Campbell [17] stated that the unique risk factors for femicide-suicides (compared to overall femicide) were prior perpetrator suicide threats and victims having ever been married to perpetrator. Also, it is known that homicide-suicide is more common in countries with low homicide rates [11,23,24] and in the context of intimate relationships [18,23,24], achieving 65% of all murder-suicide with female victims [24].

Our study revealed 5 cases where 6 homicide's witnesses were killed apart from the woman victim (including 3 children) and 2 cases where other persons were seriously injured (2 attempted homicides). Multiple victims are not frequent in intimate partner homicides: 8% in our study, 10% in a Milan study [24] and 5% in a study held by the *Chicago's Women's Health Risk Study* [50]. This study from Milan found children to be the second most common type of victims in homicide-suicide events with 21% [24].

The presence of stepchildren cohabiting with the couple (especially if it is a victim's son/daughter from a previous partner) is considered as a risk factor for intimate partner homicide [13,50]. In our study, 21% of the cases occurred within the presence of minors, children or stepchildren, who witnessed the fatal event, which, furthermore, constitutes a severe type of child abuse (considered in the article 152º of the Portuguese *Criminal Code)* with effects on aggravation of the crime penalty. Also, is well demonstrated that it constitutes a risk factor for future potential victims or perpetrators of both fatal and non-fatal IPV [56].

In the present study, most victims were killed by gunshot (45%) (specially shotguns), followed by sharp trauma (27%) (mostly with knives), and blunt trauma (15%) (mostly with blunt objects) (Table 5).

As indicated by previous research, the perpetrator's availability and access to firearms is a major risk factor for fatal IPV against women (an 8-fold increase) [9,11-13,26,50], and given that these weapons are lethal and simple to use [17], it is not surprising that in this study all perpetrators who owned firearms (including police and ex-police officers) used them to kill their partners.

In fact, most of the women were killed with a firearm solely (45%), which is in roughly accordance with the overall percentage of homicides involving a firearm in Portugal (34%) (Table 13) [11,20].

The accessibility to some specific firearms may be understood by the fact that sport hunting is regularly practiced in Portugal [64], explaining why shotguns and rifles were used in 61% of all deaths by gunshot trauma. Also, the indiscriminate employ and misuse of these weapons may be a reflection of the middle to lower income people (living in rural areas), who usually own these firearms [64].

Reports from different countries show dissimilar percentages of homicides involving a firearm and the commonest methods of IPV-related homicide of women (detailed in Table 13).

Interestingly, after addressing data carefully, we realize that the most similar countries to Portugal, in terms of homicide methods used, are the USA and Canada. USA is well known to be ruled by a great availability of firearms and few restrictive laws that limit the purchase and use of guns, which is not the case in Portugal as well as, in some way, in Canada. Despite that, in these 3 countries, the most frequent homicide method used was gunshot trauma and in large proportions: 66% in USA [14], 40% in Canada [65] and 45% in the present study, comparing to other methods. Additionally, in USA more IPV-related homicides are committed by firearms than by all other types of weapons together [5,11,14,25,37].

On the contrary to what was expected, other countries where shares of homicides involving a firearm were more or less the same as the ones reported to Portugal (such as South Africa, Canada, Denmark, Spain or England and Wales), women were mainly killed by other methods apart from gunshot trauma.

Most victims were fatally injured in the thorax (48%) while the head (40%), the neck (31%) or the face (21%) were also often involved anatomical areas in fatal IPV-related

injuries (Table 5). A study on injury patterns of female's homicides concluded that, in general, the head and face, and thorax were the most common locations of wounds: head and face injured by blunt force, neck injured by strangulation while the thorax by sharp force injuries [66]. Findings from studies on acute patterns of non-fatal IPV, on the contrary, show that injuries on the head, neck and face are the most frequent [58,67], not recognizing the thorax as the leader wounded area (as in our study). In general, these findings may be explained by the fact that these anatomical regions are preferred targets in fatal assault cases [68] probably because they comprise vital organs.

Because these types of deaths are particularly violent, in this study we were expecting to detect a higher proportion of cases with multiple fatal wounds (55%) rather than with a single wound (45%). Instead, another study on female homicides victims concluded that single injuries (58%) (more likely when a gun was used) were more frequent than multiple injuries (42%) (more likely with blunt force) [66].

Table 13 – Comparison on percentage of homicides involving a firearm and the commonest methods of IPV-related homicides of women

	Homicides involving a firearm (%) [11]	IPV-related homicides of women (%)
USA [14]	60	Gunshot (66) Sharp (16) Blunt (8)
South Africa [12]	45	Blunt force (33) Sharp (33) Gunshot (30)
Portugal (present study)	**34**	**Gunshot (45)** **Sharp (27)** **Blunt (15)**
Canada [65]	32	Gunshot (40)
Denmark [18]	32	Strangulation (33) Gunshot (23) Sharp (20)
Spain [41]*	22	Sharp (67) Gunshot (25) Asphyxia (8)
England and Wales [42]*	1	Sharp (31) Strangulation (21)

* Data is concerned homicide methods in violence against women (not only in a IPV setting)

Our share of victims with additional acute non-fatal injuries (57%), contemporaneous and beyond the fatal ones, perpetrated before their deaths, was somewhat slightly lower than the share reported by other foreign studies (65% to over 80%) [13,14,56,69]. This additional non-fatal violence was produced by blunt force (63%) or sharp force (37%), presenting with multiple injuries (94%), mainly in the upper limbs (74%) and thorax (49%).

Among all victims, 31% of the women presented defense wounds which means that they were trying to defend and protect themselves but also, it may also indicate that the victims were conscious and were not taken completely by surprise [68]. A study on general homicidal deaths, concluded that 33% of the cases had self-defense injuries on the upper extremities [70].

According to a study on sharp-force homicide using *forensiometrics techniques,* the presence of multiple injuries, located in upper-limbs and the existence of superficial thoracic injuries are more likely when a high inter-relationship between victim and perpetrator exists, are indicative that the perpetrator had strike several times at the victim and inflicted more injuries than were necessary to kill the victim (overkill), and also, they may represent defense injuries in a attempt to the victim to defend him/herself [71]. This idea is also supported by another study from the same author that found that more than ten sharp wounds give a statistically significantly higher probability that perpetrator and victim are not stranger to each other [72]. Another study considers that stabbing, beating and strangulation are more intimate forms of violence than shooting [73], which is in accordance with the fact that, in the present study, most gunshot deaths did not involve much intimate contact between the victim and perpetrator because only 29% had additional non-IPV injuries, comparing to blunt and sharp-related deaths.

Toxicological exams were performed in all cases except in 23%, because 1 corpse was found decomposed and the remaining victims had a survival time which not permitted toxicological exams.

Among all victims, genetic samples from underneath the fingernails were collected in 26% of the cases and results were positive in 7%. This type of DNA evidence is important because it constitutes an additional presumable proof (like the defense wounds) that the victim and the perpetrator had been fighting before or during the attack.

Another recent South Africa study, concludes that none of the forensic practices increased the likelihood of a conviction in female homicides, except the collection of underneath fingernails samples [74].

In 15% of the cases, sexual assault (contemporaneous to the fatal incident) was suspected, even though none of the victims presented physical injury suggestive of sexual abuse during autopsy. To confirm that suspicion in those cases, DNA samples were collected mainly in genitalia (100%), anal area (67%) and oral cavity (45%) without any positive result (Table 7).
The lack of physical sexual injuries is explained by the fact that events of sexual assault within an intimate relationship (threatened or forced sex), most of the times do not produce physical evidence because victims most often employ no resistance [75]. Literature indicates that 10-40% of all married women and 40-50% of women suffering from IPV are victims of sexual violence within intimate relationships [75]. Nearly 10% of IPV victims suffer genital injury [76] increasing to 13% in IPV victims who were eventually killed in IPV-related homicides, which may indicate a higher homicide risk for this type of injury [77]. Furthermore, general IPV associated with sexual IPV in particular, both perpetrated by the same men, is generally more severe and more likely to be fatal [78]. A study conducted in South Africa, estimated that a rape homicide was suspected in 16% of all female homicides and advises that postmortem sexual examination with collection of specimens should be conducted in all female homicide cases [79].

Legal case progression and outcomes

All judicial decisions related to the autopsy cases studied were obtained which was possible due to the period of study chosen.

All alleged and alive perpetrators were prosecuted and most were convicted (68%), more than half of them in higher Courts. Some perpetrators died before the trial and the corresponding criminal procedures were filed (32%), but their responsibility in the fatal event was considered demonstrated, reason why the cases were included in the study. A single case was identified concerning an intimate partner defendant who was acquitted due to lack of evidence.

An earlier study that linked forensic investigation factors, criminal prosecution and convictions, showed that a female homicide conviction was achieved for nearly half of those prosecuted. Also, it demonstrated that an increased likelihood of being charged

was associated with homicides occurring in the victim's home against a non-older intimate partner. Convictions were more likely if there was a previous history of IPV, a weapon was found and a crime scene was investigated. [74]
With the data that was collected in the present study, unfortunately, it is not possible to achieve these types of conclusions, but, it should be considered as a topic for a further study.

Most perpetrators were convicted of murder - *qualified murder* (60%) or *simple murder* (55%) - with or without other less serious crimes associated, with 15.5 years of prison sentence (on average) which is in accordance with the legal frame for these types of crimes (the maximum prison sentence in Portugal is 25 years for *qualified murder*) [8].
Under the Portuguese legislation, criminal cases are judged according to the law in force at the event date. This means that all our cases were judged in accordance with the Portuguese *Criminal Code* version existing before its revision in 2007, explaining the high share of murder convictions and the null share of DV convictions.
Justice Statistics show that 35.7% of all male convictions of marital homicide in trial Courts are related to qualified murder [20].
Like in other studies [42], only a small proportion of the perpetrators (14%), who were submitted to psychiatric examination (33%), were considered non-imputable of the crime and were sentenced to security measures (Figure 2).

The Trial Court conviction was accomplished 13.7 months (on average) after the fatal event.

Cluster analysis

While aggregate analyses are informative, individual-level analyses will provide some insight into the micro-dynamics of intimate relationships that would help us to better understand this phenomenon [25].
Most victims were killed by gunshot trauma and did not present any non-fatal IPV injuries: the youngest victims had 2-9 gunshot wounds. The victims killed with a sharp weapon included mainly: the oldest victims with current long-term marital relationships and killed by 2 to 9 sharp blows *versus* the youngest women with 10 or more fatal sharp wounds. Victims killed by blunt force trauma, were 50.4 years-old on average and were married to the perpetrator.
All perpetrators who possessed firearms killed with a firearm: the youngest men killed with a single fatal injury; the oldest men were in long-term current marital relationships,

half committed suicide and also killed with 1 fatal wound. Very young perpetrators killed their short-term past intimate partners with multiple sharp blows without evidences of physical violence prior to the homicide. Current husbands killed their partners, mostly, with a sharp instrument or using blunt force.
Interestingly, according to findings from USA, girlfriends were more likely to be killed by blunt force than other group of intimates [37]

Limitations of the present study

This study has some limitations that we must discuss.

Because this is a retrospective study, we are dependent on available data (from police, INML and judicial system) for details of the fatal incidents, and as result some data was missing, especially on previous IPV against the victim, but also on perpetrators, particularly the ones who died before the trial and did not have any judicial sentence.

We admit that some IPV-related deaths may have been misclassified, resulting in its exclusion and no further analyses.
One other relevant point is that we could only access 83% of all the autopsies performed on IPV female victims. This happened because at that time there were still some autopsies which were performed in small Courts, outside the scope of the INML and, consequently, were not included in this study.

These limitations mean that all the cases which were included in this study are confirmed cases but it can still be others, which were not included; so, we are presenting a safe number of cases but probably underestimated.

We did not analyze the value of the autopsy for the judicial decisions because we only studied the convicted cases, but this is an important issue that must be take into account. Only 1 article published had associated the forensic medical practices with legal case progression of female homicides, revealing a lack of consequences of autopsy practices on legal case outcomes [74].
Despite this fact, and considering other studies, namely about sexual offenses [80,81], we believe that if the quality of the autopsy is guaranteed its conclusions will positively influence judicial outcomes. Judicial decisions in these crimes depend on many factors including the crime severity but also the results from the criminal investigation (including through the forensic approach) [82].

Finally, we did not have a comparison control population but, even so, we presumed there were some trends and likely risk factors for fatal IPV against women, in particular, when it was supported by international data. However, it is impossible to confirm and measure risk factors with this data that was collected.
Furthermore, the outcomes of this research may be of interesting and helpful use, in a way that they can encourage a stronger prevention of this specific form of violence and a more accurate application of the law.

Weaknesses and recommendations in the forensic and legal management of fatal IPV cases in Portugal

We consider that one of the weakest points in the management of fatal IPV cases in Portugal is the reduced multidisciplinary articulation of all involved entities. Improving effective working relationships between police, forensic and judicial services, healthcare system, as well as social, education and non-governmental organizations services (which are already contemplated in the consecutives *National Plans against Domestic Violence*) should be the next big step.

In the present national context, the information on this topic is fragmented, there is a lack of crime databases with crossed homicide statistics and the existing databases do not include uniform records on victim-perpetrator relationships, which explain the complexity of obtaining overall numbers.
We support the idea that the final aim should be the creation of a national homicide database, like it happens in other high-resource countries: *Home Office Statistical Bulletin* on Homicide (England and Wales); *Australian Institute of Criminology - Institute's National Homicide Monitoring Program* (Australia); *Bureau of Justice Statistics* on Homicide Trends (US), *Statistics Canada*; *Observatorio Estatal de Violencia sobre la Mujer* (Spain), for example. They currently provide the most broad, reliable and longitudinal information on homicides.
This crime database could routinely and systematic collect statistics in a national level and gather information from different sources (police, health services, medico-legal and forensic services, Public Prosecutor Offices, Courts and non-governmental organizations) enabling mortality rates from IPV against women to be studied. It could be maintained by a multidisciplinary team of crime investigators united for that purpose.
Also, it is worthwhile not to forget that probably most of these women, before being killed by men-intimate partners, had some official or non-official contact with one or more than one of the services listed above. So, it is our duty to protect them and for

that purpose we need to research on them. Also we should bear in mind that this phenomenon is currently considered as an important public health and social-economic problem.

This work also emphasizes the importance of adopting standard IPV definitions which will allow an accurate data comparability between among different institutions. Increasingly, other types of intimate relationships are becoming popular such as, boyfriends, girlfriends, lovers but also, former and homosexual relationships (regardless of the involved ages, genders and cohabitation).
Both fatal and non-fatal IPV interventions in all settings must be adapted or revised to include intimate partners beyond the more conservative ones. In accordance, researchers need to adopt broader definitions of intimate relationships [25], as defined by the WHO [2] or alike legal definitions of DV by the Portuguese *Criminal Code*.

Furthermore, more attention should be given to high risk situations of fatal IPV, in order to prevent women's deaths. Police, judicial and clinical forensic medicine professionals, but also, health professionals and social workers, should be aware of the potential and real risks factors for fatal IPV, particularly, during or after relationships' ruptures.

Increased understanding of IPV against women, in all its manifestations, including fatal outcome, is dependent on improved data and trend information. The awareness of IPV prevalence and mortality rates also contribute to the prevention of this form of crime. The production of improved data both on fatal and non-fatal IPV on women is fundamental for raising awareness and formulating evidence-based policies, some of them to be applied in the scope of criminal justice. The lack of this knowledge makes it difficult to develop prevention programs and to monitor changes.

Unanswered questions and further research

Further detailed research is immediately required with the aim of providing an increased understanding of this phenomenon in the national setting and to help in the prediction and prevention of fatal IPV against Portuguese women.

Examination of recent trends of fatal IPV cases is important to recognize if the country is experiencing a decline, increase or a random fluctuation in this type of violence, if it is occurring a shift in the involved types of intimate relationships (like it has been happening in other countries) and which factors are contributing for that variation. Extending the study through a prospective work or an updated and larger sample could

be important in order to achieve more significant data than the results obtained in the present study.

A more accurate analysis must be made concerning the IPV victims, who were previously followed by responsible entities (judicial and non-judicial), but afterwards ended up dead (either killed by their partner or committing suicide).

It is fundamental that the quality of forensic exams and reports, and its influence on the judicial outcome is assessed to evaluation. An autopsy protocol for suspected cases of fatal IPV against women should be elaborated.

Another interesting study would be to verify possible consequences and effects of the Criminal Reform held in 2007 among the characteristics of IPV deaths, namely in a court level concerning judicial outcomes.

Day by day, various sexual orientations become more visible and assume a legal status. Considering that type and some characteristics of fatal IPV depend on the relationship established between the victim and the perpetrator (and their genders), it stands to reason that homosexual relationships, i.e., gay and lesbian relationships should be explored and studied, beyond the conventional intimate relationships [10,83]. Also, as dating violence is becoming more usual among adolescents, it constitutes another interesting topic to be detailed on research [10].

A further research on men victims of fatal IPV perpetrated by women should also be performed and on women suicides due to IPV.

Some comparisons studies must be done, for example comparing the autopsy cases that have been convicted and acquitted, and comparing the global cases with the cases followed or not by suicide.

CONCLUSIONS

The present study may be considered a portrait of the actual situation of fatal IPV against women, in the national setting, as 83% of the total Portuguese population was studied. It is the first national study, to our knowledge, based in forensic autopsies and complemented with judicial decisions. The methodology used may be considered as one of the most accurate to assess the total of IPV-related homicide of women.

Throughout it results, we conclude that:

1. At least 62 women were killed by current or former men-intimate partners, in Portugal, between 2005-2007, according to the autopsied and judicial-proved cases, corresponding to an IPV-related female mortality rate of 0.44 per 100.000 women aged 15 years or older;
2. Fatal IPV constitutes an important part of forensic autopsies' case load (13%), representing the most common type of women's homicide (61%), as expected in a low intentional homicide rate country;
3. The typical Portuguese victim is a young adult woman (20-40 years old), employed, killed by a current husband in a long-term relationship, usually with children in common (53%) and a frequent history of previous IPV (79%);
4. The typical Portuguese perpetrator is a man 5.5 years older than the victim, employed, usually with a history of substances abuse or psychiatric problems, owning a firearm and without known criminal records;
5. Most fatal events took place in the summer (37%), during the weekend (48%) and in homes shared by the victim and perpetrator (40%), and were triggered mostly by concrete or threat of separation (39%), or by jealousy (32%);
6. Almost half of the perpetrators attempted (23%) or committed (24%) suicide afterwards; other multiple victims occur as 2 attempted and 6 consummated homicides; some of the fatal incidents (21%) occurred in the presence of minors;
7. Most women were killed by gunshot wounds (45%), especially in the thorax (49%), with multiple fatal injuries (55%);
8. Most women presented non-fatal IPV injuries (57%) (defense wounds in 73%) especially due to blunt trauma (63%);
9. Only some victims presented positive toxicological exams for alcohol (17%) and for abuse drugs (7%);
10. Sexual offenses were suspected in 15% of the cases but physical sexual examination and DNA analysis were all negative;

11. In 98% of the cases, perpetrators who did not die, were prosecuted and convicted of murder; the average prison sentence was 15.5 years.

Intimate partner violence mortality rate among Portuguese women is low when compared with published data, as well as the absolute number of women's victims of IPV-related homicide. Discrepancies between prevalence, in the national and international context, are mainly explained due to the use of distinct concepts of intimate relationships, but also, application of different research methods and data sources. Despite the absolute numbers are low, prevalence of fatal cases related to IPV against women are high. It is essential to bear in mind that each number represents one life – one woman killed at the hands of an intimate partner.

Also, it was found during the study that there was a paucity of social information concerning the victims and the perpetrators but also, a lack of criminal investigation details, either in the forensic files or in the judicial records. In this sense, an even better characterization of the victims, perpetrators, fatal incidents and crime scene investigation must be done during the forensic investigation and medico legal approach or through access to complementary data sources, in order that a better approach and comprehension of the cases can be done.

Our analysis and those of others suggest that preventing alcohol abuse, improving mental health care services, controlling access to firearms for perpetrators and recognize the existence or not of previous IPV, should have a positive impact in decreasing fatal IPV cases perpetrated against women. Health care professionals, law enforcement and forensic technicians should be aware that women are vulnerable to fatal IPV, particularly from current cohabitating partners but also from former partners (chiefly, within a year of separation), particularly if a history of previous IPV exists. Detecting high-risk IPV situations on time, allows DV protective measures to be applied, which may prevent fatal outcomes. Promoting the recognition and assessment of this form of violence against women amongst criminal investigators and forensic doctors (improving DNA collection) could be critical for the fair judicial progress of these cases.

This work emphasizes the need to deepen the research on fatal IPV, adopting standard comparable definitions of intimate relationships and eventually to create a national homicide database, in order to formulate better evidence-based policies responses but particularly, for prevention purposes on both fatal and non-fatal IPV.

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