RESEARCH ARTICLE

METHODOLOGICAL APPROACHES FOR ESTIMATING THE COSTS OF VIOLENCE AGAINST WOMEN IN INDIA

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ARTICLE INFO	ABSTRACT
	Several authors have studied the prevalence and incidence of violence against women, but there have been few systematic attempts to investigate the financial consequences of the problem, that too mostly in developed countries. But the criminal justice policy debates can no longer ignore the basic economics of public policy choices. Violence against women is unquestionably a public problem because the entire society pays monetarily, as well as non-monetarily. Violence against women is enormously costly – to the women who experience violence directly, to women generally whose lives are constrained by the fear of violence, and to governments whose expenditures are swollen by responding to some of the consequences of this violence. In the Indian context, there has been no comprehensive study estimating the cost of violence against women. Establishing robust estimates are subject to significant data restrictions. Therefore, the present paper is an attempt to investigate the methodological aspects of estimating the costs of violence against women on the victim, family, and the State. The paper is based on desk review and critical analysis of various research studies and reports on violence against women. Measuring the full economic impact of this issue is the key to inspiring greater efforts to reduce the prevalence of violence against women.

INTRODUCTION

Violence against women is exceedingly prevalent and is recognised as a health priority by World Health Organisation (WHO) and elimination of violence against women is also included in the United Nations' Millennium Development Goals (MDGs). Despite numerous protective legislations regarding violence against women, this menace is still continuing. The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) views gender-based violence as a form of discrimination that constitutes a serious obstacle in the enjoyment of human rights and fundamental freedoms by women. The Declaration on the Elimination of Violence against Women (DEVAW) defines violence against women (VAW) to mean:

"any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or private life."

The cost of violence against women includes but goes beyond access to legal remedies and rehabilitative and support services, possibly involving 'financial damages for any physical and psychological injuries suffered, for loss of employment and educational opportunities, for loss of social benefits, for harm to reputation and dignity as well as any legal, medical or social costs incurred as a consequence of the violence' (United Nations, 2009). Several authors have studied the prevalence and incidence of violence against women in different forms, and there is enormous literature on it. However, despite the awareness that the costs of violence against women are great, there have been few systematic attempts to quantify them. Only, a small number of studies have investigated the financial consequences of the problem, that too mostly in developed countries. Establishing robust estimates of costs of violence against women are subject to significant data limitations and gaps particularly in developing country contexts like India where only incomplete and fragmented data is available. Besides, no adequate models exist to estimate all costs imposed by violence against women. In the Indian context, there has been no comprehensive study attempting to estimate the cost of violence against women, though interest has recently surged in establishing costs. The present paper attempts to assess and evaluate various alternative methodologies for estimating the cost of violence against women on the victim, family and the state. The paper also attempts to suggest appropriate methodology for estimating the cost of violence against women in India. The paper is based on desk review and critical analysis of various research studies and reports on violence against women.

Relevance of the Economic Studies of Violence against Women: The study of crime has always been multidisciplinary and Nobel laureate Gary Becker's 1968 "Crime and Punishment: An Economic Approach" began with the transfer of economic principles of rational choice theory to the area of crime and served as the starting point for modern economists' work on crime (Bushway and Reuter, 2008). In recent years, various authors (Cohen, 2000; and Welsh and Farrington, 2000) have argued that criminal justice policy debates can no longer ignore the basic economics of public policy choices. Why should economics study crime prevention? As a first reason, crime leads to considerable economic losses for the individual and the society as a whole. The choice of the relevant means for optimal prevention and combating of crime is therefore a traditional economic allocation problem: scarce public (and to some extent private) resources have to be allocated to enable the most efficient possible use. The economic mindset – expressed in the theoretical, statistical, and mathematical tools – is particularly suitable to model and analyse the relationships between crime and the economy (Thomsen, 2016). Governments spend vast sums to protect their citizens from crime. A comparatively modest investment in methods for better evaluating the effectiveness of these efforts will yield large returns (Nagin, 2001). There is a tendency to accord economic analysis an aura of reliability and greater scientific validity because of their complex methodology and reliance on monetised numbers which makes them immediately credible. Economic analyses of crime prevention cannot be ignored but should be manipulated with caution (Sansfacon, 2004).

From an economic cost perspective, violence against women is shown to have a wide negative impact on all of society, not only the victim. Violence against women is unquestionably a 'public' problem because the whole of society pays monetarily, as well as non-monetarily (Yodanis *et al.*, 2000). Revealing the effects of violence against women to the public and to the organisations affected by it, might put pressure on decision makers to take steps to reduce it. The present research, although partial and preliminary, would raise public awareness of the costs to all of society, and would help mobilise individual and community support for stopping the violence.

Categorisation of the Cost of Violence against Women: For analytical purposes, the Inter-American Development Bank (IDB) (UNICEF, 2000) has divided the costs of violence against women into four categories.

Direct Costs: Direct Costs estimate the value of goods and services used in treating or preventing violence. Direct costs take into account expenditures on psychological counselling and medical treatment (emergency room care, hospitalisation, care in clinics and doctors' offices, treatment for sexually transmitted diseases); police services including time spent on arrests and responding to calls; costs imposed on the criminal justice system (prison and detention, prosecution and court cases); housing and shelters for women and their children; and social services (prevention and advocacy programmes, job training, and training for police, doctors, the judiciary and the media).

Non-Monetary Costs: Non-monetary costs that do not draw upon medical services, but in themselves take a heavy toll on the victim-survivors by way of increased morbidity and mortality through homicide and suicide, increased dependence on drugs and alcohol and other depressive disorders. Kerr and McLean (1996) point out that the women with a history of facing violence are more likely to experience pregnancy complications than other women, and the costs resulting from the birth of a damaged baby are considerable. Miller *et al.* (1996) pointed out that the largest cost element for all violent crimes is lost quality of life and related fear, pain, and suffering. It may also be the cost item with the highest degree of uncertainty. Indirect cost estimates have focused on foregone earnings due to death and lost productivity (UNSDC 2003), job loss and lost productivity of the women who suffer violence, lost productivity of the abuser due to incarceration and mortality (Laurence and Spalter-Roth, 1995), loss of tax revenues due to death and incarceration (Greaves *et al.*, 1995), and reduced earnings of women (Morrison and Orlando, 1999;

Sanchez *et al.*, 2004). But, Cohen (2000) has argued that the methods used in quantifying these intangible costs are controversial.

Economic Multiplier Effects: Economic multiplier effects include macro-economic labour market and inter-generational productivity impacts. For example, decreased female labour participation and reduced productivity at work, and lower earnings of victims of violence. Violence against women has inter-generational impacts and is often correlated with disruption in schooling for the children of survivors, which impacts the future capacity of children to obtain adequate employment (Gupta, 2009). The "violence begets violence" hypothesis has many variants, ranging from assertions that abused children are more likely to become abusers themselves to concerns that viewing television violence will increase aggressive behaviour among children. A principal strand in the cycle-of-violence literature examines the effects of witnessing violence between parents on the probability that children will experience violence on their own marriages, either as perpetrators or as victims (Pollak, 2004). Violence affects a survivor's ability to be engaged at work, maintain employment stability, and achieve occupation attainment (Duvvury, 2016). Women who are victims of violence are also deprived of the ability to enjoy non-work time – a loss which cannot be meaningfully quantified (Kerr and McLean, 1996). The economic loss due to violence against women is a leakage that is permanently lost from the circular flow of the macro-economy (Duvvury, 2017).

Social Multiplier Effects: Social multiplier effects include the impacts on inter-personal relations, quality of life, erosion of social capital, and reduced participation in democratic processes. These effects are difficult to measure quantitatively, but their impact is substantial in terms of a country's social and economic development. Studies have shown that several women cope with abusive relationships and incidents of violence in many ways, including taking alcohol and psychoactive drugs. However, drug use can increase the risk of injury, create further barriers to seeking assistance and, over time, can lead to a serious drug dependence problem. A woman's alcoholism or drug addiction may also be used by her partner as an excuse for violence (Kerr and McLean, 1996).

Methodological Approaches for Estimating Cost of Violence Against Women: Methodologically, several alternative approaches exist within the literature to quantify the costs of violence against women. As with any methodology, each is subject to its own merits and demerits.

Accounting Approach: The accounting approach is a core methodology most commonly used in most studies to establish the direct costs of service provision for estimating the associated costs of violence against women (Greaves et al., 1995; Heinskanen and Piispa 2001, 2002; Morrison and Orlando, 1999; Access Economics, 2004). Within this approach, the economic costs of violence are typically separated into two components: direct costs and indirect costs. The accounting approach multiplies the unit cost of a service by the number of times the service was used and sums these across sectors to derive a total cost estimate. This approach requires the calculation of the prevalence rate and/or the incident rate, which can come from several alternative sources, including specialised surveys, population surveys or by estimating the institutional prevalence (Willman, 2009). An advantage of the accounting methodology is that it is straightforward and less data intensive than other methods. It is useful to establish a quick rough estimate based on available data and simple assumptions. Another advantage is that it can establish opportunity costs at the household level, which can be a powerful demonstration to communities of the impact of violence (Duvvury *et al.*, 2013). But, the accounting approach, while straightforward to carry out, may seriously underestimate the true social costs of violence against women and may be problematic in developing country contexts. The level of service provision across countries is likely to produce significant differences in cost estimates (Morrison and Orlando, 2004). The lack of service utilisation by women is partly driven by the norms of acceptability of violence, and by the lack of available

services due to inadequate policy attention (Duvvury *et al.*, 2004). The interpretation of the costs of direct provision is problematic – increase in costs of service provision may reflect effective response by government and NGOs, leading to increased use of services (Duvvury *et al.*, 2013). This implies that the true cost of violence against women cannot be deciphered or coherently estimated. Any selection of categories is to some extent arbitrary, and alternative categories can always be selected (Buvinic and Morrison, 1999). Moreover, there is potential for double counting, since the costs are not identifiable by who pays, and that time frames of data within sectors are inconsistent, making aggregation across sectors difficult (Duvvury *et al.*, 2003).

Econometric Techniques: Econometrics involves the application of specialised statistical methods and has already influenced the empirical analyses of criminologists (Bushway and Reuter, 2008). The econometric techniques may be used to examine the relationship between violence against women and many of its associated outcomes (Heath, 2014; Hindin *et al.*, 2008; Meekers *et al.*, 2013). This includes examining the impact on employment, physical health, mental health, education, children and intra-household bargaining. Typically, either a logistic regression (multiple and/or binomial) or a probit regression may be used to examine these relationships and often an instrumental variable for violence within econometric analysis will be required. Instrumental variables are used to address any potential simultaneity issues which may arise when examining the relationship between violence and many of its associated outcomes (in particular, the impact on earnings and labour force participation). These instrumental variables are those variables that are related to violence but have no correlation with the variable under examination. To identify an appropriate instrumental variable, a logistic regression is often estimated. This allows one to identify those variables that are closely linked to violence and usually include: age, educational attainment by the women and her partner, socio-economic status, excessive alcohol use by the husband, experiencing or witnessing violence as a child, and conflict negotiation within the household. Significant variables for violence are then tested against the outcome variable under consideration (for example, earnings) to assess its robustness as a variable for violence. But within the econometric framework for establishing the costs associated with violence against women is the problem of potential simultaneity between earnings and violence. Moreover, the use of instrumental variable techniques in relatively small samples may be problematic.

Propensity Score Matching: Propensity Score Matching (PSM) as an alternative approach overcomes the limitations of econometric regression analysis, in particular, many of the complications associated with instrumental variables (Morrison and Orlando, 2004). This method improves on standard parametric techniques (such as regression analysis) by allowing for the definition of control groups not on the basis of observable variables (for example, age or education) but instead on the indicator under study. In this case, the estimated probability of experiencing domestic violence. Propensity Score Matching is a non-parametric technique used to estimate causal treatment effects and is useful for managing selection bias in observational studies (Vyas and Heise, 2014). To overcome this selection bias issue, matching methods may be used to imitate an experimental design (Caliendo and Kopeinig, 2005). Typically, probability models such as logit or probit models are estimated for a range of risk factors of violence such as age of women and men, relationship status, educational attainment of women and men, household wealth, attitudes to physical violence, number of children in the household, household socioeconomic status, alcohol and drug consumption, exposure to violence as a child, and labour force participation of women and men (Morrison and Orlando, 2004). The probability model derives a single variable (called the propensity score) that captures the probability that a respondent will be exposed to the intervention (in this case, the probability of experiencing violence) (Vyas and Heise, 2014). Next, matching of exposed and non-exposed individuals takes place based on the similarity of their propensity scores. If the propensity scores of exposed and non-exposed individuals overlap in the area called the region of common

support, then they are matched. Otherwise, they are discarded from the analysis. Finally, once successful matching has taken place, the means of the variables under examination (for example, employment) of the exposed and non-exposed groups are compared. But, Duvvury *et al.* (2013) have pointed out that this methodology requires large sample sizes and the quality of the estimates depends on the satisfaction of the conditional independence assumption (such that the error term is uncorrelated with any outcome of interest). According to Morrison *et al.* (2004) PSM is sensitive to omitted variable bias, and does not explicitly deal with issues of simultaneity, particularly the bias between earnings and violence. In addition to this simultaneity bias, Heckman *et al.* (1998) have shown that bias may also exist as a result of matching errors, whereby failure to compare the treatment and control groups within the region of common support could result in significant bias within the results.

Quality of Life Losses: Quality of life losses encompasses two types of estimation: Disability-Adjusted Life Years (DALY) and Years of Life Lost (YLL). The Disability-Adjusted Life Years (DALY) method is used to estimate the burden of different diseases, accidents, and forms of violence. It is calculated as the present value of the future years of disability-free life that are lost as a result of illness, injury, or premature death. To calculate the DALYs lost to death for example, the age at premature death is subtracted from the life expectancy for that age and demographic group in a low-mortality population (Access Economics, 2004; Zhang, 2012). The calculation for the subjective nature of 'pain and suffering' may be made using measures of burdens of diseases associated with the health burdens of women experiencing violence. This is typically measured using DALYs (PWC, 2015). While the estimation of DALYs has helped in recognising violence against women as a public health issue, measures have not been useful in either formulation of policy response to violence or having an impact beyond the health sector. The weakness of this approach is that outcomes that do not result in mortality or morbidity, such as lost productivity, increased future criminality or more street children are not captured in the DALY estimates. Moreover, DALY calculations are methodologically complex and can be data-intensive (Morrison and Orlando, 2004; Duvvury *et al.*, 2013).

Population Attributable Fraction: As outlined by Australia's National Research Organisation for Women's Safety (ANROWS, 2016), population attributable fractions (PAFs) determine the proportion of a particular disease that could have potentially been avoided if the population had never been exposed to a risk factor. This is estimated by using separate PAFs for each disease. The share of disease that is attributable to violence against women is computed. The violence against women attributable cost for each disease of interest is then estimated by multiplying each PAF by the corresponding medical cost. Total attributable costs to Violence Against Women are then calculated as the sum of the violence against women attributable costs across all diseases. With the econometric approach, the violence against women attributable costs are the product of the number of victims and the resulting increase in annual medical costs attributable to violence. The increase in annual medical costs is then estimated using standard regression techniques. Attributable burden measures the direct relationship between a risk factor and a disease outcome. The method uses the comparative risk assessment approach, which is the standard method for burden of disease studies globally. The proportion (fraction) of a disease, illness, disability, or death in a population that can be attributed to a particular risk factor or combination of risk factors is called the population attributable fraction (PAF).

The calculation of PAF requires the input of the relative risk (RR) and prevalence of exposure in the population (P) (Australian Institute of Health and Welfare, 2016):

$$PAF = \frac{P(RR-1)}{P(RR-1)+1} \times 100$$

When the risk factor has multiple categories of relative risks and exposure levels, the following formula is used:

$$PAF = \frac{\sum_C P_C(RR_C-1)}{\sum_C P_C(RR_C-1)+1} \times 100$$

Where

C = an index for category
P = Prevalence
RR = Relative Risk

But according to Access Economics (2004), Population Attributable Fractions may be subject to causality issues. The burden of suffering and premature death, and their associated direct health costs, are derived from research to determine the proportion of various health impacts (deaths, mental illness, substance abuse, etc.) that are said to be caused by violence against women. However, the possibility that correlation between violence against women and another factor (for example, depression) may both be due to a third (unidentified) factor – such as a previous life circumstance, or that the causality may be two-way. Additionally, as discussed by Kruse *et al*. (2011), some selection bias may exist in the estimation of attributable fractions.

Willingness-to-pay or -accept (Contingent Valuation Methodology):
Willingness-to-pay or -accept methodology estimates the willingness of individuals to pay for lives free of violence (Morrison and Orlando, 2004). This approach is based on the assumption of basic cost-benefit analysis, which says that the cost to society of an undesirable outcome will equal the amount people would be willing to pay to avoid that outcome (Willmann, 2009). There are three willingness to pay methodologies; contingent valuation, hedonic, and value of life. All of these seek to determine how much people are willing to pay for a particular good, a particular service or a stipulated change in an outcome. It is estimated as the dollar amount that would be accepted by an individual to induce them to increase the possibility of death by x percent (Viscusi and Aldy, 2003; Access Economics, 2004). This methodology has been used to estimate the direct intangible cost of long-term pain and suffering. The willingness-to-pay estimates are based on values that the workers (or consumers) place on small risks of injury of death, whereas "willingness-to-accept" estimates are based on actual jury awards for identified individuals who are injured. The latter method has been used in high-income market economies with developed jurisprudence on damages in road accidents, medical practices, etc. Due to absence of data, the willingness-to-pay to avoid certain types of violent crimes may be estimated by matching injuries and trauma from violence against women including rape and stalking to common crimes and applying their estimates of willingness-to-pay to estimate the monetary cost of pain and suffering due to violence against women. Similarly, jury awards may be used to determine the willingness to accept compensation for pain and suffering and loss of quality of life due to fatal and non-fatal outcomes (Duvvury *et al*., 2013).

But, the willingness-to-pay approach requires significant data and makes assumptions regarding the similarity of duration and intensity of trauma from violence against women (Duvvury *et al*., 2004). The application of the methodology is limited in many developing countries where market-based valuation of life, i.e. life and other types of health insurance are undeveloped, is not the norm (Duvvury *et al*., 2013). Estimating the willingness to pay for a fundamental right, while demonstrating the importance society attached to an issue may be controversial. Willingness to pay estimates are sensitive to income levels and income distribution, which can also make them unattractive methodologies to use (Morrison and Orlando, 2004).

Benefit Cost Ratio: Cost-effectiveness and cost-benefit analysis are the most widely used techniques of economic analysis that allow choices to be made between alternative uses of resources or alternative distribution of services. These approaches, widely used in other fields of public policy for many years, must now be adopted by criminology (Cohen, 2000). A properly devised cost-benefit analysis decision procedure – one that takes account of distributive and other non-quantifiable, qualitative concerns – is a promising avenue for rationalisation and reform of criminal justice (Brown, 2004). Cost-Benefit Analysis is a natural extension of the economist's normative framework, focused on maximising society's welfare.

In practice, it is a method that can help policy makers rationally choose between policies since it is an application of the rational choice model to the macro level of a policy maker choosing between different crime control strategies. Cost-benefit analysis starts with an assessment of whether any given program or treatment works to prevent crime and then estimates the relative costs and benefits of such a policy (Bushway and Reuter, 2008). In cost-benefit analysis approach the economic cost associated with violence is calculated and the benefit is measured by the degree to which that cost is avoided (PWC, 2015). The Post-2015 Copenhagen Consensus on gender equality uses a benefit-cost ratio (BCR) for their gender related research. From a cost-benefit analysis, economic efficiency can be reported in the form of a cost-benefit ratio (benefits divided by costs) or net value (benefits minus costs). Interpreting these measures is straightforward: a benefit cost ratio greater than 1.0 and (for net value) a plus sign means the program is economically efficient (Hornick *et al*., 2000). But in practical terms, an economic analysis of the efficiency of a program is an extension of an outcome evaluation and is only as defensible as the evaluation upon which it is based. Some argue that economic analyses can only be conducted when an 'experimental or strong quasi-experimental design' has been used in the evaluation. However, in the field of violence against women, there are political and legal constraint which may preclude random allocation of perpetrators to treatment and control groups (Laing and Bobic, 2002).

Benefit-cost analysis is an art that is built on many important assumptions. When used properly, cost effectiveness and benefit-cost analyses can be valuable tools that help inform the public policy debate. However, like any statistical tool, benefit-cost analysis is vulnerable to misapplication through carelessness, inexperience, or deception. The technique is sometimes criticised because it presents an aura of precision, an objectivity that might not be justified. The results can be no more precise than the assumptions and evaluations that are employed. Thus, when used improperly, they can become nothing but rhetorical ammunition in an ideological debate (Cohen, 2000).

Gender Responsive Budgeting: Gender-responsive budgeting (GRB) is a method that analyses government budgets and the planning, execution, and reporting (budget cycle) to delineate the gendered impacts of budgetary decisions. It has been widely applied to establish the obligations of governments to address violence against women, the level of resources allocated, and the financial gaps in resource allocations. The approach focuses on the entire budget, rather than at specific unit costs of services, prevention interventions and/or application of legal remedies. A gender-responsive budgeting approach to costing can identify gaps in violence against women related services or policies, weaknesses or absence of referral systems and/or protocols needed for better management of specialised and general public and private services that survivors might access. The gender-responsive budgeting (GRB) methodology involves institutional, policy and legal scan (environmental scan); review previous research on violence in the country, review of available administrative and (if it exists) survey data; mapping of survivor's journey for seeking and accessing services; and budgetary analysis. Conducting a budgetary analysis typically relies on a 3P (Prevention, Provision of Services, and Prosecution) approach. Prevention typically revolves around analysing the resources available to institutionalise and effectively implement a legal and policy framework. Analysis of the provision of services usually involves examining the government budget for the provision of specialised health and legal services (such as crisis centres, shelters, etc.). Finally, a budgetary analysis of the prosecution of perpetrators is undertaken. As a result of implementing this methodology, the expected outcomes will establish gaps in legislation and policy, in particular services; the level of resources allocated to existing services; the sources of funding for these services; system wide referrals and protocols in practice; and adequacy of current allocations and resources (Ashe *et al*., 2017).

Economic Multipliers: Violence against women prevents an economy from attaining its full economic potential. Estimating economic multiplier effects can give us some indication of the loss to economic growth as a result of violence against women by taking into account the structural inter-linkages of the macroeconomy. As outlined by Raghavendra *et al*. (2017), the loss of income at an individual level has both direct and indirect effects due to the structural inter-linkages of the economy, which translates losses at a microeconomic level to losses at a macroeconomic level. Considering the structure of production in the estimation of loss due to violence can help to quantify the impact of loss in one sector on the other sectors of the economy through the multiplier effect. Aggregate demand is skewed towards goods and services related to the effects of violence thereby diverting resources from their optimal use. This results in lower economic growth and a reduced standard of living. This has an impact on aggregate supply that is also reduced through lower productivity, reduced output and exports, and reduced savings and investments. Additionally, this reduction in output is even larger because of the economic multiplier whereby a dollar lost represents more than just a dollar. Rather, it represents the lost tax revenue and the benefits thereof, as well as the lost saving and spending that is passed on to others to save and spend many times over (Day *et al*., 2005).

Social Accounting Matrix: A Social Accounting Matrix (SAM) is also a representation of the economy. It is an accounting framework that assigns numbers to the incomes and expenditures in the circular flow diagram. The framework of a SAM provides a firmer theoretical basis to estimate the economic costs of violence against women. SAM accounts for the structural interlinkages that exist within real economies, regardless of whether they are developed or developing economies. SAM is a particular representation of a macroeconomic system that incorporates a considerable level of information about the transfers, transactions, and relationships between macro and meso level economic categories or accounts (Pyatt and Round, 1985). Using SAM, we can estimate the loss of income due to violence against women within the framework of the circular flow of income between activities, factors, and household accounts. In addition to the level of income loss due to violence, which is the direct cost incurred by women and men in individual sectors of production, we can derive the indirect impacts of that loss for the other sectors in terms of both production and consumption demand using the SAM-based multiplier analysis. The multiplier analysis can be modified to incorporate both these effects to study how violence against women impacts on macroeconomic output and income.

Game-theoretic Approach: In earlier works, the game theoretic approach started with cooperative bargaining models of partners with separate preferences who establish threat points or fall-back positions in their interactions over pooled income within a household framework. Utility has to be at least equal to the next best alternative outside the relationship (Manser and Brown, 1979, 1980; McElroy and Horney, 1981). The later models consider non-cooperative dynamics, which are more suited to situations of domestic violence. In these studies, an abusive partner punishes the victim or obtains desired outcomes through violence and income transfers (Tauchen, Witte and Long, 1991; Farmer and Tiefenthaler, 1997; Kingston-Riechers, 1997). Typically, these rational choice models surmise that the level and repeated nature of violence in the household is a function of economic alternatives outside the relationship and each partner's control or bargaining power over marital resources (DeRiviere, 2008). In a game-theoretic context, violence or the threat of violence can be regarded as an aspect of the "threat point" in a cooperative bargaining model or as part of a "punishment strategy" in a non-cooperative game. This framework points to factors such as the wife's employment status or potential earnings, or the attractiveness of her alternatives outside the marriage, as determinants of the incidence of marital violence (Pollak, 2004). Tauchen *et al* (1991) consider a non-cooperative game in which violence has both expressive and instrumental components: violence increases the husband's utility directly and may also increase his utility indirectly through control of his wife's behaviour.

Their paper specifies a two-state game; whether there is violence in equilibrium depends on the level of resources controlled by each spouse and on whether the reservation utility constraint is binding (e.g., whether the wife is no better off remaining in the marriage than she would be if she left). Farmer and Tiefenthaler (1997) present a non-cooperative model of domestic violence that implies that wives' income and other financial support available from outside the marriage will decrease the level of violence in intact families. But the economists' traditional modelling strategies, while offering a useful framework for analysing bargains in the household at a moment in time, are inadequate to the challenge of modelling violence and outcomes that vary over time. Typically, employment and other human capital attributes – variables which are believed to facilitate a woman's escape from the violent household – are treated as exogenous in the current theoretical formulations. Women's choices extend beyond instrumental outcomes of monetary self-interest (DeRiviere, 2008).

Time Frame for Estimation of Cost: How we determine economic costs also depends on the timeframe being considered. Researchers generally aim to estimate the annual costs of violence against women. Ideally, costs could be calculated for every year and changes could be observed over time. However, any costing study is limited by the data available for use. Most data sources are collected infrequently, sporadically, or once only. Therefore, researchers must resort to gathering information where it is available, often from various years and jurisdictions, and merging it together using a price index to bring the figures to a common year. There are three styles of modelling relating to timeframe: the prevalence-based model, the incidence-based model and life-cycle model (Bowlus *et al*., 2003).

Prevalence-based Modelling: In prevalence-based modelling, the costs resulting from past and present violence, are determined for a given year. For each category of costs, a prevalence rate must be calculated for the percentage of the population involved. Thus, current victims and survivors of all ages are included, and the method estimates the annual cost to society of all individuals who suffer due to violence within a given year, regardless of when the violence took place. Therefore, the resulting estimates reflect a blend of costs for individuals who have been suffering for various lengths of time and do not isolate any potential differences in costs by stage or duration of violence.

Incidence-based Model: An incidence-based model estimates the present-value of the lifetime costs of present violence on the victims. It could be used to predict the future effect of changes in the current rates of violence against women. If the current rate of VAW falls, so would the future costs. However, such a model requires sophisticated data sources as well as assumptions about future technology, demographic changes, medical advancements, and interest rates. Therefore, they appear more as a technical prediction than an actual snapshot of society. The prevalence rate is concerned with the percentage of people who have suffered violence, while incidence concerns the number of incidents. Since violence is often a repeat violence, this means that the number of incidents will be greater than the number of victims (Walby, 2004).

Life-Cycle Model: The life-course or life-cycle model is used to estimate the long-term consequences of violence against women on earnings over the individual's lifecycle. From this perspective, the key to identifying long-term monetary costs of violence against women is found by determining the psychological and physical consequences of violence against women for individual victims and perpetrators, and the sequence of behaviours or experiences that link violence to later income attainment.

Data Issues regarding Violence against Women: There are several alternative approaches available within the literature to estimate the cost of violence against women. While there are many advantages and disadvantages of each approach, the choice of methodology is limited by several prevailing factors. Establishing robust estimates of costs of

violence against women may be subject to significant data limitations and gaps particularly in developing country contexts where only incomplete and fragmented data is available. Data on crime in India are published annually by the National Crime Records Bureau (NCRB). These are compiled from records of police stations all over the country and refer to reported and registered crime. For recent years the data cover crimes against women in some detail, disaggregated to the district level. Reporting of crime tends to be incomplete; so, the data are prima facie suspect. Nevertheless, they may be useful in studying regional variations, considering that underreporting is a universal feature.

There are substantial gaps and erratic compilation of data. This directly affects the cost estimates (Greaves, 1995). Most crimes against women go unreported for understandable reasons: attached social stigma, distrust in legal mechanisms, fear of retaliation and so on. Institutional indifference makes matters worse. It is almost impossible to lodge a complaint against men in the police and the armed forces, or in government services. Crimes against women have roots in the male dominated socio-economic, legal, and political order (Mukherjee *et al.*, 2001). Embarrassment, shame, fear of reprisal after reporting, or concern about a family's breadwinner being jailed are a few of many reasons why a victim might be hesitant to report a violent incident (Tennessee Economic Council on Women, 2013). Similarly, a major methodological problem in victimisation surveys on the physical and sexual abuse of women is the underreporting of abuse (Brush, 1990; Hanmer and Saunders, 1984; Koss, 1992; Sessar, 1990; Stark and Flitcraft, 1988; Straus, 1990b; Weis 1989; Smith, 1994). An abused may not reveal her victimisation to an interviewer for a variety of reasons. She may feel that the subject is too personal to discuss, she may be embarrassed or ashamed, she may fear reprisal by her abuser should he find about the interview, she may misunderstand the question, or she may think the abuse was too minor to mention. She may even have forgotten about it, particularly if it was minor and happened long ago. If the abuse was especially traumatic, she may not want, or be able, to recall it. If she does disclose that she has been abused, she may not respond fully and honestly to follow-up questions about the experience.

Comparative Assessment of Alternative Methodologies: Overall, the accounting approach is the most commonly used method to estimate the direct and indirect tangible costs associated with violence against women. This approach is easy to implement and can provide a quick rough estimate of costs (Duvvury *et al*, 2013). However, this approach on its own is likely to severely underestimate the true cost of violence to the economy. Econometric techniques (including propensity score matching) have been useful in examining the multiple impacts of violence (such as the impact on education, labour force participations, earnings, and physical, mental, and reproductive health) on women and their children.

While econometric methods can be sensitive to selection bias and issues relating to the selection of instrumental variables, propensity score matching is a viable alternative for overcoming some of these issues and offers a more methodological rigorous approach for examining the impacts of violence. Similarly, while the estimation of quality of life losses (such as DALYs), population attributable fractions, and the willingness to pay approach, help to establish the health-related costs of violence, they have not yet been useful in formulating policy responses or having any impact outside the health sphere (Morrison and Orlando, 2004). Finally, there have been several techniques (benefit-cost ratio and economic multipliers) that have yet to be subject to rigorous empirically testing, therefore, making it difficult to access their ability to provide meaningful estimates on the costs of violence against women and girls. All methods have strengths and weaknesses, and the challenge is to choose the appropriate one given data constraint and the intended use for the estimates (Morrison *et al.*, 2007). The lack of methodological consistency makes comparisons across countries and settings problematic (Waters *et al.*, 2004). Comparisons of costs are hampered because different studies count different costs, use different methods, and often report total costs for specific populations (Varcoe *et al.*, 2011).

CONCLUSION

The value of economic studies on violence against women lies in their potential to promote social policy and reduce violence against women. To calculate meaningful estimates, governments must invest in collecting data. In order to more accurately estimate the costs of violence against women, the amount, quality and coordination of data must be greatly improved within and between government departments at all levels, and in business, labour and industry. To provide a comprehensive assessment of costs of violence against women, a combination of methodologies may be employed as recommended by Ashe *et al*. (2017). To establish the economic direct and indirect tangible costs, accounting approach can be employed. Econometric methodology, with the inclusion of propensity score matching, may be used in examining multiple impacts of violence (such as the impact on education, labour force participations, earnings, and physical, mental and reproductive health) on women and their children. The estimation of quality of life losses (such as DALYs), population attributable fractions, and willingness to pay approach, will help to establish the health-related costs of violence. Using social accounting matrix, we can estimate the full macroeconomic loss owing to violence while considering the complex interlinkages of the macroeconomy. Finally, using gender responsive budgeting, we can examine budgetary planning and allocations by government to address violence against women and girls.

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