

## Non-lethal Firearm Violence

When a gun is fired the result is not always fatal: many victims survive. This may sound like good news, but the consequences of firearm injuries can be extremely severe, and treatment and recovery place a heavy burden on survivors, their families, communities, and society. Non-lethal firearm violence is far more widespread than deaths from firearms worldwide. A better knowledge of the incidence and patterns of non-lethal firearm violence would clarify the overall burden of armed violence on society and underpin the development of effective responses. Yet current information about non-lethal firearm injuries is limited, and is hampered by a lack of data.

This *Research Note* summarizes findings published in the *Small Arms Survey 2012: Moving Targets*,<sup>1</sup> focusing especially on the impact of intentional injuries committed with a firearm (firearm assaults), but also considering the consequences of self-inflicted and unintentional firearm injuries.

The first section explains how the type of firearm and ammunition, as well as the availability of medical care, influence the 'survivability' of firearm injuries; the second reviews existing data sources; the third section presents available data on the incidence of non-fatal injuries; while the last one examines direct and indirect costs of firearm injuries.

### Factors influencing the severity of firearm injuries

When a bullet hits a body, several factors affect the severity of the injury. The technical specifications of the ammunition used, including bullet size, type of tip (e.g. hollow-tipped, pointed, round nose), velocity, and 'flight pattern', influence a bullet's trajectory through the body and the subsequent damage to tissue, organs, and bones. In general, the higher the bullet's velocity the more lethal the injury.

Another element affecting an injury's severity is the number of bullets fired in a given time by a weapon. Semi-automatic and automatic pistols, which fire more bullets in a shorter time



A 14-year-old boy with a gunshot wound to his leg is treated by medical personnel in the emergency room of a hospital near the Petare slum in Caracas, Venezuela, November 2009. © Carlos Garcia Rawlins/Reuters

than single-shot rifles and repeating revolvers, are likely to cause greater injury.<sup>2</sup>

The part of the body that is hit is crucial for the injury's consequences. Gunshot wounds to the head have the highest risk of being lethal (Vyrostek, Annet, and Ryan, 2004, Figure 21) or leading to irreversible damage. Victims of abdominal gunshot wounds may need access to highly specialized surgical assistance to survive, while injuries to the extremities often result in fractures that may lead to haemorrhages, infections, amputation, or permanent trauma due to joint or bone deformation.

Finally, the likelihood of death or permanent impairment is reduced by the accessibility and speed of initial emergency and trauma care services, as well as the specific training of the emergency service providers (Hofman et al., 2005, p. 14).

## Sources of data

Among a variety of sources of data on firearm violence (public health and law enforcement data, victimization surveys, media reports), the bulk of statistical data used to assess the extent and trends of non-lethal firearm injuries originates from the public health sector. Police incident reports and victimization surveys provide additional information about the nature and circumstances of injuries and the types of weapons used. They may also add important qualitative information from victims, especially about the non-physical consequences of their injuries, such as the psychological stress placed on victims, family members, and friends. Victimization surveys provide additional insight into the use of firearms in non-fatal crimes, although they may be characterized by a lack of uniformity in methods and reporting.

When hospital, police, and survey data is not accessible or does not exist, news reports can provide another

source of information when documenting non-fatal firearm injuries. Media reports are often detailed enough to capture whether incidents result from political or social conflict, or criminal or domestic violence, or whether the injuries inflicted were intentional or unintentional (YAVA, 2010, p. 2). However, media reports in high-violence settings should be used with caution.<sup>3</sup> In particular, journalists' access to high-risk areas can be severely limited, and local and national interests may exert control over reporting, both of which create sampling problems.

Data on trends and patterns of firearm violence is relatively robust if such violence has fatal consequences, due to the availability and quality of mortality statistics, while information on non-lethal injuries is more difficult to collect (Gilgen and Tracey, 2011, p. 30). This depends on different definitions and counting rules based on the nature, severity, and characteristics of the injuries, as well as the needs and purposes of the data-collecting entity.

In principle, the World Health Organization's uniform International Classifications of Disease system,<sup>4</sup> now in its 10th edition (ICD-10), provides a common frame to emergency department and hospital admissions for recording the context and mechanism of injuries. In practice, the picture is more nuanced. Firstly, many slight injuries—and some serious ones—are never presented to health facilities. Secondly, the time and management requirements necessary to apply the ICD-10 codes may not be available or may be viewed as overburdensome on health practitioners in many settings. Thirdly, collection and coding methods may be highly variable within and across countries. Finally, the necessary capacity to collect and code data may be limited to large hospitals.

Very few countries have relatively sophisticated, nationwide non-fatal

injury surveillance systems providing detailed information on the characteristics of firearm injuries similar to those in place in the Netherlands and the United States.

## Assessing the scale, scope, and impact of non-lethal firearm violence

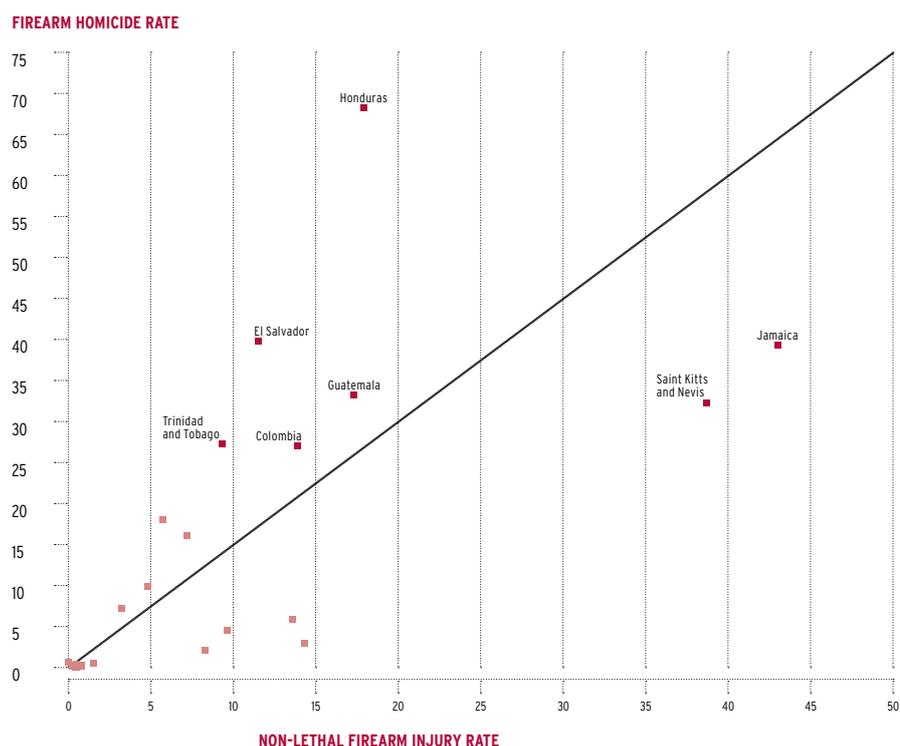
In 2011 the *Global Burden of Armed Violence* estimated that there were 396,000 intentional homicides per year (Geneva Declaration Secretariat, 2011, p. 43). The proportion of homicides committed with firearms lies between a high estimate of 60 per cent (Geneva Declaration Secretariat, 2008, p. 67) and a low of 42 per cent (UNODC, 2011a, p. 10). This indicates between 166,000 and 238,000 non-conflict firearm homicides per year.

The concept of 'case fatality rate'<sup>5</sup> is useful in order to describe the relationship between fatal and non-fatal firearm violence. This concept is used in epidemiology to provide a rough indicator of the proportion of people who do not survive a specific type of disease or injury over a specific period of time, with the objective of reducing this proportion to the minimum through improved medical services, prevention programmes, and other interventions.

The Survey examined data on non-lethal firearm violence from 26 countries or territories,<sup>6</sup> which is a relatively small sample in comparison to homicide datasets (see Figure 1).<sup>7</sup> The estimates presented must be regarded as tentative,<sup>8</sup> yet the data suggests that the higher a country's firearm homicide rate, the higher its case fatality rate for all firearm violence.<sup>9</sup>

In countries like Brazil, Colombia, and Mexico, all of which show higher rates of firearm homicide, the case fatality rate is around 70 per cent. If this correlation held globally, it would mean that gunshot victims in coun-

Figure 1 **Non-fatal firearm injuries and firearm homicides in 26 countries, latest available year**



**Note:** This figure compiles injury data from the Survey's database (Small Arms Survey, 2011) and firearm homicide data from UNODC (2011b).  
**Source:** Small Arms Survey (2011); UNODC (2011b)

tries with higher overall levels of firearm violence are less likely to survive their injuries; by contrast, the lower the overall levels of firearm violence, the better the chances of the victim of a shooting surviving his or her injury.

By extrapolating results to all countries in the Survey's database, it is possible to generate an average global case fatality rate for intentional, non-conflict firearm injuries of 48 per cent, or approximately one non-fatal injury for every fatal injury incurred. Assuming that trends were stable, and notwithstanding the potentially reduced life expectancy for firearm injury survivors, this would result in a conservative estimate and put the number of fatal and non-fatal firearm assaults at the same level. It is likely, however, that the number of people living with the consequences of firearm injuries is much higher. For example, if the ratio were 3:1—a figure that is often cited in US literature—this would indicate that between

500,000 and 750,000 people survive firearm injuries sustained in non-conflict settings every year.

### Assessing the cost of firearm injuries

A comprehensive assessment of the costs of firearm violence should go beyond the direct costs, especially medical, and include, for example, the costs of law enforcement and criminal justice, legal services, foster care, and private security. Furthermore, there are tangible indirect costs, such as loss of productivity, lost investments in social capital, and higher insurance costs, while a broad range of intangible indirect costs may also be taken into account, e.g. health-related loss of quality of life (pain and suffering, both physical and psychological), reduced job opportunities, reduced access to schools and public services, and reduced participation in community life (WHO, 2008, p. 7, Table 1).

The impact is clearly higher in low-income countries. A study carried out in Jamaica found that firearm-related injuries accounted for approximately 16 per cent of all injuries in 2006, but caused approximately 75 per cent of total direct medical costs for fatal injuries, 53 per cent of direct medical costs for serious injuries, and 6 per cent of direct medical costs for slight injuries (Ward et al., 2009, p. 448).

### Conclusions

Serious gaps still exist in our knowledge of trends and patterns of non-lethal firearm injuries, as well as in information on the long-lasting effects of firearm violence on survivors. Currently, most assessments of armed violence are exclusively based on the number of people killed. Luckily, most victims survive, and it is possible to estimate that between two and seven million people could be living with the consequences of firearm injuries sustained in settings outside armed conflicts. To be most valuable, monitoring efforts should progressively include and integrate statistics from various sources on non-fatal (firearm) injuries. Doing so will provide researchers, advocates, donors, and policy-makers not only with a fuller understanding of the burden of firearm violence, but also with prevention options and indicators to evaluate such options.

While developing, supporting, and sustaining hospital-based surveillance systems may create extra work for already burdened medical staff, there is an important value in doing so—not only for administrative and planning purposes, but also for improved pre-hospital and emergency care, and for the design, targeting, and monitoring of prevention and control strategies. Injury surveillance systems also represent important entry points for donors who focus on violence prevention.

## Notes

- 1 See Alvazzi del Frate (2012).
- 2 According to Wintemute (1996), 'reports from major [US] cities document a contemporaneous increase in the overall severity of firearm-related injuries. The transition from revolvers to pistols is considered a key factor by many observers', resulting in changed wounding patterns, with an increased number of bullet wounds per incident per body leading to higher mortality rate.
- 3 For a discussion on the challenges of using media reports to document armed violence, see Small Arms Survey (2005, pp. 235–38).
- 4 The ICD-10 system allows for public health injury data to be coded according to interpersonal violence (assault) and firearm as the mechanism, and to distinguish *serious* injuries from *slight* ones. Under this classification a *serious* injury is one in which the patient had to be admitted to hospital, while a *slight* injury is one in which the patient was treated in the emergency department and then discharged.
- 5 The concept of 'case fatality rate' takes the number of cases with a lethal outcome divided by the total number of lethal and non-lethal cases and multiplies the result by 100 to calculate a percentage: fatal injuries / [fatal + non-fatal injuries] \* 100.
- 6 The Small Arms Survey (2011) dataset on non-lethal firearm injuries includes primarily health statistics, and crime statistics where no public health information was available. The crime statistics included conform to a variety of forms and definitions (e.g. non-fatal firearm injury, non-lethal violence, non-fatal shooting, non-fatal physical assault, assaultive injury, serious injury, gunshot wound).
- 7 For example, the Global Burden of Armed Violence 2011 database on homicides contains data from 198 countries/territories (Geneva Declaration Secretariat, 2011), while the UNODC database on homicides committed with firearms contains data from 116 countries (UNODC, 2011b).
- 8 Data on fatal and non-fatal injuries originates from different sources and data collection systems, may not be representative of the same populations, and refers to different points in time.
- 9 In the 26 countries for which relevant data is available (firearm homicide data was not available for two countries in the Survey's non-lethal injury database), there is a correlation between rate of firearm homicides and non-lethal firearm injuries (0.689; N = 26).

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## About the Small Arms Survey

The Small Arms Survey serves as the principal international source of public information on all aspects of small arms and armed violence, and as a resource centre for governments, policy-makers, researchers, and activists.

The Small Arms Survey, a project of the Graduate Institute of International and Development Studies, Geneva, hosts the Geneva Declaration Secretariat.

For more information, please visit: [www.smallarmssurvey.org](http://www.smallarmssurvey.org)

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## About the Geneva Declaration on Armed Violence and Development

This Research Note was published in support of the Geneva Declaration on Armed Violence and Development, a high-level diplomatic initiative signed by more than 100 states, designed to support states and civil society to achieve measurable reductions in the global burden of armed violence by 2015 and beyond.

For more information, please visit: [www.genevadeclaration.org](http://www.genevadeclaration.org)

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