

WORKING PAPER



# UNDERSTANDING VIOLENCE

## The Role of Injury Surveillance Systems in Africa



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By Diego E. Zavala and  
Jennifer M. Hazen

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**T**he Geneva Declaration on Armed Violence and Development, endorsed by more than 105 countries as of this writing, commits signatories to supporting initiatives intended to measure the human, social, and economic costs of armed violence, to assess risks and vulnerabilities, to evaluate the effectiveness of armed violence reduction programmes, and to disseminate knowledge of best practices. The Declaration calls upon states to achieve measurable reductions in the global burden of armed violence and tangible improvements in human security by 2015. Core group members include Brazil, Guatemala, Finland, Indonesia, Kenya, Morocco, the Netherlands, Norway, the Philippines, Spain, Switzerland, Thailand, and the United Kingdom, with the support of the United Nations Development Programme.

Further information about the Geneva Declaration, its activities, and publications is available at [www.genevadeclaration.org](http://www.genevadeclaration.org). 



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## List of abbreviations

CDC	Centers for Disease Control and Prevention
DRC	Democratic Republic of the Congo
NANFISS	National Non-fatal Injury Surveillance System
NIMSS	National Injury Mortality Surveillance System
PDA	Personal digital assistant
WHO	World Health Organization




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## Executive summary

**T**he impact of armed violence on social and economic development is far-reaching. Armed violence affects all societies, all countries, and people from all walks of life. It takes many forms, from criminal acts in the streets to violent demonstrations, from organized crime to gang warfare, from communal conflicts to civil wars. The human toll of armed violence is tremendous, reaching nearly three-quarters of a million people per year, with the vast majority being killed in non-conflict (or non-war) settings.<sup>1</sup> The cost of armed violence has been estimated to range from USD 95 billion to as high as USD 163 billion per year. Despite growing acknowledgement of these widespread negative effects and high costs, there remain gaps in our knowledge about violence, and a dearth of evidence upon which to design effective policies and programmes to prevent violence and to minimize its effects.

A number of recent international initiatives seek to address the problem of armed violence. A few examples include the 2001 UN Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons in All Its Aspects, the Organisation for Economic Co-operation and Development's 1997 DAC Guidelines on helping prevent violent conflict, and the World Health Organization's 2002 World Report on Violence and Health. In 2006 the Geneva Declaration of Armed Violence and Development highlighted the critical role of states and civil society in preventing and reducing violence across the globe in both conflict and non-conflict settings. Specifically, the Geneva Declaration, endorsed by more than 105 states, calls upon signatories to support 'initiatives to prevent and reduce human, social and economic costs of armed violence, to assess risks and vulnerabilities, to evaluate the effectiveness of armed violence reduction programmes, and to disseminate knowledge of best practices'. The Declaration aims to achieve demonstrable reductions in the global burden of armed violence and improvements in human security by 2015.

While the Geneva Declaration process and other local, national, regional, and international initiatives are important political processes, they are also vital policy and programmatic instruments. What these initiatives demon-

strate is the need for clear evidence on the causes and consequences of violence in order to design effective strategies to prevent it. Without this information, it is difficult to understand the problem, and therefore impossible to respond in an effective manner. The key is measurability—the ability to identify clear risk factors, and the ability to determine the effectiveness of interventions to reduce these risks and prevent violence. States are increasingly aware of the need for a rigorous approach to violence prevention rather than relying on best guesses or what seems to work, but many have yet to put in place common practices for collecting data and using this information towards improved violence prevention.

The purpose of this paper is to aid states in strengthening their understanding of how a public health approach to injury prevention can be used in developing country contexts to diagnose problems of violence—particularly in Africa. The key findings of this paper include the following:

- Data is central to good policy, but currently many countries do not possess good data or effective means of collecting it.
- Obtaining good data requires investment in solid survey and surveillance tools at the local and national level. Surveillance can be implemented in stages across a country. For example, it can be initiated in a single hospital, which can serve as a basis for training, learning, and expansion to other hospitals. This is particularly important in settings where funding and staff might be limited and the importance of collecting data is not well understood.
- Surveillance systems measuring violence can complement other ongoing health activities. For example, a surveillance system can track various diseases (e.g. malaria, HIV, tuberculosis, polio) and multiple factors that affect public health at the same time. If done correctly, tracking violence may not require large expenditures in addition to the initial investment required to create an appropriate system.
- Finally, public information campaigns are required in order to develop a better understanding of the importance of good data and how data can be used for effective policy and programme design and implementation.

In Africa, government health officials have prioritized certain diseases—such as HIV/AIDS, tuberculosis, and malaria, as well as maternal and child health—which is understandable given that they represent the greatest burden of disease on the continent (WHO, 2006c). However, in some regions of Africa, evidence suggests that violent deaths may be one of the leading causes of premature mortality. In the Mthatha area of South Africa, for

example, statistics reveal an increase of almost 41.4 per cent in homicide rates between 1993 and 2005, from a rate of 94 persons per 100,000<sup>2</sup> to 133 per 100,000, one of the highest homicide rates in the world (Meel, 2008). Surveillance systems could be used to track these diseases as well as the violence that affects so many populations. These efforts should be seen as complementary, not competing. Throughout Africa, securing the required funding for such systems also ‘remains a challenge’.<sup>3</sup>

This paper is divided into five sections. The introduction provides an overview of the topic and an outline of the paper. Chapter 1 introduces the public health approach to injury prevention and identifies several public health methods for collecting data pertinent to violence control. Chapter 2 provides an overview of the data that is currently available for injury mortality and morbidity in Africa. Chapter 3 presents the results of a multinational pilot project in five African countries (the Democratic Republic of the Congo, Kenya, Nigeria, Uganda, and Zambia). This pilot project involved the creation of an injury surveillance system in five hospitals, one in each country. The analysis of the project offers valuable insight into what is required in order to successfully implement and sustain a hospital-based injury surveillance system under challenging circumstances. The chapter highlights lessons learned from the pilot project with a view to informing future efforts at implementing surveillance systems.

This paper is designed for a broad audience interested in armed violence prevention and reduction. It specifically speaks to African decision-makers, development practitioners, and medical professionals, who are at the heart of public health initiatives across the continent. 📌





## Introduction

**M**ore than a decade ago, the 49th World Health Assembly declared violence a leading public health problem (WHA, 1996). This declaration focused the attention of all United Nations member states on the need to address injury prevention and control and the utility of the public health model to achieve these ends. In response, the World Health Organization (WHO) developed a plan of action for violence prevention based on scientific study, which the 50th World Health Assembly endorsed in May 1997 (WHA, 1997). To bolster their case, WHO published a comprehensive report on violence and health in which it demonstrated how a public health approach can make a significant contribution to violent injury prevention across a broad spectrum worldwide (Krug et al., 2002). The WHO report presented a number of recommendations, including enhancing state capacity to collect data on violence. In 2003, the 56th World Health Assembly noted these recommendations and encouraged member states to promote the report and adopt the recommendations (WHA, 2003). These international policy developments have contributed to mobilizing governments and non-governmental organizations to approach violence prevention in a more comprehensive manner, one that is not limited to law enforcement, but that includes a broader strategy of cooperation with health and education ministries as well as development programmes, among others.

A number of governments have responded to these international initiatives and are beginning to include injury prevention among their top health priorities. In 2003, the African Union declared 2005 the African Year of Prevention of Violence. In 2007, a meeting of African health officials developed a draft plan of action for violence prevention in Africa (AU, 2007). In March 2008, the Ministries of Health from the Americas issued a 'Ministerial Declaration' recognizing that additional efforts were needed to prevent injury and violence, including the strengthening of data collection methods in order to obtain scientific evidence of risk and protective factors, mortality and morbidity statistics, and the economic impact of injuries and violence (MHA, 2008).

The public health approach to armed violence offers several advantages in efforts to understand, measure, and address problems of violence. It

emphasizes the prevention of violence, as opposed to the punishment of crimes after the fact. This is a significant contribution to efforts to reduce violence. Violence has often been treated as a criminal justice or law and order challenge associated with individual (or group) perpetration. The public health approach highlights the fact that violence is not the result of an individual's actions alone. Violence is instead viewed as a social phenomenon. The emphasis is less on the individual committing the act than on the context in which violence is perpetrated. Accordingly, violence cannot be explained by any one individual or any one factor. Instead, violence is the result of a complex interplay between the individual and his or her surroundings (Krug et al., 2002; Butchart et al., 2002). This environment contains a number of factors that influence individual behaviour, including the person's home, relationships with peers, the community, and broader societal factors such as norms and laws. This emphasis on context suggests that contextual factors can be altered in order to reduce the risk of violence. Producing such change requires an understanding of these factors, through data collection and multifaceted interventions to address multiple factors.

An essential element of the public health approach is the emphasis on evidence-based planning and programming (Mercy et al., 1993). Data collection and analysis provide the core of this approach. Collected information is expected to answer questions pertaining to the 'who, what, where, when, and how' of a violent incident. Oftentimes this information is collected at hospitals and clinics from victims of violence through hospital surveillance systems. It can also be gathered through household and community surveys, police data, organizations working with victims, and morgue data (see Box 1). When these various incidents are drawn together for analysis, they produce a picture of the scale and scope of violence in that community. This provides essential information for identifying 'hot spots' where violence takes place more frequently, for identifying risk factors for violence (i.e. conditions that make individuals more likely to become victims of violence), and for tailoring responses to the characteristics of violence in a given community (Rivara, 2003).

One important tool for data collection is the surveillance system, the focus of this report. In general, a surveillance system, common in many hospitals and clinics, provides a record of each case of disease or injury of an individual who enters the health system. In other words, every time an individual is injured or sick and goes to the doctor, this information is recorded and entered into a database that collates information about the frequency of diseases and injuries. This information can then be monitored to identify epidemics, common diseases, and recurring injuries, thereby alerting policy-makers to diseases and injuries that most affect the population and need to be





**PHOTO** ► Relatives carry an injured youth to hospital after a shooting in the capital Mogadishu, Somalia, September 2007.  
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addressed through policy interventions. The use of surveillance systems has proved effective for a number of other health issues, in particular communicable and chronic diseases. For example, in the United States, surveillance systems in all states report the frequency of measles, diphtheria, and tuberculosis. This compulsory reporting aids the Centers for Disease Control and Prevention (CDC) in providing weekly updates of the incidence of these diseases. Another example of a successful surveillance system comes from

#### Box 1 : Data sources<sup>4</sup>

Vital statistics registries	Autopsy reports
Community surveys	Verbal autopsies
Health clinic records	Morgue data
Doctor records	Police reports
Emergency room records	Crime statistics
Hospital records	Court records
Death certificates	Interviews

the International Association of Cancer Registries. This centre provides guidance and support to cancer registries implemented in high-, middle-, and low-income countries around the world. The effectiveness of the surveillance system for identifying and monitoring the incidence of disease suggests a high potential for equally successful utility in the study and tracking of violence.

The paper is organized in the following manner.

- Chapter 1 introduces the **public health approach** to injury and violence prevention. The main purpose of this section is to explain the approach, identify several methods of collecting data, and highlight the role that surveillance systems can play in understanding violence.
- Chapter 2 presents the data that is currently available on **injury, mortality, and morbidity in Africa**. The main purpose of this section is to underscore the limited nature of existing information and emphasize the need for more and better data collection.

- Chapter 3 reveals the results of a multinational **pilot project in Africa**. Conducted in five African countries—the Democratic Republic of the Congo, Kenya, Nigeria, Uganda, and Zambia—the project involved the creation of an injury surveillance system in five hospitals, one in each country. The main purpose of this section is to demonstrate the feasibility of creating injury surveillance systems in Africa, provide valuable insight into what is required in order to successfully implement and sustain a hospital-based injury surveillance system under challenging circumstances, and highlight a number of lessons learned to inform future endeavours. 🔄

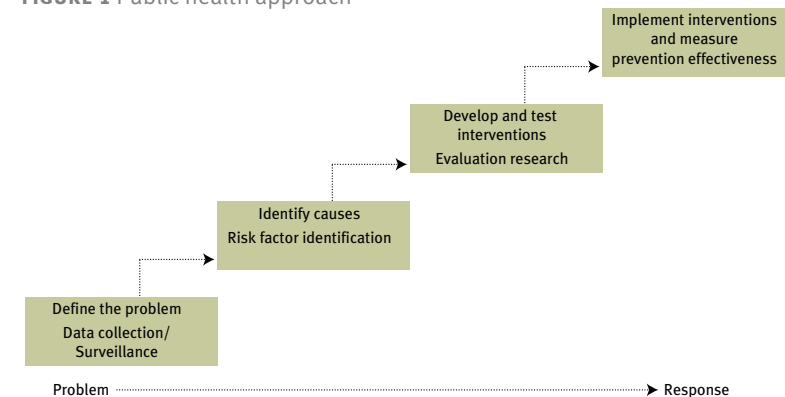


## 1. The public health approach in brief

**P**ublic health can be described as a science of disease prevention. At its core, it aims to protect and promote the health of populations and prevent the spread of disease. It does so by identifying diseases when they begin early in a population, then designing means and measures to prevent the disease from infecting others in the population (e.g. quarantine, hand washing, the wearing of face masks). The same idea of prevention is now being applied to violence. Although violence is not transmitted in the same way as disease (e.g. a sneeze), it is now widely accepted that violence is a threat to the health of populations and that public health tools can be applied to the study of violence in the same way as they have been for disease.

The public health approach follows a clear process of scientific steps: research, programme design, implementation, and assessment (see Figure 1). The process begins with data collection in an attempt to identify the problem and gather information about it. The second step is to understand the characteristics of the problem. The third step entails the design of policy and programming to address the problem. The fourth step involves the assessment of the effectiveness of these policies and programmes and the widespread implementation of those deemed effective.

**FIGURE 1** Public health approach



SOURCE: Mercy et al. (1993, p. 15)

To illustrate this approach, it is useful to consider the spread of a disease in a community. This is identified as the problem and efforts are made to collect information about it. This step involves identifying those who are getting sick, oftentimes including the determination of the ‘source’ of the disease, meaning the first person who fell ill. Study of the sick individuals can identify common characteristics: where they attend school, where they work, with whom they interact, etc. Study of the healthy population can provide explanations as to why they remain unaffected by the disease: they do not have the same social circles, they work out of town, they do not eat at the same restaurants, etc. This analysis of factors provides an understanding of the pattern of the spread of the disease, which can contribute to the design of a programme to interrupt this pattern. One famous case is the cholera epidemic in London in the 1850s and the role of the water pump in the spread of disease. Through observation of the community’s activities, a researcher, John Snow, identified the water pump as a key transmission source of the disease. The suggested solution: remove the pump handle so that the community would no longer access the polluted water.

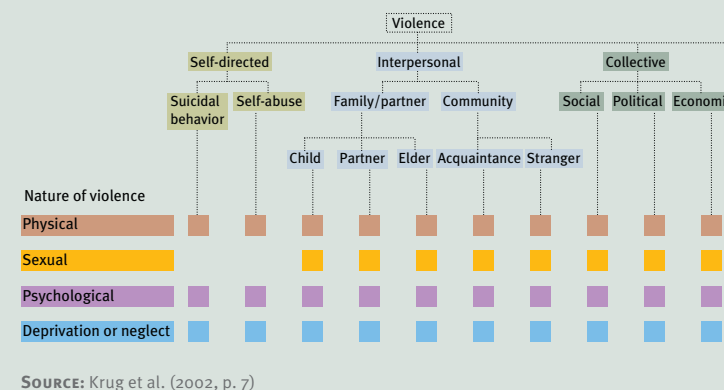
A similar approach can be used for addressing armed violence. To illustrate this approach in the context of violence, it is helpful to consider a situation in which a community is experiencing a high number of violent attacks. The problem is identified as violent attacks. Information is collected about these attacks: who is perpetrating the violence, who are the primary victims, where do the incidents take place, at what time of day do they take place, what kind of weapon is being used, etc. This information, when compiled, begins to reveal a pattern: the perpetrators are always a small group of young men with handguns, and the victims are young women who are walking alone at night in a certain part of town. This information identifies certain risk factors for violence in this situation: night-time, travelling alone, being female, being in a certain geographic area, and the presence of handguns. This information can then be used to develop preventive policy and programming, such as increasing patrols in high-risk areas or at night, increasing night-time public transport options, organizing community escorting programmes to prevent women from having to travel alone, or implementing legislation to address the illicit possession of firearms. The final step is to assess rigorously these programmes and determine whether they have been successful at reducing the number of violent attacks. Based on the result, policy-makers can support and expand successful programming.

The public health approach stresses the need for comprehensive collaboration across sectors to prevent violence before it occurs, and to minimize the impacts when it does take place. Success also requires collaboration between government officials (whether police officers, social workers,

## Box 2 Defining armed violence

For the purposes of this report, armed violence is ‘the intentional use of illegitimate force (actual or threatened) with arms or explosives, against a person, group, community, or state that undermines people-centred security and/or sustainable development’ (Geneva Declaration Secretariat, 2008, p. 2). Figure 2 provides a typology of violence designed by WHO to depict three broad categories of violence: self-directed, interpersonal, and collective. Self-directed violence is any violent act that an individual commits against him- or herself. Interpersonal violence includes violent acts committed between individuals or small groups. Collective violence refers to any organized act of violence committed by one group against another group.

FIGURE 2 WHO typology of violence



SOURCE: Krug et al. (2002, p. 7)

health officials, or educators) and the community. The involvement of local communities in the development and implementation of violence prevention strategies remains a key to success. There is no blueprint for reducing armed violence in every locale. Effective strategies will address the characteristics of the violence—whether it is armed robbery, gang violence, or organized crime. Such strategies must not only be tailored to the community, but also engage the community in the solution. Communities provide important sources of information about violence, perpetrators, and victims. This information is important to understanding the violence. Communities are also the key implementers of any strategy—whether acting as a reporting mechanism to the police, conducting neighbourhood patrols, or providing safe after-school opportunities for at-risk youth. If communities are not involved in the design and implementation of a strategy, or if they do not understand its importance, they are unlikely to give it their support. Without community support, no strategy can succeed, no matter how well designed it might be.

## Collecting data: understanding the impacts of violence

It is clear from the preceding discussion that reliable information about violence is at the core of any prevention effort. The more that is known about violence in a given community or population, the better able policy-makers are to design effective strategies to reduce it. Within a public health framework, there are two main methods for obtaining reliable mortality and injury data: population health surveys and public health surveillance systems.<sup>5</sup>

Health surveys are one useful tool for collecting information about health.<sup>6</sup> A health survey entails asking individuals a series of established questions in an interview setting at a given point in time. Normally, health surveys are conducted with a specified number of people from a given community in order to provide an unbiased and representative sample upon which generalizations about the community can be made. The surveys do not interview all members of the community, or even all individuals who experience disease or injury. The interviews are analysed collectively in order to gain a greater understanding of the context in which disease and injury occur in the community and the prominent risk factors at a given time.

Public health surveillance is a second valuable data collection tool. Injury experts seek to implement surveillance systems for injury morbidity because they can provide—within a period of months—detailed information on the context in which injury occurs in a community, establishing the time, place, and mechanism of injury and providing sufficient information to develop violence prevention strategies. WHO and CDC have adopted the following definition for health surveillance:

the ongoing systematic collection, analysis and interpretation of health data essential for planning, implementing, and evaluating public health activities, closely integrated with timely dissemination of the data to enable effective and efficient action to be taken to prevent and control disease. (World Bank, n.d.)

The core elements of a hospital-based injury surveillance system include the time and place of the injury, the mechanism (e.g. use of blunt object or firearm), and the context in which the injury occurred (e.g. assault, domestic violence). Clinical findings such as severity, anatomic site, and discharge status, which are usually in the medical record of a patient, are also included in the surveillance data collection form.

A surveillance system entails the ongoing and systematic collection of information about individual disease and injury cases. These cases are usually identified in hospital or clinical settings where individuals seek

medical attention for injuries or ill health. The system is intended to collect information about all cases of injury and disease that are present at hospitals and clinics; however, it cannot capture information on cases of individuals who do not seek medical assistance or alternative sources of care. The latter is an important consideration in developing countries, where individuals do not always choose to go to established state medical facilities, but instead visit local healers or practitioners of traditional medicine. Since the surveillance system captures information on a continuous basis, it provides for an ongoing evaluation of the data collected. It also allows for the identification of any threats to population health by disease, injury, or violence and for prompt reporting to health authorities and the community. If the surveillance system provides continuous coverage and captures all cases, it can swiftly provide the data needed to quantify and qualify violent injury in a defined population. This system of data collection provides a baseline for understanding the status of a community's health; the effectiveness of policy and programmes can then be assessed by measuring their impact against this baseline.

There are some important differences between surveillance systems and surveys. The first pertains to the time period covered. The surveillance system is an ongoing, systematic effort to collect information on individual cases. A health survey, by contrast, provides a snapshot of a community's health at a given point in time. It can provide some sense of whether health is improving or declining, but it cannot provide an assessment of change over a long period of time. Surveys can be, and often are, conducted at regular intervals, which can contribute to a better understanding of changes in health over time. A second difference pertains to data collection and completeness. A surveillance system aims to obtain injury data for all cases occurring in a defined population. A survey, by contrast, seeks to obtain injury data from a representative sample of a defined population. A third difference pertains to the burden of implementation. A surveillance system requires constant input and maintenance over time. A survey, by contrast, requires an investment of time and resources for a relatively short period.

Both methods of data collection can provide important information about population health. The advantage of the surveillance system is that one can identify changes as they occur, which can lead to the implementation of timelier responses. In addition, the surveillance system provides a strong infrastructure for measuring changes over time, and for assessing the effectiveness of programming. Where surveillance systems do not currently exist, health surveys can be useful tools. They offer an important first step to developing a knowledge base about population health and convincing national stakeholders of the need for more sustained data gathering through the creation of a surveillance system.



## Developing surveillance systems

The process of implementing an integrated surveillance system in low- and middle-income countries can be daunting. A surveillance system requires resources, personnel, and infrastructure. In many countries, these do not exist or are not available consistently or across the country. Indeed, professional health staffing in Africa remains the lowest in the world, with 2.3 health professionals per 1,000 population compared to 18.9 per 1,000 in Europe (WHO, 2006a, p. xvii). In addition, many health information systems are weak or ‘dysfunctional’ (WHO, 2006c, p. xix). In such situations, the development of a surveillance system can begin with its implementation in a single hospital. This provides a ‘pilot’ for the implementation of a nationwide system but does not require the outlay of tremendous resources. It also offers a means to convince government officials and medical staff that the creation of such a system is warranted and useful. Securing buy-in from those who fund and implement the system is essential to ensuring the system’s sustainability. It is thus important to select an appropriate test case to demonstrate the utility of the system. In the case of violence, for example, it would make sense to select the hospital or hospitals that receive the most cases of injury due to violence. This provides an ideal opportunity both to collect information about the majority of violent injury cases and to demonstrate the utility of the system.

In an effort to understand the distribution of injury, developing countries often implement a hospital-based injury surveillance system, largely because such a system can be readily integrated into existing hospital infrastructure. The minimum infrastructure required to start a surveillance system can be found in many existing health facilities. The material resources necessary include computers and database software. The human resources include medical staff to record patient information and individuals to input this data on a regular basis. Ideally, hospitals already collect patient data. This data forms the basis for the injury surveillance system, and additional data requirements are not significant. Instead, the creation of a surveillance system is often simply the standardization of data collection—including for basic demographic information (e.g. place of residence, place of injury) and information relevant for the medical treatment of the individual (e.g. medical history, use of drugs and alcohol). This can be achieved through the creation of a standardized form for data collection, and the input of this data into a computer system, which enables later analysis of injury patterns. Information about injury, which might be perceived as ‘extra’ information by

medical personnel, includes: the relationship of the victim to the perpetrator, the means of injury, and the context of the injury (e.g. time of day, location). Much of this information is often, but inconsistently, written in the narrative of the circumstances of the injury obtained by the admitting nurse or physician. Including this information in a standardized form and providing incentives for routinely using the form can enhance the collection of data and make it useful for analysing violence.

The ideal surveillance system is an ‘integrated’ one. An integrated surveillance system includes the participation not only of medical institutions, but also of any other institutions that are involved in detecting, investigating, reporting, and attending injury cases. These can include schools, community centres, law enforcement, courts, and morgues. A coordinating centre can facilitate the collection of information in a central location, which can enhance the coverage and completeness of the data and provide a basis for collaborative efforts to prevent and reduce violence. Such collaboration is taking place in a number of countries, such as Jamaica and Burundi, where violence or crime observatories coordinate data collection, event monitoring, and response among various government agencies and non-governmental organizations. The implementation of an integrated injury surveillance system requires a certain level of infrastructure as well as human and financial resources. An integrated system also requires significant collaboration among public, and sometimes private, institutions that have their own priorities, agendas, policies, and data management structures. Cooperation across institutions will often require policy decisions to be made at a higher political level and then translated into administrative directives that can be implemented locally.

The resources necessary for establishing an integrated surveillance system are seldom available in low-income countries. Even in high-income countries, such as those in North America and Europe, a nationwide integrated injury surveillance system is difficult to implement. For example, the United States established the National Violent Death Reporting System in September 2002, intending it to serve as an integrated surveillance system for violent deaths. Yet by 2004, only 13 of the 50 states had been incorporated into the system. Its first detailed report was released in 2008 and included statewide information for just 16 states (Karch et al., 2008). Given the challenges of implementing an integrated surveillance system, WHO has established a set of injury surveillance guidelines that range from the ‘core minimum data’ elements required to the more complete, detailed information requirements of an integrated system (Holder et al., 2001).

### Box 3 The Colombian experience

In 1993, the mayor's office in Cali launched a programme named 'Desarrollo, Seguridad, Paz' (development, security, peace) or DESEPAZ, which included a public health approach to reduce the number of violent deaths in the city. Other aspects of the programme included a needs assessment, strategies to strengthen democratic institutions, community empowerment, and the promotion of peaceful conflict resolution in the community.

In response to high homicide rates a small arms intervention programme was implemented in two Colombian cities: in Cali in 1993 and in Bogotá in 1995. By 1994 the rate of homicides in Cali had reached 124 per 100,000 population, nearly a fourfold increase since 1983, when the rate was 23 per 100,000. In Bogotá the homicide rate in 1995 was 68 per 100,000.

As part of the programme, an integrated violent death surveillance system was quickly established. This system facilitated the characterization of the context of violence, the identification of risk and protective factors, and the monitoring of the impact of violence reduction programmes on homicide rates.

Each week, information on all reported homicides from the police, forensic medicine, the attorney general's office, and the department of transportation was integrated into a single database. This information was analysed and used to develop programmatic responses. One intervention strategy implemented in both cities was the restriction of the carrying of firearms by civilians (including those with legal permits to carry firearms) during high-risk periods, which included weekends (especially after paydays), holidays, and election days.

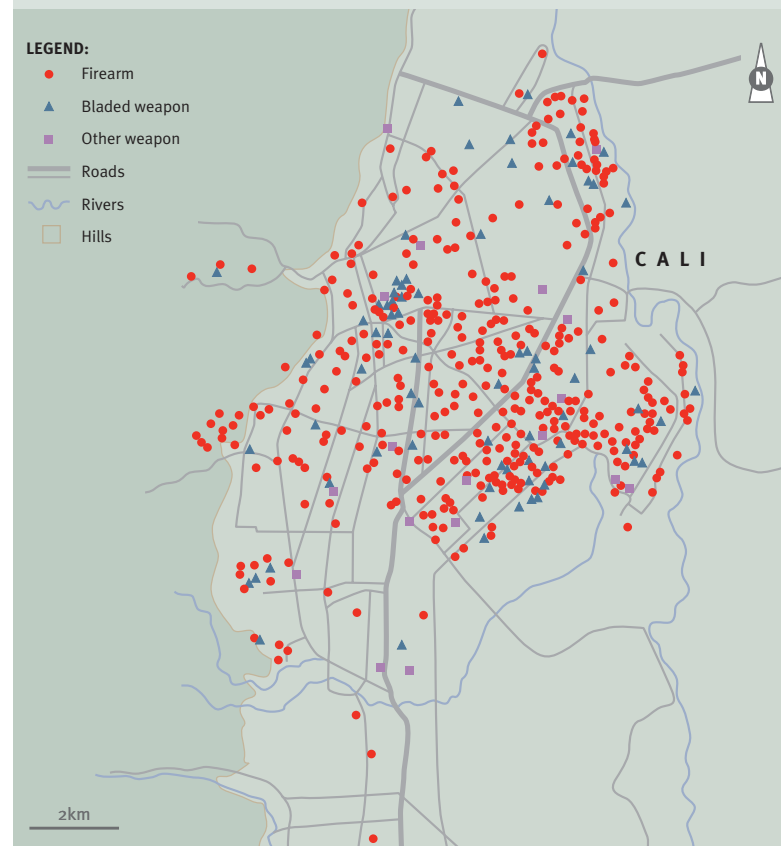
A study comparing the homicide rates during the intervention and non-intervention periods in both cities showed a significant decrease in homicide rates during the intervention period. In Cali the homicide rate during the intervention period (November 1993–December 1994) was 89 per 100,000 compared to 107.5 during non-intervention periods. In Bogotá, the intervention period was implemented in three intervals (December 1995–March 1996, December 1996–February 1997, and March–April 1997), and the rate of homicides for all three intervention periods was 54.2 compared to 59.3 in non-intervention periods.

The integrated injury surveillance system developed in Cali provides valuable lessons for implementing similar systems elsewhere. Established in response to the high rates of homicides in the city, it involved the participation of several government institutions, including the police, forensic medicine, the judicial system, human rights organizations, the media, and the population in high-risk areas of the city. By 2005 the programme had expanded to include the five surrounding municipalities that constitute the metropolitan area of Cali. An important element of the sustainability of the Cali system is the existence of a coordinating centre for data collection and analysis: the Institute for Peace Promotion and Injury and Violence Prevention (CISALVA).



The Institute not only manages data collection and analysis but also produces annual reports and frequent bulletins to share the analysis with the community. The close monitoring of data collected provides detailed findings; the report of August 2008, for example, reveals a slight reduction in the percentage of homicides committed with a firearm during the first six months of 2008—from 84.5 per cent to 81.0 per cent (Informativo, 2008, p. 2). Map 1 demonstrates the usefulness of spatial analysis of critical information such as accessibility and use of firearms throughout the city, showing that some neighbourhoods are at greater risk of experiencing violence than others.

**MAP 1** Geographic distribution of homicides, by weapon type, Cali, Colombia, January–July 2008



**MAP SOURCE:** Informativo (2008, p. 3)

**BOX SOURCE:** Villaveces et al. (2000)

## Examples of success

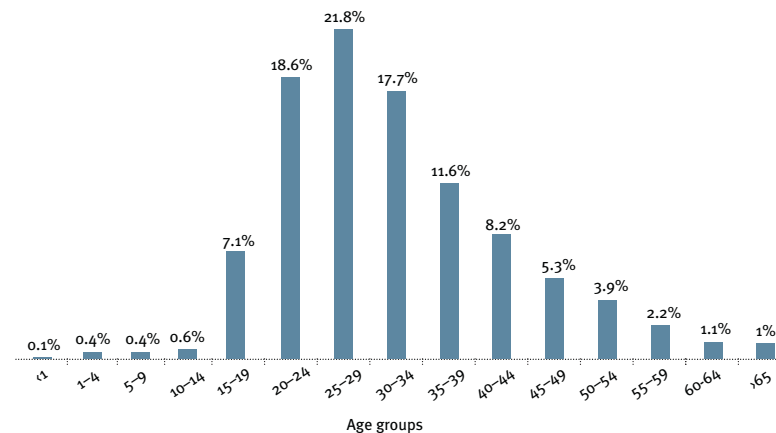
Encouragingly, some developing countries have succeeded in creating injury surveillance systems despite limited resources. Colombia, a medium-income country, is one of the best examples in the Western hemisphere (see Box 3). In response to a prolonged history of internal armed conflict and some of the highest homicide rates in the Americas, local government authorities have made key policy decisions to implement an integrated surveillance system that provides detailed information on violent deaths in the civilian population (Garfield and Llantén Morales, 2004; Concha-Eastman et al., 2002).

South Africa provides another example of innovative programming. In South Africa, the creation of a publicly accessible knowledge network, available mainly through the Internet, has provided a forum for sharing reliable health information. ‘Violence and injury’ is one of the health issues (or ‘modules’) included in the network. Contributors to this module include the South African Medical Research Council, the University of South Africa, and the Council for Scientific and Industrial Research. These institutions have implemented two national surveillance systems: one on fatal injuries (the National Injury Mortality Surveillance System, NIMSS) and one on non-fatal injuries (National Non-fatal Injury Surveillance System, NANFISS).

The NIMSS surveillance system collects data from 37 mortuaries in six provinces. Although NIMSS does not provide country-wide coverage, the annual reports do offer valuable information on the context in which violent deaths occur in South Africa, especially in large urban settings (UNISA, 2005). The 2005 NIMSS annual report gives an account of 23,541 injury deaths, of which 38.8 per cent resulted from homicide or other violence. The report shows that young men between the ages of 15 and 44 were at greatest risk of violent death. This is a pattern similar to that found in other countries where violence has had a significant impact on society. The data indicates that approximately 42 per cent of all violent deaths resulted from the use of firearms, the leading weapon of injury, and that two out of three victims of violent gun deaths were under 35 years of age (see Figure 3) (UNISA, 2005).

The second surveillance system, NANFISS, was created ‘to reliably reflect future problems and regional trends’ (SAHealthInfo, 2009). Generated from an assessment of the number of injury cases treated at all public emergency care facilities in South Africa, this system was intended to involve the ongoing capture of data on injuries at 41 high-caseload facilities, which would provide an early warning system and a measure of trends. Although all 41 facilities had been identified through the initial phase of the programme, to date NANFISS has begun data collection in only two facilities due to funding constraints.

FIGURE 3 Violent gun deaths in South Africa, by age group, 2005



SOURCE: UNISA (2005)

The examples from Colombia and South Africa are important for demonstrating what can be achieved even in countries with limited resources. Despite significant challenges, injury surveillance systems can be implemented effectively at the city level. This provides a basis for expanding coverage across a country over time. Nevertheless, the cases also highlight the many challenges faced in resource-poor contexts. Surveillance systems require not only financial resources but also political support to succeed and to be sustainable over time. The level of political support depends on the extent to which the method of surveillance is understood and the extent to which the idea of data collection is accepted. Securing political support thus requires that stakeholders be informed about the nature and operation of a surveillance system and how it can assist medical practitioners and policy-makers. This is especially true in environments where data collection might be difficult or viewed as a waste of time and resources. 📌





## 2. Current assessments of intentional mortality and morbidity in Africa

**W**ell-established country population information—often referred to as ‘vital statistics’—is the first basic element in a vital statistics system. It includes a reasonably accurate account of the births, deaths, and migration experience over time as well as a numerical count of events and a systematic coding of deaths by type. Such data provides information on the causes of death and enables a government to determine the allocation of resources based on pressing threats to health. The International Classification of Disease is a standardized cause-of-death coding system that can be used by countries; it provides a basis for consistently defining causes of death within a country and enabling cross-national comparisons (WHO, 2007a). The second fundamental element of a vital statistics system is reliable estimates of the size of the population and its demographic distribution over time. This data is often captured through a population census; unfortunately, however, reliable and complete information on the official counts of deaths and illnesses is notoriously deficient or lacking altogether in most developing countries around the world. The following section provides an overview of what is currently known about intentional mortality and morbidity in Africa.

### Mortality statistics

Mortality statistics are essential for an understanding of the magnitude of violence as a public health problem. Mortality data is largely generated from a death certification process, which in most countries is a legal procedure that requires a medically determined cause of death. For violence-related deaths, it requires a legal investigation, including the provision of a post-mortem report on the cause of death. This death documentation process in most low-income countries is incomplete or unavailable for large segments of the population. Although there is growing awareness about the need to improve the collection of vital statistics, developing the required infrastructure and access to technology is greatly dependent on the socio-economic development of these countries and regions (WHO, 2006c).

Nationwide systems to collect vital statistics have long been established and maintained in high-income countries in order to provide reliable statistics

necessary to make evidence-based public health policy decisions. By contrast, very few developing countries have well-established systems. A recent evaluation of mortality data by WHO revealed that of 115 countries reporting death data, only 64 (55.6%) have ‘complete’ death registration coverage, with most of these in Europe (39 countries). Of the 46 African countries evaluated, 25 (54.3%) had no data available, 42 had no data available after 1990, and only one is considered to have ‘complete’ death registration, which implies countrywide reporting. In the African region the completeness of death counts was less than ten per cent (Mathers et al., 2005). A recent review of vital statistics reports submitted to WHO revealed limited improvement in developing countries over the last 50 years (Mahapatra et al., 2007). Despite the fact that the establishment of the Millennium Development Goals has clearly demonstrated the need for reliable statistics on a range of health indicators, technical support and financial assistance to develop vital statistics systems in medium- and low-income countries have not been forthcoming (AbouZahr et al., 2007).

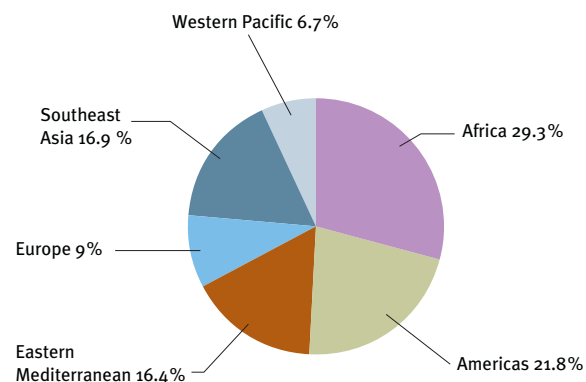
Given the paucity of vital statistics information, many estimates of mortality and morbidity must be made based on mathematical models that account for incomplete or deficient data reported by developing countries (WHO, 2006b; Lopez et al., 2001). The mathematical modelling is complex due to the need to take into consideration a number of variables, such as: having to estimate the number of people living in a country where census data is unreliable; taking into account the impact of the HIV/AIDS pandemic on populations; and estimating the changes in population size estimates due to internal or external displacement of people as a result of natural disasters or armed conflicts (UN, 2006). A number of correction, forecasting, and sampling methods have been suggested in order to develop the basis for making strategic decisions needed to accomplish health-related Millennium Development Goals (Murray, 2007; Hill et al., 2007). These methods have been used to estimate the rate of stillbirths over time and forecast under-five mortality through the year 2015 (Stanton et al., 2006; Murray et al., 2007). Another useful measure is expressed as disability-adjusted life years (DALYs); this summary measure of population health incorporates the impact of premature death (due to injury or disease) and the loss of productive years (due to disability) (Begg and Tomijima, 2002).

Three countries that have implemented sample vital registration systems are China, India, and Tanzania. These systems aim to determine the cause of death in a sample of cases in a given region of each country. In the absence of medical forensic services, these countries use verbal autopsy reports to determine the cause of death of an individual based on an interview with the next of kin of the deceased. This method has been proven useful in countries

where there is no reliable registration of deaths, death certification is not common, and autopsies or post-mortem reports are limited or unavailable for large territories or regions. In India, for example, there were an estimated 9.5 million deaths in 1999 (Jha et al., 2006, p. 18). Approximately 37 per cent of these deaths were registered, and one-third have a recorded cause of death classification. A new study in India—‘One Million Deaths’—is a prospective study aiming to ascertain the medically certified cause of death of individuals based on verbal autopsies (Jha et al., 2006). Sentinel surveillance is another method being used; it monitors changes in the occurrence of a specific disease or condition in a limited region. In Tanzania the National Sentinel Surveillance System was implemented to collect information on demographic events such as births, deaths, marriage, and divorce in a geographically defined population (Tanzania MoH, 2004).

The experiences in China, India, and Tanzania suggest that ‘sampling’ vital registration may be a cost-effective way to obtain reliable data on vital events in large populations or in countries with limited resources where national coverage is not possible (Setel et al., 2005). This method is not without its drawbacks, however. While sampling vital registration requires the careful calculation of the minimum recorded number of deaths, sampling based on verbal autopsies does not always provide a clear classification of cause of death. WHO has issued standards for determining cause of death based on verbal autopsies, but the method remains limited in its ability to distinguish the underlying cause of death from overlapping symptoms (e.g. malaria, tuberculosis, HIV/AIDS) (WHO, 2007b; Quigley, 2005).

**FIGURE 4** Estimated regional distribution of interpersonal violence mortality, 2008\*



\* Includes war and civil conflict. Based on an estimated total of 810,000 deaths.

SOURCE: Mathers, Boerma, and Ma Fat (2008)

**TABLE 1** Deaths by cause, by WHO region, estimates for 2004

Cause of death	World		Africa	Americas	Eastern Mediterranean	Europe	South-east Asia	Western Pacific
	(000)	% of total	(000)	(000)	(000)	(000)	(000)	(000)
Unintentional injuries	3,906	6.6	496	342	321	564	1,331	846
Road traffic	1,275	2.2	205	152	146	129	306	336
Poisoning	346	0.6	42	25	17	107	96	59
Falls	424	0.7	19	41	24	79	126	134
Fires	310	0.5	48	8	29	23	186	16
Drowning	388	0.7	62	22	30	34	100	139
Other unintentional injuries	1,163	2	121	93	76	191	517	163
Intentional injuries	1,642	2.8	273	238	163	226	392	348
Self-inflicted	844	1.4	50	69	36	151	252	286
Violence	600	1	182	155	25	65	115	57
War and civil conflict	184	0.3	40	11	99	10	20	2
Other intentional injuries	14	1	0	2	3	0	6	4

NOTE: Due to rounding, numbers may not add up to provided totals.

SOURCE: WHO (2008)

Data on the leading causes of mortality in Africa in 2000 suggests that violence remains a significant cause of death for those 44 years of age and younger. Collective injury or ‘war injuries’ is among the top five leading causes of death and burden of disease for Africans between the ages of 5 and 44 years. Interpersonal violence is the fourth leading cause of death among 15–29-year-old Africans and the eighth leading cause of burden of disease among 15–29 and 30–44-year-olds in Africa (WHO, 2002b). In 2004, intentional injury remained an important contributor to mortality across the globe (see Table 1).

In 2006, a comprehensive report published by WHO’s Africa regional office identified the leading causes of death in the region as HIV/AIDS, malaria,

tuberculosis, and maternal and child conditions. The report acknowledges the impact of intentional injury as a 'lesser known toll' on health together with chronic diseases such as cancer and cardiovascular diseases. The report also highlights the mortality profile of youths in the region due to intentional injuries such as war and interpersonal violence, and non-intentional injuries such as road traffic injuries, drowning, and burns (WHO, 2006c). In global terms, Africa and the Americas are still the most violent regions with the highest interpersonal violence rates (see Figure 4).

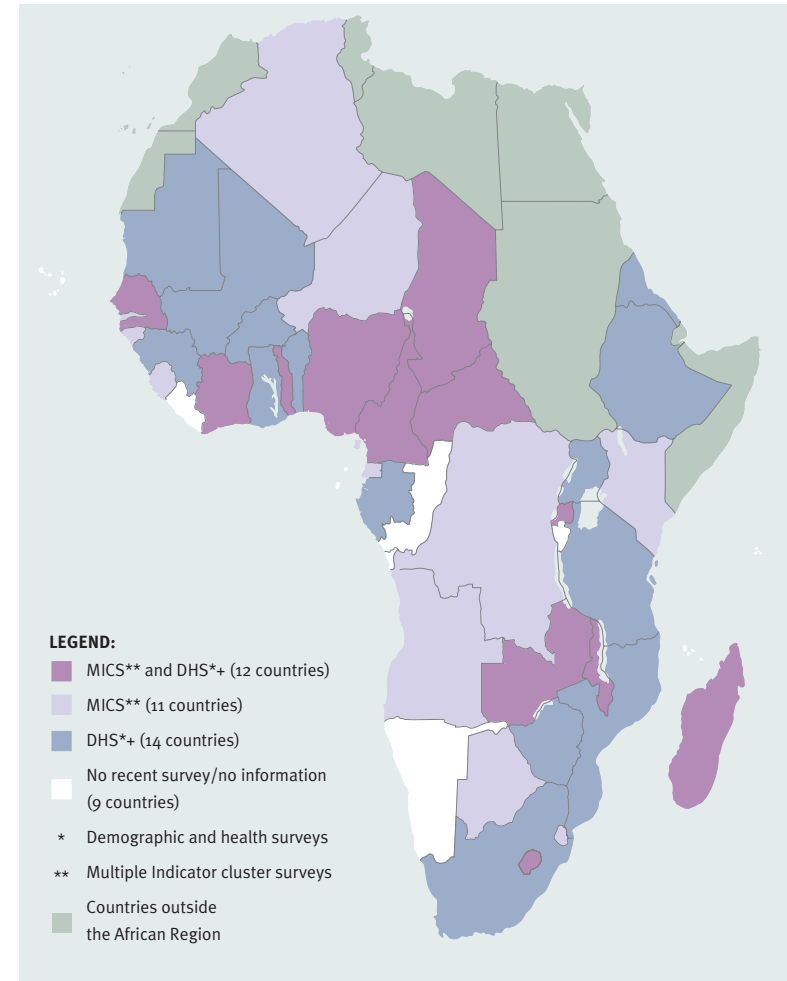
## Morbidity statistics

WHO has developed a comprehensive health survey for implementation in all countries around the world. Modules include information on child and adult mortality, risk factors, and nutrition. They are tailored for high- and low-income countries but the survey data obtained is comparable across populations (WHO, 2002a). The wide application of health surveys at the regional, national, and local levels has produced useful data on injury in various countries. To date, 18 African countries have implemented WHO health surveys, which report on the prevalence of road traffic injuries and 'non-traffic injuries', but not specifically violence-related injuries.<sup>10</sup>

In the absence of reliable national vital statistics data, multi-country surveys have provided invaluable data for mortality and morbidity estimates in developing regions. In 1998 a network of demographic surveillance systems was formed in Africa; it is known as the International Network of Demographic Evaluation of Population and Their Health, or INDEPTH.<sup>11</sup> Since then, INDEPTH member states have carried out a number of surveys in sub-Saharan Africa. While most of the network members began carrying out surveys in Africa in the 1990s, the first health surveys in the region were reportedly administered as early as 1940 in South Africa and 1962 in Senegal (Ngom et al., 2001). The network has produced three monographs: age-specific mortality and morbidity patterns in Africa and Asia; model life tables for 18 countries in sub-Saharan Africa; and a health equity study in Africa and Asia.<sup>12</sup> Map 2 indicates where household surveys have been carried out in Africa; Map 3 reveals the coverage of death registries.<sup>13</sup>

A number of efforts have been made to collect morbidity data in Africa. National household surveys conducted in South Africa and Nigeria provided information mainly on maternal and child health, malaria, and HIV/AIDS (SA DoH, 2002; Nigeria NPC, 2004). Survey questions on intentional and

MAP 2 Types of household surveys conducted in Africa

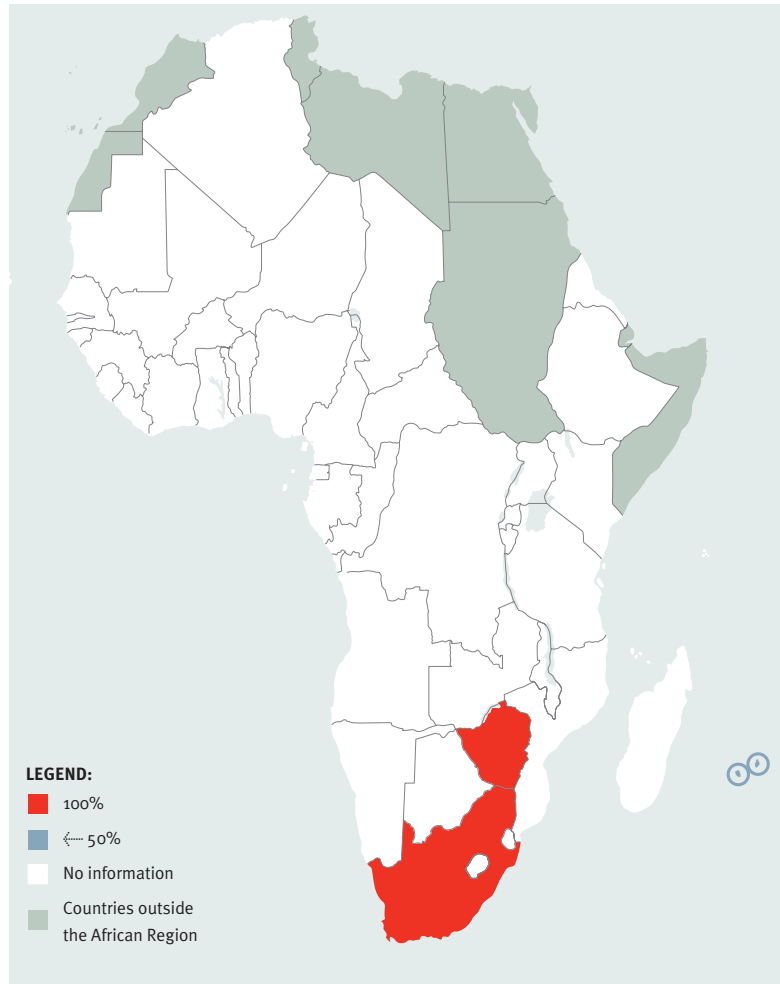


NOTE: A DHS usually covers the female population; a DHS+ includes both men and women.

SOURCE: WHO (2006c)

non-intentional injury were included in the South African household survey, which indicated that approximately 16 per cent of all reported injuries resulted from interpersonal violence (see Figure 5). Several health issue surveys on specific health problems have been conducted, including rates of caesarean section and HIV/AIDS mortality (Buekens, Curtis, and Alayón, 2003; Grassly et al., 2004). The ability of countries to carry out these surveys suggests that similar methods could be used to study violence.

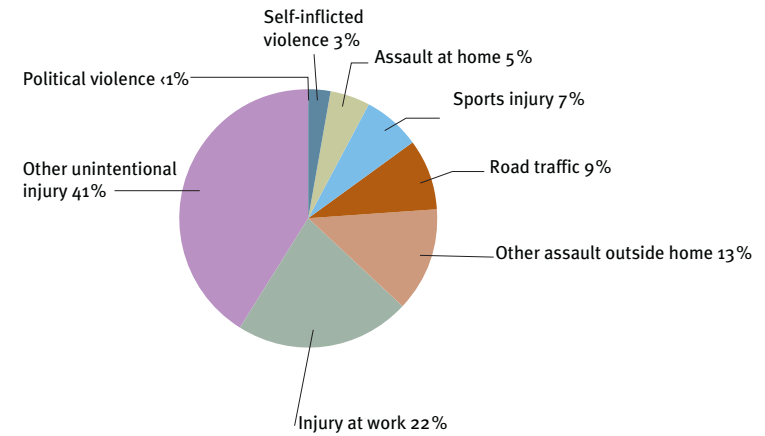
**MAP 3** Death registration coverage in Africa, by cause, 1995–2003



SOURCE: WHO (2006c)

The use of newly available technology is making health surveys in rural Africa feasible and more efficient, producing reliable data on specific health issues. One promising project, Project SATELLIFE, collected survey data related to a measles immunization programme in Ghana. The data was entered directly into personal digital assistants (PDAs) and linked via satellite cellular phones to a central data bank, enabling the completion of 2,400 surveys in three days (Hinas, 2003). Another similar project, the EpiSurveyor, provides open-source computer software for health data collection using PDAs. This

**FIGURE 5** Types of injuries, South Africa National Health Survey, 1998

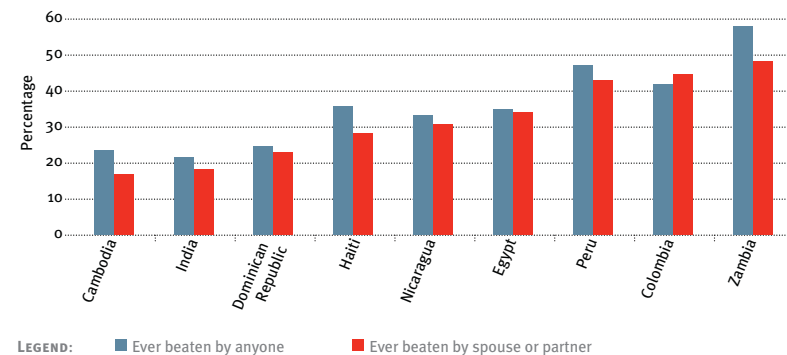


SOURCE: SA DoH (2002, p. 180)

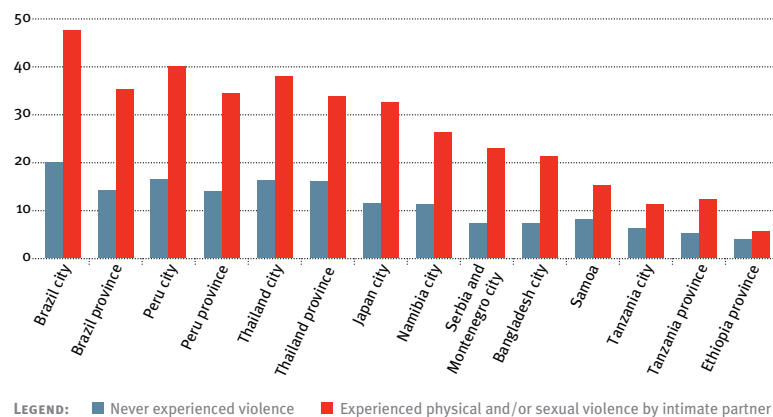
project has deployed its technology to assist health surveys in Ethiopia, Ghana, Uganda, and Zambia. For example, health officials in Zambia were able to complete a nationwide survey on measles coverage. Recently the United Nations announced an expansion of the use of this technology in Africa (UN Foundation, 2008). While these survey methods have not yet included the collection of data on injury or interpersonal violence, they could be easily adapted to such data collection efforts.

A number of multi-country surveys have provided useful information on domestic violence. These can enhance understanding of the utility of such data,

**FIGURE 6** Percentage of women aged 15–49 who have experienced violence



SOURCE: Kishor and Johnson (2004, p. 12)

**FIGURE 7** Percentage of women reporting suicidal thoughts

LEGEND: ■ Never experienced violence ■ Experienced physical and/or sexual violence by intimate partner

SOURCE: WHO (2005)

contribute to a basis for studying other types of violence, and offer examples of best practices for replication in other countries. One multi-country survey on domestic violence, published in 2004, included nine countries across three continents: Colombia, the Dominican Republic, Haiti, Nicaragua, and Peru; Egypt and Zambia; and Cambodia and India (Kishor and Johnson, 2004). The results indicate that a significant proportion of women surveyed had experienced interpersonal violence by a spouse or partner, with nearly half of the respondents in Zambia (48.4%) reporting violence by their spouse or partner (see Figure 6).

Likewise, WHO administered a multi-country health survey on domestic violence in ten countries: Bangladesh, Brazil, Ethiopia, Japan, Namibia, Peru, Samoa, Serbia and Montenegro, Tanzania, and Thailand (WHO, 2005). Detailed questions on the impact of domestic violence on the mental health of women indicated a sense of helplessness among respondents, expressed as suicidal thoughts in response to physical or sexual violence or both (see Figure 7). The study found significant differences between women who had never experienced domestic violence and those who had experienced domestic violence in the past, except in Ethiopia.

According to the WHO regional advisor on injury prevention in Africa, by 2005 efforts to implement injury surveillance systems had been initiated in Ethiopia, Mozambique, and Uganda. Ghana and Kenya were in planning stages while Guinea, Rwanda, and Senegal had expressed interest (Kobusingye et al., 2005). By September 2008 injury surveillance systems were in place in Ethiopia, Mozambique, and South Africa, while the surveillance system in Uganda was strengthened with new funding. New projects had been initiated in Eritrea and Cameroon, and a project was being considered for implementation in Nigeria. 🔄



### 3. Pilot project in Africa: the multinational injury surveillance system

At the international conference on the ‘Role of Health in the Prevention of War-Related Injury’ held in Vienna in July 2004, African members of International Physicians for the Prevention of Nuclear War, or IPPNW, and other health professionals agreed to participate in a coordinated research effort. This project, which involved the creation of a multinational injury surveillance system pilot project in five African countries, the Democratic Republic of the Congo (DRC), Kenya, Nigeria, Uganda, and Zambia, began in early 2006 and was completed in 2007 (see Box 4).

An important reason for initiating this project was that all participants agreed that obtaining detailed and reliable data on violent injury from a surveillance system would contribute to the understanding of the dynamics of violence in their countries. On a practical level, the pilot project was an effort to determine whether it was possible to establish an injury surveillance system in countries where resources for public health strategies are minimal or non-existent. Hospitals in each country were selected and a six-month prospective data collection on new injury cases treated at the hospitals’ emergency departments began in January 2007.

#### Challenges to implementation

A detailed evaluation process of the surveillance system was included in the project planning. On a monthly basis the data collected at each hospital was sent to the project coordinating centre, which collated and analysed the data and provided feedback to each participating hospital. In addition, each participating hospital was supposed to evaluate the sensitivity of the surveillance system by comparing the number of injury cases it registered with the number of cases registered by the hospital in order to determine whether the system was capturing all of the cases, or whether there were gaps in the system. This ongoing evaluation was intended to identify any problems with data collection, such as indicating days and times during which injury cases were most frequently missed, which could then allow for corrective measures to improve the data capture of the surveillance system.

#### Box 4 Pilot project outcome

The primary purpose of the pilot study was to use the same protocol to systematically and simultaneously collect, review, and evaluate injury data in five African countries—the DRC, Kenya, Nigeria, Uganda, and Zambia. The intent of the six-month pilot study was to demonstrate that implementing a surveillance system is feasible in developing country contexts, and that the information derived from the surveillance system could be used to provide evidence-based recommendations to local government health authorities, public policy makers, and community advocates about armed violence prevention strategies.

In the six months of data collection a total of 4,207 injury cases were recorded in the five countries. These included 2,454 injuries due to road traffic (58.3%), 1,683 injury cases due to interpersonal violence (40%), and a small number of cases reported as self-inflicted injuries (suicide), other, or unknown (see Table 2).

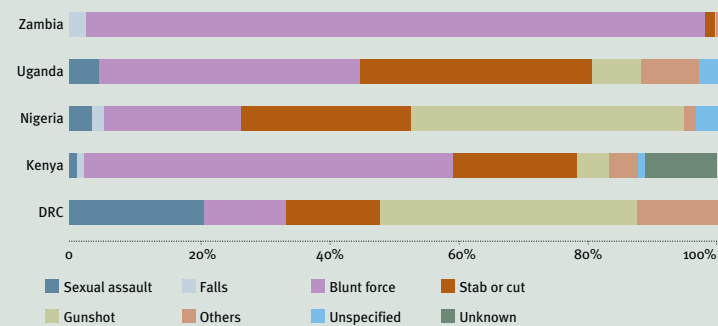
Injuries resulting from interpersonal violence account for nearly 40 per cent of recorded injuries in the five participating countries. The data also suggests some common characteristics. Young adult males are most at risk of violent injury. Fights among strangers were the most common scenario of violent injury. The type of weapon used in interpersonal violence varied across the participating countries (see Figure 8). While blunt force produced the most injuries across all countries, knives and guns were also commonly used. Nigeria and the DRC stand out as countries with high levels of gun violence.

**TABLE 2** Pilot study results: type of injury by country

TYPE OF INJURY	DRC	KENYA	NIGERIA	UGANDA	ZAMBIA	TOTAL
Road traffic	42	400	271	389	1,352	2,454
%	42.4	68.3	80.4	82.6	49.8	58.3
Self-inflicted	9	1	6	7	26	49
%	9.1	0.2	1.8	1.5	1	1.2
Interpersonal violence	48	179	57	67	1,332	1,683
%	48.5	30.6	16.9	14.2	49.1	40
Other	0	3	2	7	4	16
%	0	0.5	0.6	1.5	0.2	0.4
Unknown	0	3	0	1	0	4
%	0	0.5	0	0.2	0	0.1
Missing	0	0	1	0	0	1
%	0	0	0.3	0	0	0
<b>Total</b>	<b>99</b>	<b>586</b>	<b>337</b>	<b>471</b>	<b>2,714</b>	<b>4,207</b>
%	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>



**FIGURE 8** Recorded injuries, by mechanism



SOURCE: Zavala (2007)

Ongoing evaluation of the surveillance system proved difficult. Problems with Internet access and the large geographic distance between the coordinating centre and the participating hospitals reduced effective communication. Electronic delivery of data was not possible on a monthly basis. Delays in obtaining data for evaluation inevitably led to the inability to monitor data capture effectively or to intervene to address deficiencies in data collection. Despite these limitations, there were opportunities to provide feedback to each hospital and for some corrections to be made during the short implementation period of the pilot project.

Unexpected administrative delays proved to be another obstacle. These delays meant that the pilot study could not be initiated in all of the hospitals at the same time. The project began in the DRC, Nigeria, and Uganda on 1 January 2007, as originally agreed. In Zambia, the project start date was delayed until 1 March 2007. In Kenya, prospective data collection was only possible for the last month of the pilot project (June 2007). In an effort to address the problem of missing data for the earlier months of the project, data was collected retrospectively in Zambia and Kenya. In Kenya, this meant that the vast majority of the data was collected retrospectively. The final analysis of this country's quality of data demonstrated the limitations of using a retrospective method, especially in situations where the medical information routinely collected at clinics and hospitals does not always provide sufficient data or details of incidents to ensure complete records. While retrospective studies can be useful where medical records are complete, they are of less use where medical information is limited. In the latter case, prospective studies are more likely to provide useful and complete information.



## Evaluation of the pilot project

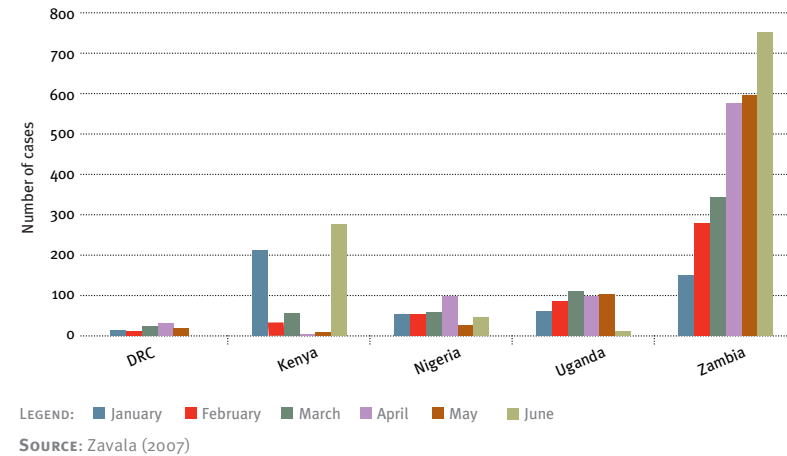
At the end of the pilot project, the principal investigator in each hospital was asked a series of questions in an effort to determine what worked and what did not. Table 3 summarizes the strengths and challenges identified in carrying out the project.

The assessment of the project made it clear that the perceptions of the hospital personnel mattered, and that they differed across the project. For example, while staff in one hospital viewed the surveillance form utilized in the project as a ‘strength’ for its ease of use, staff in another hospital saw it as a ‘challenge’ because of the requirement to collect detailed information and the time it took to obtain that information. Similarly, the data collection process was perceived as a ‘strength’ in one hospital and a ‘challenge’ at another. The requirement of a more thorough evaluation of patients was seen as a ‘strength’ of the project aimed at improving the documentation of injury cases. Inadequate funding and a lack of human resources, particularly skilled personnel, were perceived as challenges to the project in three hospitals. Staff at all five hospitals agreed that the technical support and the training provided before the collection of data were key elements contributing to the successful implementation of the project.

**TABLE 3** Strengths and challenges of pilot project

STRENGTHS	CHALLENGES
<ul style="list-style-type: none"> <li>• Technical support provided</li> <li>• Training provided to enable participants to train subsequent participants</li> <li>• Emergency department staff training provided</li> <li>• Availability of extra data on injuries</li> <li>• Involvement of medical students/assistants</li> <li>• Data collection and data entry well done</li> <li>• Questionnaire easy to fill out</li> <li>• Project accepted by hospital staff</li> <li>• Injury data available for research</li> <li>• Increased awareness of surveillance systems by hospital and health authorities</li> <li>• More thorough evaluation of patients</li> <li>• Improvement of data capture by hospital personnel</li> <li>• Can be implemented in one hospital on a permanent basis and expanded to other hospitals as resources allow</li> <li>• Findings can be used to build support for additional surveillance, capacity building, and improvements in the infrastructure of local hospitals</li> </ul>	<ul style="list-style-type: none"> <li>• Insufficient funding for 24/7 data collection for six months</li> <li>• Difficulty in obtaining ethical research clearance</li> <li>• Limited number of emergency department staff available</li> <li>• Emergency department staff very busy</li> <li>• High patient turnout</li> <li>• Lack of computers for data entry</li> <li>• Poor Internet connections for transmitting data</li> <li>• Requires accurate data entry</li> <li>• Requires computer literacy</li> <li>• Inadequate incentives for emergency department staff</li> <li>• Questionnaire very detailed</li> <li>• Medical history a time-consuming process</li> <li>• Lack of full-time data entry personnel</li> <li>• Need skilled personnel</li> <li>• Political instability</li> </ul>

**FIGURE 9** Multinational injury surveillance system pilot project: number of cases collected, January–June 2007



Complete data capture proved difficult to achieve. An evaluation of the surveillance data at the end of the data collection period suggests that an injury surveillance system takes time to begin functioning properly in terms of capturing the information on specific injury cases arriving at the emergency department in each hospital. The short time (six months) for data collection did not allow for the implementation of the injury surveillance system in each participating hospital. The mixed results in the data collection process were evidenced by the irregular distribution of cases collected each month. The comparison of the number of cases collected in each hospital in the surveillance system with the actual number of cases listed in the hospital register was not possible to accomplish, thus it is not possible to determine the number of cases potentially missed in the pilot project. Figure 9 illustrates the monthly data collection reported by each country represented in the pilot project.

Kenya and the DRC experienced the greatest difficulties. The experience in Nairobi demonstrates that retrospective data collection on injury cases in a large hospital setting is problematic, and that complete data capture by the surveillance system may not be possible. Despite the large limitations in implementing the surveillance system in Kisangani, the fact that data emerged from as difficult a scenario as the DRC is promising. On the other hand, the hospital in Lusaka, Zambia, provides the best evidence that a greater period of time is needed to consolidate an injury surveillance system. As shown in Figure 10, the number of cases collected gradually increased from the first to the last month of data collection. Yet this extraordinary

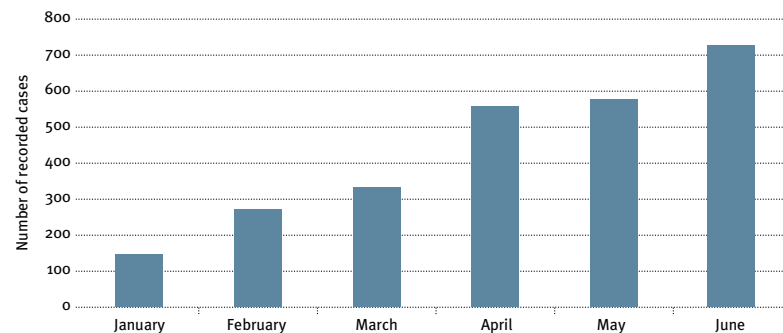




**PHOTO** ◀ A young fighter of the Patriotic Force of Resistance for Ituri in Tchei, South Ituri, July 2006. © Lionel Healing/AFP Photo

success in Zambia is tempered by the fact that health personnel were paid to provide completed surveillance questionnaires. The provision of such economic inducements for cooperation and participation in the project can

**FIGURE 10** Multinational injury surveillance system pilot project: number of cases collected for Zambia, January–June 2007



SOURCE: Zavala (2007)


be counterproductive to the creation of sustainable surveillance systems as participating health professionals become reliant on the additional source of income that is unlikely to be available in the long term.

### Lessons learned from pilot project

First and foremost, participants must understand the utility of collecting data on violence and injury and should receive some incentive for participation. In many cases, such a project may be seen as time-consuming and relatively useless. In order to develop political support for financing the project and hospital staff support for implementing it, the benefits of the data collection process can be demonstrated through examples from other countries. It can also be shown through early analysis of data collected through the surveillance system. For example, a tabulation of the most frequent type of injuries found by gender, age, time, and place can enable the identification of key sources of injury and potential injury ‘hot spots’ in the community.

Hospital administrators and medical personnel directly involved with the surveillance system must understand that the required data collection procedures should become an integral part of the regular data collection process of a patient's medical record, and not just a temporary effort. This requires all medical personnel involved in the data collection process to remain committed to the collection of data at all times. The surveillance system is a constant, 24-hour system that requires continuous input in order to identify all injury cases of relevance to the surveillance system. The aim is to regularize data collection and make it a routine, rather than an extraordinary activity.

Adequate resources are needed for the effective implementation of a surveillance system. This includes the availability of computers (and database software) for data entry; sufficient staff for data collection and data entry; adequate funding for staffing; the provision of training for staff members; and local technical maintenance for the surveillance system. It will also require, at least initially, incentives for participation. These incentives might come in the form of monthly allowances, performance bonuses, or other non-monetary goods. At the beginning of the process such incentives are likely to encourage participation. However, care must be taken to prevent the creation of dependencies on these payments; otherwise, the discontinuation of payments following pilot projects could lead to participants abandoning the surveillance system.

Training is vital to the effective implementation of a surveillance system. Hospital personnel responsible for collecting the relevant injury data need to understand the surveillance form, how to fill it out accurately, and the process for ensuring that information is entered into the database. Those responsible for entering the data need to be computer-literate, familiar with the surveillance form, and competent in the use of the database software. Although in many cases the analysis of the data may need to be outsourced initially, efforts should be made to tap into locally available resources. For example, the national statistics office or the university statistics department could be sources of individuals trained in data analysis. Training to develop local capacity for analysing injury surveillance data will be important for the sustainability of a surveillance system. Ensuring that these analytical capabilities exist in the country will contribute to local ownership of the data and of the surveillance system. 



## Conclusion

The scarcity of reliable mortality and morbidity data in developing countries limits the ability of governments and other stakeholders to understand fully the scope and scale of violence, and the impact it has on communities, political stability, and economic development. Solid data is at the core of good policy formation and evaluation. Currently policy-makers lack sufficient data to design, implement, and assess policy and programming. Government officials at the state and local level, as well as supporting intergovernmental and non-governmental organizations, have acknowledged this critical gap, and in several instances have made efforts to initiate data collection projects.

Health surveys and sampling surveillance systems have generated useful information on many communicable diseases. These same strategies can be applied to injury research. The collection of health data need not be limited to disease alone, but can include injury information, including data on violence. The promotion of the achievement of the Millennium Development Goals has boosted public health efforts to assess the impact of disease, malnutrition, and other health-related problems that affect communities and inhibit development. This has enhanced technical collaboration and generated a number of ambitious survey projects, both of which aim to produce effective interim systems of data collection where country-wide vital statistics are neither currently available nor obtainable in the short term. While most of these efforts have contributed to a broader understanding of disease and population health, they have not focused on questions of injury and violence, but they do offer the opportunity to move in this direction.

The intent of the multinational injury surveillance system pilot project was to demonstrate that the implementation of hospital-based surveillance systems is feasible in an African context. Surveillance systems offer the opportunity to generate reliable information on injury and mortality resulting from violence. This information can demonstrate the extent of the problem and highlight the impact of violence on affected communities and countries, thereby generating support for addressing the causes of violence. This information, in combination with political and community support for

problem-solving interventions, can support the development of sustainable injury prevention initiatives. However, the creation of surveillance and other data-gathering systems continues to face a number of challenges.

This pilot study and other public health initiatives have identified a number of obstacles to implementing a public health approach to violence prevention. These include limited understanding by government officials of the scope, scale, and impact of violence; insufficient understanding of the need to collect data to generate effective policy; insufficient understanding of violence as a public health concern outside of immediate medical care; limited funding for data collection and analysis, particularly from donor organizations; lack of technical support; non-existent or poor infrastructure for data collection and resulting injury prevention measures; and insufficient human and material resources to implement surveillance systems.

The public health approach is not the only solution to problems of violence. Instead, it offers a concrete manner of collecting information needed for creating evidence-based policy. To be successful, the strategies and programmes designed to address problems of violence will depend on collaborative efforts among various sectors—law enforcement, the judiciary, education, health, public safety, and civil society. However, without an understanding of the problem, without evidence to inform the design of violence prevention strategies, and without a baseline for measuring effectiveness, policy-makers will never know whether their efforts are making a difference. 📌



- 1 For a discussion of these widespread impacts, see Geneva Declaration Secretariat (2008).
- 2 Homicide rates are typically expressed as rates of the number of persons killed per 100,000 persons in the population. The global homicide rate has been estimated at 7.6 per 100,000 for 2004. See Geneva Declaration Secretariat (2008, p. 67).
- 3 Diego Zavala's personal communication with Dr Olive C. Kobusingye, World Health Organization Regional Office for Africa, 18 September 2008.
- 4 For a discussion of data sources, see Holder et al. (2001).
- 5 For a discussion of surveys and surveillance, see Holder et al. (2001).
- 6 For a discussion of how to conduct community surveys, see Sethi et al. (2004).
- 7 WHO has developed guidelines for designing and building an injury surveillance system; a step-by-step process is described in Holder et al. (2001).
- 8 For additional information on homicides in Cali, see Concha-Eastman et al. (2002).
- 9 For more information, see SAHealthInfo (n.d.).
- 10 The 18 countries comprise: Burkina Faso, Chad, Comoros, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Malawi, Mali, Mauritania, Mauritius, Namibia, Republic of the Congo, Senegal, South Africa, Swaziland, Zambia, and Zimbabwe. For country reports, see WHO (n.d.).
- 11 For additional information and a list of funders, see INDEPTH (n.d.b).
- 12 See INDEPTH (n.d.a).
- 13 For examples of household surveys and death registries, see UNISA (2005) and MHA (2008).
- 14 Diego Zavala's personal communication with Dr Olive C. Kobusingye, WHO Regional Office for Africa, 18 September 2008.
- 15 This project was funded by Foreign Affairs and International Trade Canada and the Small Arms Survey.



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