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A PUBLIC HEALTH APPROACH TO DEVELOPING ARMED VIOLENCE INDICATORS

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EXECUTIVE SUMMARY

This paper articulates a public health approach to understanding and preventing armed violence, including an organizational framework for enhancing violence prevention capacity with elements covering leadership; data collection; collaboration and information exchange; implementation of prevention programming, and victim care and support systems. It argues that the collection of information solely on, for instance, gun-related violence, is of limited value from a prevention perspective, and therefore that armed violence indicators should be collected as part of a larger set of indicators covering other aspects violence, and country status in respect of violence prevention and victim care capacity.

Accordingly, the recommended indicators are grouped into the following three categories: violence prevention and victim care capacity; risk factors for violence, and incidence rates of violence. Examples of possible indicators under each of these headings are provided, and the standard conceptual requirements that indicators be reliable, consistent, comparable and based upon easily available data is noted. A review of data currently available through WHO sources highlights the wide differences that exist between regions, countries and types of indicator, and shows that data to calculate global baseline values for any of the proposed indicators are lacking. For homicide rate, the most widely available indicator, it is possible to calculate baseline values for the WHO regions of the Americas and Europe, and for violence prevention and victim care capacity, baseline values can be calculated for Europe only.

For developing a system to track violence worldwide, the review suggests that, despite major regional gaps in coverage, existing WHO datasets and WHO-coordinated surveys contain a good deal of the information needed to design and test some of the proposed public health indicators for violence prevention and response capacity, risk factors, and outcomes. WHO should therefore be supported to improve access to its existing data holdings, and ensure that as new information initiatives are planned and implemented, items addressing violence are included. Ideally, this should be done within the framework of the WHO Global Health Observatory that is currently being developed, so that once violence indicators are included, the relationships between them and other health outcomes can be more readily explored.

BACKGROUND

In the year 2004, there were an estimated 1.64 million deaths due to violence throughout the world. This was half the number of deaths due to HIV/AIDS, roughly equal to deaths due to tuberculosis, somewhat greater than the number of road traffic deaths, and 1.5 times the number of deaths due to malaria. The largest number of violent deaths was due to suicide: 844,000 cases or 51%. Homicide accounted for 600,000 deaths or 36% (Global Burden of Disease, 2008), of which 360,000 are estimated to involve firearms (Geneva Declaration Secretariat, 2008). There were 184,000 deaths directly due to war (Global Burden of Disease, 2008). Less than 10% of all violence-related deaths occur in high-income countries (Dahlberg and Krug, 2002). Global estimates for the proportion of suicides involving small arms are unavailable, but for countries where national-level data are available, the proportion of firearm-related suicides ranges from 1-60% (Geneva Declaration Secretariat, 2008). The proportion of war-related deaths involving small arms is unknown, but is likely to account for a large proportion of those killed as direct result of conflict.

For every death, non-fatal injuries due to violence lead to dozens of people hospitalized, hundreds of emergency department visits and thousands of doctors' appointments. For instance, each year an estimated 16.7 million people globally receive medical treatment for injuries arising directly from violence (Global Burden of Disease, 2008). Over and above these deaths and injuries, some highly prevalent forms of violence (such as child maltreatment, intimate partner violence, and sexual violence) have numerous non-injury health consequences, including high-risk behaviours such as alcohol and substance misuse, smoking, unsafe sex, eating disorders and the perpetration of violence, and via these risk behaviours contribute to such leading causes of death as cardiovascular disorders, cancers, depression, diabetes and HIV/AIDS (Krug et al. 2002). Although the negative effects of violence are felt by all, violence also disproportionately affects the development of low- and middle-income countries. In poorer countries, the economic and social impacts of violence can be very severe in terms of slowing economic growth, undermining personal and collective security, and impeding social development (WHO, 2008).

Following the *World report on violence and health* violence is defined as the intentional use of physical force or power, threatened or actual, against oneself, another person, or a group or community that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation (Dahlberg and Krug, 2002). Three general types of violence are encompassed by this definition: interpersonal, self-directed, and collective. Interpersonal violence includes forms perpetrated by an individual or small group of individuals, such as child maltreatment by parents and caregivers, youth violence, intimate partner violence, sexual violence, and elder abuse (Dahlberg and Krug, 2002). Self-directed violence includes suicidal behaviour and self-harm where the intent may not be to take one's own life (Deleo et al. 2002). Collective violence is the use of violence by groups or individuals who identify themselves as members of a group, against another group or set of individuals, to achieve political, social, or economic objectives. It includes war, terrorism, and state-sponsored violence towards its own citizens (Zwi et al. 2002).

While all three of types of violence may involve the use of weapons, either to inflict injury (as where a person is shot or stabbed), or to threaten, this paper focuses upon indicators for interpersonal violence. Relative to collective violence, interpersonal violence accounts for many more deaths and non-fatal consequences than collective violence, and, as shown by scientific studies, various highly prevalent forms - such as youth violence and child maltreatment - are readily preventable through interventions that target the underlying causes and risk factors. Despite this, interpersonal violence receives substantially less political attention than collective violence, and development assistance agencies have to date made only modest investments in prevention programmes. While useful in sowing the seeds of violence prevention, such programmes are generally too small and time-limited to yield quantifiable prevention gains.

In developing indicators for interpersonal armed violence, it is important to note that the collection of information solely on, for instance, gun-related violence, is of limited value from a prevention perspective, and therefore that armed violence indicators should always be collected as part of a larger set of indicators for interpersonal violence in general. In countries where it has been studied, a strong risk factor for owning and carrying a gun is having been the victim of a previous violent incident (whether or not a gun was involved). Indicators that limit themselves to gun-related violence would be unable to provide early warning of increasing non-gun related violence that might catalyse increased demand for guns. In countries with high levels of interpersonal armed violence, vital statistics, police and health information systems may have the capacity to identify and count violent events such as homicides or assaults, but lack the ability to provide detailed information about the types of weapon involved. By focussing exclusively on guns these useful sources of information would be lost. Finally, violence prevention strategies that directly aim at reducing access to guns and other weapons are of limited effectiveness by themselves, and should be complemented by other strategies that address the behavioural, social and environmental factors that lead to the increased risk of violence occurring in the first place. Indicators that focus only on armed violence could not be used to inform or monitor such strategies. Accordingly, in addition to a number of indicators specific to armed violence, this paper recommends indicators for interpersonal violence in general.

PUBLIC HEALTH APPROACH

This paper articulates a public health approach to understanding and preventing armed violence as a basis for the proposed indicators. By definition, public health is not about individual people. Its focus is on dealing with diseases and with conditions and problems affecting health, and it aims to provide the maximum benefit for the largest number of people. This does not mean that public health ignores the care of individuals. Rather, the concern is to prevent health problems and to extend better care and safety to entire populations. The public health approach to violence is based on the requirements of the scientific method. In moving from problem to solution, it has four key steps:

1. Uncovering as much basic knowledge as possible about all the aspects of violence through systematically collecting data on the magnitude, scope, characteristics and consequences of violence at local, national and international levels.

2. Investigating why violence occurs – that is, conducting research to determine the causes and correlates of violence; the factors that increase or decrease the risk for violence; the factors that might be modifiable through interventions.
3. Exploring ways to prevent violence, using the information from the above, by designing, implementing, monitoring and evaluating interventions.
4. Implementing, in a range of settings, interventions that appear promising, widely disseminating information and determining the cost-effectiveness of programmes.

Public health is above all characterized by its emphasis on prevention. Rather than simply accepting or reacting to violence, its starting point is the scientific fact that violent behaviour and its consequences can be prevented. Public health identifies three levels of prevention.

- **Primary prevention** seeks to stop violent behaviours from occurring in the first place. Activities may be focused on children from pre-birth through school age to adolescence, and their parents or principal caregivers. Interventions may include parenting initiatives, life and social skills training for children, and efforts to harness the violence-reducing effects of policies that addressing wider causal factors such as social and economic inequality, social and cultural norms that support the use of violence, and access to guns, alcohol and illicit drugs.
- **Secondary prevention** focuses on the immediate responses to violence, such as pre-hospital care, emergency services, or treatment for sexually transmitted diseases following a rape.
- **Tertiary Prevention** involves a focus on long-term care in the wake of violence, such as rehabilitation and reintegration, and attempts to reduce the long-term disability associated with violence and, in perpetrators, the likelihood of their re-offending.

Table 1 lists 10 scientifically credible violence prevention strategies that can potentially influence multiple forms of violence (including armed violence), and represent areas where developing countries and funding agencies can make reasonable investments. In designing and implementing violence prevention programmes that draw upon these strategies, the public health approach organizes the causes of violence into four levels of influence, each of which also constitutes an entry point for intervention.

Table 1. Ten Credible evidence based strategies for preventing violence

1. Increase safe, stable, and nurturing relationships between children and their parents and caretakers;
2. Reduce availability and misuse of alcohol;
3. Reduce access to lethal means, such as guns, knives, and pesticides (often used to commit suicide, especially in low- and middle-income countries);
4. Improve life skills and enhance opportunities for children and youth;
5. Promote gender equality and empower women;
6. Change cultural norms that support violence;
7. Improve criminal justice systems;
8. Improve social welfare systems;

9. Reduce social distance between conflicting groups;
10. Reduce economic inequality and concentrated poverty.

Source: WHO. (2008). *Preventing violence and reducing its impact: how development agencies can help*. Geneva, WHO.

Individual level influences are biological and personal factors that increase the likelihood of an individual becoming the victim or perpetrator of violence. These include factors such as alcohol and/or drug use, impulsive behaviour, a childhood history of maltreatment or witnessing domestic violence. Proven individual prevention strategies include pre-school enrichment programmes during early childhood (ages 3-5 years), life skills training and social development programmes for children aged 6 to 18 years, and assisting high-risk adolescents and young adults to complete schooling and pursue courses of higher education and vocational training.

Relationship level influences are factors within the family, and in friendship and peer networks that increase the risk of violence. Proven family prevention strategies include providing training for parents on child development, non-violent discipline and problem-solving skills; promoting parental involvement in the lives of children and adolescents through programmes to develop home-school partnerships; and mentoring programmes to develop attachments between high risk youth and caring adults in order to build social skills and provide a sustained relationship.

Community level influences include factors at school, in neighbourhoods and in workplaces that increase risk. They include a lack of education, a lack of vocational opportunities, and cultural norms that legitimize violence. Proven and promising community prevention strategies include increasing the availability and quality of childcare facilities, increasing the availability and quality of pre-school enrichment programmes and improving school settings, including teacher practices, school policies and security.

Societal level influences are the larger, macro level factors that influence violence such as gender equality, societal norms, economic or social conditions that support general inequalities. In all countries where the relevant data are available, income inequality is one of the major determinants of variability in homicide rates. In society, strategies that are proven and promising include reducing alcohol availability and misuse through enactment and enforcement of liquor licensing laws, taxation and pricing; reducing access to lethal means, including firearms, sedatives and pesticides; and promoting gender equality through strategies such as supporting the economic empowerment of women.

Building the Foundation for Violence Prevention and Victim Care

As noted by Mercy et al (2008) and Zaro et al (2007), successful violence prevention requires a foundation that supports the development, implementation, maintenance and monitoring of interventions, programmes, and policies. This foundation builds on many of the same capacities that are needed and, in some cases have already been developed, for other public health problems. Efforts should thus be made wherever possible to address violence prevention by building upon the infrastructure developed to address other public

health problems. The following elements, as described in Mercy et al (2008) and Zaro et al (2007), are critical for building this foundation, and the proposed indicators therefore include a sub-set aimed at monitoring country progress towards putting these elements in place.

Develop a National Action Plan and Identify a Lead Agency

Developing a national plan is a key step towards effective violence prevention. A national plan should include objectives, priorities, strategies and assigned responsibilities, and a timetable and evaluation mechanism (Krug et al. 2002; Butchart et al. 2004). It should be based on input from a wide range of governmental and non-governmental actors (WHO, 2004), and coordinated by an agency with the capacity to involve multiple sectors in a broad-based implementation strategy (WHO, 2004).

Enhance the Capacity for Collecting Data

Data are necessary to set priorities, guide the development of interventions, programs, and policies, and monitor progress (Krug et al. 2002; Pinheiro, 2006; United Nations, 2006; Rosenberg et al. 2006). A goal should be to create a system that routinely obtains descriptive information on a few key indicators that can be accurately and reliably measured (Butchart et al. 2004). The contributions of violence to other public health problems (e.g., HIV, mental health) should be documented and baseline measurements for violence and its consequences routinely measured along with other health problems.

Increase Collaboration and the Exchange of Information

Violence prevention work engages many different societal sectors. In particular, health, criminal justice, and social service institutions play critical roles in formulating and implementing prevention strategies and addressing victims' needs. The success of violence prevention efforts depends substantially on these sectors being able to cooperate and coordinate their efforts. Violence prevention initiatives should therefore dedicate attention to enhancing effective collaboration between these sectors (Krug et al. 2002; United Nations, 2006).

Implement and Evaluate Specific Actions to Prevent Violence

The development of information that evaluates what programmes and policies are most effective is critical (Krug et al. 2002; Pinheiro, 2006; United Nations, 2006; Rosenberg et al. 2006). There are a number of effective and promising violence prevention strategies that can be adapted and implemented in developing countries (Krug et al. 2002; Pinheiro, 2006; United Nations, 2006; Rosenberg et al. 2006). Such efforts must be carefully evaluated to ensure that they are working and to build the prevention knowledge base.

Strengthen Care and Support Systems for Victims

Health, social, and legal support systems for victims of violence are critical for treating the psychological, medical, and social consequences of violence (Krug et al. 2002; Pinheiro, 2006; United Nations, 2006; Rosenberg et al. 2006). These systems can help prevent future

acts of violence, reduce disabilities, and help victims cope with the impact of violence on their lives (Butchart et al. 2004). Violence prevention efforts should be integrated into existing health systems developed for the diagnosis, treatment, and evaluation of interventions for other health problems. Strengthening integrated health systems should include strengthening violence prevention capacity.

INDICATORS

Many UN and other international agencies hold datasets and coordinate surveys that generate information that can be used to construct the indicators discussed below. However, it is beyond the scope of this paper to review this full range of potential data sources, and the following discussion is therefore limited to those where there is direct WHO involvement.

Conceptual Considerations

Indicators are statistical measures used to monitor progress towards desired outcomes. In relation to armed violence, and viewed from the public health perspective, desired outcomes can be grouped into the following three categories:

- increased capacity for violence prevention and victim care;
- reduced risk factors for violence;
- reduced incidence rates of violence.

To provide valid measurements over time, indicators should be reliable, representative, consistent, comparable and based upon easily available data. However, since there are no sources of data relevant to interpersonal violence that meet all of these criteria for all countries of the world, the following discussion includes suggestions for indicators where the coverage using existing datasets ranges from about 50% of the world's population (for homicide rates) to zero (in the case of conceptually desirable indicators that have yet to be implemented).

Violence prevention and victim care capacity. Violence prevention capacity is here defined as the extent to which a country has institutionalized the foundations for violence prevention. Examples of violence prevention capacity indicators include:

- the presence of systems that routinely collect and report reliable data on violence related deaths and non-fatal injuries;
- the presence of national policies and programmes explicitly designed to prevent violence;
 - national programmes to increase safe, stable, and nurturing relationships between children and their parents and caretakers;
 - national programmes to improve life skills and enhance opportunities for children and youth;
 - legislation to restrict the carrying of guns in public;
 - legislation to reduce alcohol-related violence.
- the presence of national policies and programmes designed to provide services for victims of violence.
 - Presence of an appropriately trained person or unit in charge of this national plan

- Percent of pre-hospital first responders with first aid training;
- Existence and population coverage of formal emergency medical services (e.g. EMS or ambulance system)
- Percent of hospitals that meet WHO essential trauma care criteria
- Percent of seriously injured who arrive to hospital within one hour of the event.

Risk factors for violence. Of the many risk factors that could be recommended for inclusion in a globally relevant set of interpersonal violence indicators, priority should be accorded those that are policy sensitive and which are being (or are soon likely to be) addressed by national and international prevention efforts. Input data for such indicators will be obtained from social and economic datasets and periodic population-level surveys. Examples of indicators for violence risk factors include:

- Individual level
 - History of child maltreatment;
 - Assaulted/threatened in last 12 months;
 - Prevalence of firearm ownership;
 - Prevalence of firearm carrying in public spaces;
 - Prevalence of alcohol misuse.
- Relationship level
 - Positive parental involvement in the lives of adolescents
- Community level
 - Social capital
- Societal level
 - Youth unemployment rate;
 - Income inequality.

Incidence rates of violence. Ultimately, all efforts to prevent violence require data on deaths, non-fatal injuries, and non-injury-related violent events (e.g. being threatened by someone with a gun). Such data are needed by countries to assess the scope of their violence problem, to target responses to it, and to monitor the impact of their efforts to prevent it. Examples of indicators for incidence rates of violence include:

- Deaths due to violence
 - Age-adjusted homicide rate, per 100,000 population, for people, males and females;
 - Age adjusted firearm-related homicide rate, per 100,000 population for people, males and females;
 - Age-adjusted emergency-room visits due to assaults, per 100,000 population for people, males and females;
 - Age-adjusted emergency-room visits due to firearm-related assaults, per 100,000 population for people, males and females;
 - Mortality rate among the group with life threatening, but salvageable injuries (e.g. proportion of violence related deaths with injury severity score of 9 - 36) for people, males and females.
- Non-fatal violent incidents
 - Prevalence of self-reported victimization resulting in time lost from routine activities, and/or a doctor or hospital visit for people, males and females;

- Prevalence of self-reported involvement in an incident involving being threatened by someone with a firearm for people, males and females.

Data availability

The conceptual requirement that indicators be reliable, consistent, comparable and based upon easily available data contrasts sharply with the reality concerning information availability.

Violence prevention and victim care capacity

To date, only countries in the WHO European region systematically assess violence prevention and victim care capacity, using a questionnaire survey and an inventory of national policies and programmes. This is done as part of a broader collaborative project between WHO and the European Commission to monitor progress in implementing a WHO European Regional Committee Resolution on the prevention of injury and promotion of safety. In 2009, there were questions on whether national policies and programmes were in place for prevention and victim care, and on 78 evidence-based programmes for the primary prevention of 10 types of injury and violence (including programmes to reduce the availability of and access to firearms). An additional, 21 questions asked about programmes for the prevention of alcohol-related harm and those targeting the reduction of socioeconomic inequalities. Health ministry focal persons for injury and violence prevention were sent, and completed, the questionnaire electronically. This information was analysed to provide a regional overview and country profiles. An inventory of national policies on preventing injuries and violence was collated. After being verified by focal persons, the country profiles have been uploaded on the WHO Regional Office for Europe web site to act as a resource and catalyst for action. Responses on 47 out of 51 Member States with at least one focal person were obtained, and of these 25 are from the European Union (EU), and nine from Russian speaking countries. Of the 47 countries completing the 2009 survey, 37 had completed a highly comparable survey in 2008 (see http://www.euro.who.int/InformationSources/Publications/Catalogue/20080912_1)

A medium-term goal of WHO is to establish equivalent systems for monitoring national injury and violence prevention capacity in the Member States of all other WHO regions.

Risk factors for violence

Increasingly, questions about behaviours that are risk factors for violence are included in population level surveys of health risk behaviours more generally. For instance, the Global Schools-based Student Health Survey (GSHS, see <http://www.who.int/chp/gshs/en/>) includes core questions about binge drinking of alcohol; illicit drug use; and positive parental involvement, as well as an optional module on violence that includes questions about the carrying of guns and other weapons, and being assaulted in the past 30 days. GSHS is administered to a nationally representative sample of school-going children aged 13-15 years. Table 2 lists the countries by WHO region that have already administered or will be administering GSHS including the optional violence module.

Table 2. Countries administering GSHS with violence module by WHO region

AFRO	AMRO	EMRO	EURO	SEARO	WPRO
Algeria Angola Botswana Ghana Kenya Malawi Mauritius Namibia Seychelles Swaziland Tanzania Uganda Zambia Zimbabwe	Anguilla Antigua and Barbuda Argentina British Virgin Islands Cayman Islands Chile Colombia Costa Rica Dominica Ecuador Grenada Guyana Jamaica Montserrat Peru Saint Lucia Saint Vincent and the Grenadines Suriname Trinidad and Tobago Uruguay Venezuela	Djibouti Jordan Lebanon Libyan Arab Jamahiriya Morocco Oman Pakistan Tunisia United Arab Emirates Yemen	Macedonia Tajikistan	Bangladesh Indonesia Maldives Myanmar Sri Lanka Thailand	China Fiji Philippines Nauru

For adults aged 25-64 years, the WHO Stepwise approach to surveillance (STEPS, see <http://www.who.int/chp/steps/en/>) includes similar questions to those in GSHS about alcohol use and weapon carrying, in addition to questions about exposure to child maltreatment and social trust. However, the violence module for STEPs has only recently been finalized, and it is not yet possible to indicate which countries will be applying it.

Information on the prevalence and patterns of alcohol use in most countries of the world is available from WHO's Global Information System on Alcohol and Health, and in the 1999 and 2004 Global status reports on alcohol (http://www.who.int/substance_abuse/activities/gad/en/index.html)

The World Health Survey was conducted during 2002 in 70 countries from all WHO regions. Although it is unclear whether the survey will be repeated, it is noted that the 2002 data collection instrument included a number of questions asking about perceptions of safety (see <http://surveydata.who.int/>).

As well as these WHO instruments, population-based survey instruments and databases administered by other international agencies probably also include items that can be used to generate individual, relationship and community level indicators

At the societal level, information about risk factors such as economic inequality and youth unemployment are routinely gathered as input for the calculation of economic, social and

human development indicators. The appendices of the annual *Human Development Report* provide an overview of the range of such indicators available (e.g. see HDR 2009 at http://hdr.undp.org/en/media/HDR_2009_EN_Complete.pdf)

Incidence rates of violence

Deaths due to violence. As it is a legal requirement in nearly all countries that every death be certified and registered, a fair proportion of countries have already established nationally regulated systems with standard instruments, such as the death certificate, for the collection of cause of death information. To these instruments are applied universally accepted definitions and coding conventions such as the International Classification of Diseases and Injuries in its ninth or tenth revision (ICD-9 and ICD-10, see <http://www.who.int/classifications/icd/en/index.html>). From a public health perspective, data derived from these systems are the preferred source of information about violent deaths, since for many low- and middle-income countries they appear to be more valid, more reliable and more widely available than police crime data on homicides, and are generally disaggregated by sex, and into standardized age groups. However, far from all countries collect such data, and in certain regions, almost no countries do so. Table 1 shows the situation as of 2008, with 78/193 countries having "no population level death registration data" these being 43/46 African countries; 12/21 Eastern Mediterranean countries; 8/11 South East Asian countries and 11/27 Western Pacific countries (Mathers, Boerma and Ma Fat, 2009).

Table 1. Availability of recent death registration data in 2008, by WHO region (from Mathers, Boerma and Ma Fat, 2009)

Data/method	Number of countries						
	Africa	The Americas	Eastern Mediterranean	Europe	South-East Asia	Western Pacific	World
Death registration data with coverage of 85% or more	3	21	2	40	1	12	79
Death registration data with coverage of <85%	–	12	7	11	1	3	34
SR5*	–	–	–	–	1	1	2
No population level death registration data [†]	43	2	12	2	8	11	78
Total countries	46	35	21	52	11	27	193

*China and India both maintain systems in which deaths are recorded in a representative sample of districts across the country. Cause of death for most deaths is attributed using data collected using the VA methods (see text).

[†]Some of these countries do collect data on deaths in hospitals or urban areas, but these data cannot be considered to provide a representative picture of cause-of-death patterns at the population level.

To compensate for these data gaps, the WHO Global Burden of Disease (GBD) programme has developed models for estimating broad cause-of-death patterns that can serve as the starting point for indirect methods of estimating attributable mortality for a comprehensive list of detailed causes, including deaths due to suicide, homicide and collective violence.

The resulting GBD global-, regional- and country-level estimates provide the total number of deaths and death rates due to suicide, homicide and collective violence by sex and three age groups (0-14; 15-59 and 60 years and over) for 192 countries. The accuracy of these estimates is a function of the quality and coverage of the input data, and they are coded into one of three levels of evidence and uncertainty (Mathers, Boerma and Ma Fat, 2009).

- Level 1. Death registration data, complete or incomplete, containing useable information on causes of death is available for the country. Partial country-specific information on incidence or prevalence of non-fatal causes available.
- Level 2. Forms of information other than death registration data (eg. verbal autopsy) are available. Country-specific information on mortality for specific causes available. Partial country-specific information on incidence or prevalence of non-fatal causes available.
- Level 3. Country information on level of adult mortality not available and it was predicted from child mortality level OR cause of death information for most causes not available, and cause pattern predicted using cause-of-death models. Partial country-specific information on incidence or prevalence of non-fatal causes available.

Non-fatal violent incidents. Information about non-fatal violent incidents consists of two main categories: health services information about non-fatal violence-related injuries that receive medical attention and is collected by medical staff at the time of diagnosis and treatment; and self-reported information about violent victimization.

Data on violence-related injuries treated by the health services reside in the inpatient and outpatient services (specifically the casualty department or emergency room [ER]) of hospitals. Inpatient data (which also include hospital discharge data) describe those injuries severe enough to require admission, while ER data also capture the less serious injuries that still need some attention. While hospital discharge data is more likely to be universally available, rates may be heavily biased by the quality of services - countries and institutions with more advanced health care services are expected to have lower hospitalization rates. Therefore, comparing the latter across countries may result in misleading conclusions. In most settings, all injuries enter the health care system via the ER, therefore, ER-based indicators will be more robust as coverage is more complete (not restricted to only the more severe cases) and not influenced by quality of care. As for mortality data, the utility and comparability of ER data are increased when they are coded using universally accepted definitions and coding conventions such as the International Classification of Diseases and Injuries in its ninth or tenth revision (ICD-9 and ICD-10). Table 3 lists the low-to-middle income countries by WHO region where, according to WHO focal points, some form of ER-based injury surveillance is under way, which in most instances involves municipal or provincial level coverage only, and usually for intermittent time periods. The data yielded by these systems are not collated by WHO and must be obtained from the principal investigators on each project.

Table 3. Low-to-middle income countries by WHO region in which focal points indicate ER-based injury surveillance activities are under way

AFRO	AMRO	EMRO	EURO	SEARO	WPRO
Ethiopia Ghana Mozambique Kenya South Africa Uganda	Argentina Brazil Bolivia Colombia Costa Rica Ecuador El Salvador Guatemala Honduras Jamaica Mexico Nicaragua Panama Paraguay Peru	Egypt Iran	Belarus Lithuania Russian Federation Turkey	Bangladesh DPR Korea Maldives Myanmar Nepal Timor Thailand	Cambodia Vietnam China Mongolia

Data on self-reported violent victimization are collected by means of surveys. From a public health perspective, GSHS and STEPS are the most relevant surveys (see earlier section on risk factors for country coverage).

Practical steps for developing a system to track armed violence worldwide

The data availability review highlights the wide differences that exist between regions, countries and types of indicator, and shows that data by which to calculate global baseline values for any indicators of armed violence are lacking. For homicide rate, the most widely available indicator, it is possible to calculate baseline values for the WHO regions of the Americas and Europe, and for violence prevention and victim care capacity, baseline values can be calculated for Europe only.

For developing a system to track violence worldwide, the review suggests that, despite major regional gaps in coverage, existing WHO datasets and WHO-coordinated surveys contain a good deal of the information needed to design and test some of the proposed public health indicators for violence prevention and response capacity, risk factors, and outcomes. WHO therefore should be supported to improve access to its existing data holdings, and to ensure that as new information initiatives are planned and implemented, items addressing violence are included. Concerning the three categories of violence indicators discussed in this paper, WHO should be supported to undertake the following practical steps. Ideally, this should be done within the framework of the WHO Global Health Observatory that is currently being developed, so that once violence indicators are included, the relationships between them and other health outcomes can be more readily explored.

Violence prevention and victim care capacity

- Using the WHO European regional template, design, pilot and implement a questionnaire-based survey of country violence prevention in the remaining five WHO regions.

Risk factors for violence

- Specify content, methodological (especially sampling), and repeatability criteria for surveys to be considered as potential indicator information sources.
- Identify completed surveys that have asked relevant questions, request and obtain information about methodology and repeatability, and screen out all instances that do not meet criteria for representivity, validity and repeatability.
- For the remaining surveys request and obtain the data and use it to calculate trial indicator values for the countries where the surveys were implemented, and statistically explore how these values relate to other relevant indicators as a means of testing their validity.
- For societal-level indicators (e.g. Gini coefficient, unemployment rates), identify those sources that experts consider to be the most valid and reliable.

Incidence rates for violence

- All available country cause of death (COD) stats can be downloaded from the WHO web site, and can be used to calculate homicide rates by age and sex (the most recent available year will vary between 2008 and 2004).
- A smaller subset of the above, for around 40 mainly high-income countries, can be used to calculate firearm related mortality rates by age, sex and manner of death (i.e. homicide, suicide, unintentional, undetermined; the most recent available year will vary between 2008 and 2004).
- For countries without COD stats, WHO GBD country level estimates have sometimes been used as a proxy for homicide, suicide and war-related deaths (e.g. see UNODC's compilation of international homicide statistics, at <http://www.unodc.org/documents/data-and-analysis/IHS-rates-05012009.pdf>). However, the WHO GBD team strongly cautions against using these estimates as proxies for actual homicide rates owing to the wide uncertainties attaching to the estimates.
- Health services information about non-fatal violent injuries is currently only available through special literature review, primary research strategies and ad hoc requests to local surveillance system managers.
- For survey information about non-fatal violent victimization, see the preceding note on risk factors for violence.

Other UN agencies, such as UNODC, are likely to have complementary information about criminal justice system capacity, and risk and outcome indicators derived from national police and criminal justice information systems. As for WHO, they should be supported in efforts to ensure that these data are made more accessible and that as they are designed and implemented questions relevant to violence are included in new information systems.

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