

Aiming for Prevention: Medical and Public Health Approaches to Small Arms, Gun Violence, and Injury

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The level of global small arms violence is enormous and the scale of human suffering it causes is immense, although poorly counted. It causes at least hundreds of thousands of deaths and more than a million injuries each year, as well as permanent physical and psychological damage, destruction of families, lost productivity, and diversion of resources from basic health services. Research is required on three basic issues, as follows: health effects of weapons; the contributing factors and causes, including behavioral issues; and impacts of interventions and their cost-effectiveness. Policies and programs designed to reduce the human and social impacts of small arms should make use of public health knowledge and analysis of risk factors as a means of bringing increased focus and effectiveness to their objectives. At its international conference on small arms, gun violence, and injury, "Aiming for Prevention" in Helsinki in September 2001, International Physicians for the Prevention of Nuclear War called on health professionals as well as scientists, activists, humanitarian and development workers to contribute to an effective confrontation of the small arms pandemic.

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"Sometimes patients will come six or seven in number, and you have one operating room, and so it's difficult to prioritize because all of the injuries are severe. When they brought these patients in from a drive about four hours away after the 22 people were shot, five of those patients were under the age of five. There was one child that needed a colostomy, the child is only three years old. And you're prioritizing between a three-year-old and a six-year-old. I mean, it's ridiculous."

Olive Kobusingye,
surgeon and epidemiologist, Uganda (1)

For two decades, International Physicians for the Prevention of Nuclear War organization has advocated for a primary prevention approach to weapons that cause massive, indiscriminate human suffering and casualties that overwhelm capacities for medical treatment. With the intensity of modern conventional weaponry and war, International Physicians for the Prevention of Nuclear War organization's call for prevention has extended from nuclear weapons to weapons such as small arms. International Physicians for the Prevention of Nuclear War views warfare as interconnected on a spectrum of violence, with smaller wars and weapons escalating unpredictably to larger ones. Thus, working to prevent war with small arms is crucial to the overarching effort of preventing nuclear war.

Small arms and gun violence is manifest in vastly different ways – from war and mass violence to individual acts of murder and suicide. Despite this range of use, violence with small arms has common features, such as lethality – small arms tend to increase the chance that an act of violence will end in a fatal outcome; medical burden – attempts to restore the health of victims of small arms violence are challenging, time consuming, and costly; and preventable – on the whole, small arms violence is preventable. Primary prevention is the most appropriate way to deal with a problem causing massive casualties worldwide.

This report attempts to clarify the tools and resources necessary to take a health approach to small arms and gun violence in local and international settings. The term "small arms" herein refers to those conventional firearms characterized as available, affordable, easy to use and transport by one or two people, and capable of causing severe, lethal injury. It addresses both military and civilian arms of such definition, including assault rifles, handguns, grenades, mortars, long-guns, and others.

This report recognizes the diversity of the problem and the need to tailor local interventions to meet local circumstances. It also acknowledges the global connections of the networks and sources that supply the weapons and the international nature of the politics, economics, and population flows that underpin the problem. Therefore, global dialogue among health

professionals is necessary to inform local efforts, and international coordination is necessary for sharing information, tools, resources, and strategies.

Knowledge and Research

The level of global small arms violence and the scale of human suffering it causes is poorly counted. But it is known to cause at least hundreds of thousands of deaths and more than one million injuries each year, as well as permanent physical and psychological damage, the destruction of families, lost productivity, and the diversion of resources from basic health services. Research is required to provide useful estimates based on solid data.

Aggregate Data from "Organized Settings"

World Health Organization (WHO) released a report "Small Arms and Global Health" in July 2001 (2,3), which compiled official data from 48 countries representing about one fifth of the world population. It showed that (a) 100,000 deaths per year are caused by small arms and gun violence; (b) in high income countries, most firearms deaths are suicides (about 70%), whereas in middle and low income countries most are homicides (about 75% and 90%, respectively), with the USA and Brazil both having aberrantly high rates of homicide; (c) small arms are the leading means of homicide in some areas of high gun violence (80% of total in Cali, Colombia, and 66% in Durban, South Africa), they are the leading cause of all fatal injuries, more numerous than traffic accidents, for South Africans between 15-64 years of age; (d) adolescents and young adults are at highest risk, and men are at significantly higher risk than women; and (e) non-fatal outcomes, ie, injuries, occur several fold times more than deaths, require lengthy and costly hospital stays, and include mental health effects.

These figures outline a major health problem even without account of the remaining four fifths of the world population. Existing record-keeping is minimal to non-existent in many poor countries, especially those with humanitarian crises and armed conflict.

Data from "Disorganized Settings"

The International Committee of the Red Cross maintains a database from its participating hospitals located in conflict zones around the world. Other than this unique resource, most research in areas of humanitarian crisis is limited to local studies by independent researchers or humanitarian programs. In one case of armed conflict, a 9-month outbreak in the Ogoni region of Nigeria in 1993-1994, the short- and long-term effects were noted first hand by a practicing doctor (Table 1) (3).

Categories of Health Impacts

Health impacts can be grouped into direct and indirect effects. Direct health effects of arms are death, injury, disability, mental and emotional consequences, fear and stress, whereas indirect effects on individuals are forced displacement, kidnapping, forced recruitment, sexual assaults, torture, reduced

Table 1. Short- and long-term health effects of 1993-1994 armed conflict in Ogoni region of Nigeria

Immediate effects on health and health services	Long-term effects on health
<ul style="list-style-type: none"> - 3,000 victims of armed violence, of which 250 died and 1,000 required amputation - many cases of sexual violence and torture - public hospitals closed - ambulances stopped running - preventable disease, such as malaria and diarrhea, went untreated - medical resources were diverted to treatment of gun injuries and infectious disease - medical research stopped - immunization stopped 	<ul style="list-style-type: none"> - mental health effects - apathy, alienation, withdrawal, hopelessness, and post-traumatic stress disorder - poverty families sold farms to pay for medical treatment, or head of household was in hospital and family relocated to care for him - medical research stopped - unresolved grief and social pathologies

access to health services, infectious disease, and malnutrition. Distinctions should also be made between externally or objectively measurable effects, such as physical injury, and subjective effects, such as fear and stress. Such effects can be assessed through both quantitative and qualitative data. Effects on health services are depletion of health resources, cessation of health services, destruction of health infrastructure, targeting of health personnel. Health effects in terms of personal and societal costs are potential life years lost, potential productivity lost, reduced personal mobility, reduced family income, and decreased development.

Research Challenges, Tools, and Techniques

Comprehensive surveillance of injury and mortality includes collection of data on factors such as the nature of injury, cause of death, make and origin of the weapon, circumstances of the event, and victim/perpetrator relationship. Surveillance of indirect health effects, including mental trauma and social costs, must identify suitable indicators for measurement. Data can be collected from various sources, such as medical and humanitarian (hospitals, forensic pathology, and humanitarian agencies), law enforcement and government (police, coroner, agency monitoring firearms, and military), and other community sources (newspapers and media, interviews, and surveys).

Collecting and handling data entails many challenges. First, data provided are often unreliable and inconsistent. Second, agencies differ in definition of terms and research methods. Third, geographic coverage of the data is not complete, with an urban bias in many countries and a higher-income bias internationally. Fourth, there are some cultural aberrations in reporting, e.g., in some Latin American countries suicides are under-reported, whereas accidental deaths are over-reported. Lastly, language groups differ in their definition of terms, e.g., in the Spanish language, the term "homicide" is often used to describe involuntary manslaughter as well as intentional homicide or murder.

Examples of comprehensive injury surveillance projects in South Africa (4) and Wisconsin, USA (3),

illustrate the additional logistical challenges that research projects must overcome. Most notably, research is resource intensive and requires a long-term commitment of funds and effort. Research projects require the involvement or approval of multiple agencies with differing agendas, some of whom may initially be suspicious of the goals of the project or deny access to researchers. A lack of detailed information on the make and origin of firearms used in injuries presents a barrier to research.

In disorganized settings, such as poor countries in humanitarian crises, additional logistical challenges may include dynamics such as that described for the Congo DR: territory may be divided and controlled by warring parties, researchers may be suspected of espionage, health infrastructures may be ruined and their data rendered invalid, and communication and transport may be lacking (by road, air, and telephone) (5).

A significant body of research exists in low-income states and war-affected regions that is of high quality but poor presentation. Researchers lack the resources to refine and distribute it, and so it fails to reach the mainstream international medical journals and indexes.

Recommendations for Research

Research is required on three basic issues, as follows: 1) the health effects of weapons; 2) the contributing factors and causes, including behavioral issues; and 3) the impacts of interventions and their cost-effectiveness.

Efforts should be made to establish common nomenclature, guidelines for research and measurement, and uniform reporting methods; a research information network should be developed.

Special effort is required to collect data from "disorganized settings" – areas of extreme resource constraint and humanitarian crisis – and to help strengthen record keeping systems. Dialogue and capacity building is especially needed among practitioners and researchers from these areas.

Medical journals in small countries or specialized fields can function as "shepherds", not just "gatekeepers" (6), to assist in the refinement and presentation of research from under-served areas, such as poor countries and areas of humanitarian crisis.

Funding for public health research of small arms should be a priority for the donor community, with recognition of the necessity for long-term research, and a commitment to quality analysis of collected data.

Linked data systems should be employed combining data from medical examiners, coroners, law enforcement, and including background information about the firearm used, and the relationship between the victim and perpetrator.

Measures are needed to improve access to information about firearms used in injuries. First, a standardized system of marking firearms should be established and linked to records about the gun's features and history. Such data should be available to public health agencies from any country. Second, policies

are needed to ensure that firearms used in injury are fully investigated as to their model, features, and origin.

Analysis of Risk Factors

Collected data are useful for analyzing trends, whether on a global or local scale, and for focusing policy interventions. Data can be analyzed to identify trends for risk incurred by whom, when, where, and from what type of weapon, as it is done by the South African National Injury Mortality Surveillance System (Table 2) (4).

Table 2. Risk factors for firearm injury in South Africa, as identified by South African National Injury Mortality Surveillance System (4)

High-risk groups	Times and places of high risk
– youth	– weekends (40% of all firearms deaths)
– men (80% of all firearms deaths)	– firearms death rate increases as year progresses
– blacks at higher risk for homicide	– firearms death rate higher after 7:00 pm
– whites at higher risk for suicide	– in private homes (44% of all firearms deaths) and on road or street (23%)
– alcohol (in 40% of all firearms deaths)	

Though comprehensive aggregate national data are unavailable for disorganized settings, more localized studies provide insights into trends. International Committee of the Red Cross studies in Cambodia that inquired into the combatant or civilian status of the weapon-injured person led to the finding that civilians were being targeted not only by artillery and mortar fire in combat, but also by handguns used in interpersonal disputes unrelated to combat. Further study in Cambodia and Afghanistan showed that in the absence of a post-conflict disarmament program, the rate of gun injury did not decrease significantly after the cessation of armed conflict (3).

A number of local pioneers in the field of public health have initiated injury surveillance projects of varying scale in countries such as Brazil, Bangladesh, Cambodia, Uganda, Canada (3), Finland (7,8), and Honduras (9).

Categorizing Risk Factors

Various models may be used to analyze risk. An "ecological" model presents several levels of society where risk factors and the qualities associated with high risk can be identified, as follows: (a) societal (availability of firearms, economic disparity, ethno-cultural heterogeneity, social acceptability, and impunity); (b) community (low cohesion, negative peer influences, and isolation of women), (c) family (poor family cohesion, poor monitoring of children, and male control of household); and (d) individual (young, male, alcohol, victimization, and firearm in the home) (3).

An analysis of risk factors associated with international small arms violence suggests that the societal level can be further broken down into international (presence of illicit arms networks, narco-trafficking,

and organized crime networks), national (failure of state to protect human security, and weak law enforcement), and inter-community (traditions of inter-ethnic raiding).

Identifying Key Risk Factors

Research studies that compare countries, cultures, and households that are similar for all but one variable, and research that compares a region before and after modification of a variable (e.g., through legislation), help to illuminate the importance of specific risk factors.

Availability

Availability of firearms, or access to them, is described by some as the "universal" risk factor, in other words the one that is critical in all forms of gun violence regardless of the context. Many studies have suggested that access to firearms increases the *lethality* of violence, raising the probability that an act of violence will result in death. Others have shown that reducing access to firearms also reduces the *frequency* of acts of violence by showing that the "substitution" effect – the resort to alternate tools of violence in the event of blocked access to firearms – is inconsistent at best. In discourse about small arms, efforts to address the availability of small arms are called "supply side" efforts.

Human Insecurity

Human insecurity, or the lack of protection by other means, is viewed as the root motive for the ownership and use of small arms. Such insecurity can arise from many causes (Table 3).

Table 3. Factors associated with human insecurity as a root motive for ownership and use of small arms

Factor type	Example
Economic disparity	gap between rich and poor, General Index of National Inequalities (GINI, ref. 10)
Poverty without recourse	refugee camps
Ineffective law enforcement	under-resourced, absent, or corrupt police (police forces "leasing" guns to bandits for use at night, as a source of added income)
Failed, weak, or corrupt states, ie, states unable or unwilling to prevent gun violence	in "shadow states", a ruling party may view a well-functioning government bureaucracy as a threat to its power base, and may prefer to run the government as a profitable enterprise
Resource predation by external actors	transnational corporations, and oil companies in conflict with populations over rights to land

In small arms discourse, efforts to address the human insecurity leading to arms use are called "demand side" efforts.

Social Acceptability

Social acceptability includes attitudes, cultural beliefs, and behavioral factors. Various types of social acceptability apply the following: (a) "cultures of honor", or vendetta cultures (e.g., codes to avenge dishonor with violence or reciprocal violence, which

includes honor killings of women and inter-gang killing); (b) acceptability of killing (e.g., in defense of property, family, or against criminals); and (c) gun traditions (e.g., guns as a rite of passage or a symbol of group identity). Efforts to address the social acceptability of arms use are also called "demand side" efforts.

Identifying Groups Vulnerable to Direct and Indirect Health Burden from Small Arms

Although young men are effected directly by gun violence in greatest numbers, other groups are at high-risk for specific types of armed attack, or bear a great deal of indirect burden from small arms violence.

Women. Women are targeted for specific types of violence, such as sexual attacks. Compared with men in some studies, women are more likely to be attacked by someone they know. They bear the brunt of economic burden when spouses and children are killed and shoulder a great deal of the challenge of maintaining social and community cohesion.

Children. Children are at risk of being forcefully recruited as child soldiers, exploited sexually, or kidnapped to extract ransom from families. Children are especially affected by psychological trauma, given their early stages of mental development, and inherit the societal legacies from mass violence.

Refugees and internally displaced persons. Refugees may arrive at camps bearing arms used in a previous context, but are sometimes scapegoated unfairly as a source of weapons by host communities. They may bring their political differences to the new site and have conflict with fellow refugees or their host community. Without income sources, they may resort to selling arms to members of the host community, even if their camp is at risk of being targeted. Refugees often suffer from associated health problems of malnutrition and infectious diseases. Internally displaced persons are not protected by international conventions on refugees. There is no international coordinating mechanism or organization to defend the rights and interests of internally displaced persons. As such, they suffer many of the same problems as refugees, and are particularly susceptible to state predation, collapse, or repression.

Recommendations

Data collection on small arms violence must be accompanied with careful analysis of the risk factors attending such violence. Researchers should attempt to understand the factors that are most causal and the most preventable or susceptible to intervention. Policies and programs designed to reduce the human and social impacts of small arms should make use of public health knowledge and analysis of risk factors as a means of bringing increased focus and effectiveness to their objectives.

Prevention Through Policy and Programs

Information from public health research and analysis does not directly lead to evidenced-based decision-making. Instead, preparatory work is required to find audience with policy-makers, develop their

acceptance for public health input, and overcome the reflexive retort "Don't confuse me with the facts. My mind is already made up" (3).

Effective Preventive Action

Effective prevention action, whether in policy advocacy or field programs, requires knowledge, a mobilized constituency or popular base, and clear, precise objectives. It is widely accepted that there is some level of legitimate use of small arms for military, law enforcement, and civilian professional and personal purposes. In addition, small arms are present at every level of society, and their use is not easily controlled by legislation alone. Thus, in general terms, to reduce injury from small arms does not call for a ban, but wise norms and regulations on appropriate possession and use.

Norms and regulations are needed to establish criteria and enforce the appropriate: 1) acquisition, possession, carrying, and use of small arms, 2) supply, trade, and transfers of small arms, 3) penalties for violations of the above norms. Such norms need to be operative at international and national levels through treaties and legislation, but must also function at the level of the community, family, and individual through cultures, beliefs, and norms for responsible behavior. Research among pastoralist clans in the Horn of Africa, for example, observed intra-clan use of small arms as closely regulated by indigenous clan codes and penalties, although, by contrast, inter-clan violence remained a major problem (11).

Policies and Programs to Mitigate Risk Factors for Small Arms Injury

Availability, or "supply" of small arms. Measures to reduce access to small arms are possible at several levels and focused on reducing the lethality of violence but not necessarily its frequency (Table 4).

Table 4. Type and application of targeted controls on firearms

Type of limitation	Application of limitation (examples)
General access	increase the screening or cost required to obtain a weapon
At-risk access:	
by risk group	safe storage (for the risk group of children)
by time	weekend restrictions on carrying guns, as in Bogota and Cali, Colombia
by place	gun-free zones, as in South Africa; no firearms in bars and taverns
Reduce surplus	post-conflict weapons collection and destruction programs
Prevent diversion to illicit market	domestic and international efforts for controls of illicit trade, and verification of end-users
Prevent supply to inappropriate users	establish human rights and humanitarian criteria for restrictions on legal arms transfers

Preventing diversion and misuse: realities of supply both legal and illicit. Recent global negotiations at the United Nations produced a legally-binding agreement on controls of non-state, illicit firearms production and transfer (Firearms Protocol, UN International Convention against Transnational Organized Crime available from: http://www.undcp.org/crime_cicp_convention.html), and a politically-binding statement on the control of illicit arms transfers (Program of Action,

UN Conference on the Illicit Trade in Small Arms and Light Weapons in All its Aspects, available from: <http://www.state.gov/t/pm/sa/unconf/>). Both are important steps, but recent research shows that state-authorized, legal transfers constitute the major source of supply, and the number of small arms-producing countries increased to 64 in the 1990's, including high- and low-income countries (3).

Arms are an instrument of political power, employed for diplomatic, strategic, and economic reasons. The world's most powerful governments are also arms producers. For this reason, to engage a serious debate on policies of legal arms transfers, an unprecedented mobilization of credible information and political constituencies is required.

Existing international law describes norms and responsibilities for states engaged in legal arms transfers, but such norms need to be clarified, observed, and enforced. One such effort, a campaign for a Framework Convention on International Arms Transfers led by the Arias Foundation and other nongovernmental organizations, seeks to clarify existing international law and its application to human rights and humanitarian concerns (3).

Human insecurity and social acceptability, or "demand" for small arms. Work to reduce demand for small arms may involve traditional humanitarian, social development, and education projects, but includes a focus on understanding and addressing the specific reasons for weapons possession and use in a community or culture. Such work aims not only to reduce the lethality of violence, but its frequency as well. Efforts to address human insecurity include initiatives for economic development, education, security sector reform, human rights protection, good governance, and effective justice systems. Efforts to address social acceptability include surveys of attitudes, engaging with cultural traditions, and public education.

Example of interventions addressing both supply and demand risk factors. The organization Viva Rio, based in Rio de Janeiro, Brazil, combines a public health approach with community-based organizing to impel policies and programs to reduce small arms violence (Table 5) (3).

The projects of Viva Rio have had success in reducing risk factors for gun violence, including a zero-

Table 5. Examples of targeted interventions from Viva Rio, Rio de Janeiro, Brazil

Risk factor type	Targeted risk area or issue	Intervention
At-risk group	young, urban men	provide fast-track adult education to enable social mobility
High risk locality	favelas, or shantytowns	collaborate with police force to prioritize gun violence prevention, provide 24-hour presence, and follow-up with economic development programs
Availability of small arms	domestic arms production and illegal smuggling from neighboring country	promote domestic controls and oppose international arms transfers to neighboring country

injury rate for the high-risk *favela* during its first project year, government-sponsored public events of weapons destruction, and national legislation.

Evaluation

A crucial component of public health intervention is the process of evaluation of effectiveness. The complex web of risk factors must be assessed, including cultural attitudes toward weapons and levels of human insecurity. For example, efforts at weapons collection may be ineffective where human insecurity and demand for arms is very high. Increasing resources for law enforcement may fail without addressing issues of corruption in the force and mistrust in the community. Following intervention, research of results and evaluation of methods is necessary.

Recommendations for Prevention

Combined, Focused Action on Supply and Demand Factors

Rather than debating the primacy of supply vs. demand factors, both types of factors should be addressed simultaneously. "Supply side" efforts reduce the presence of lethal weapons and create an environment more conducive to demand reduction work. "Demand side" efforts reduce the dependence on and market for small arms and thereby create an environment more conducive to reducing supply. To achieve focus for local action, proper public health analysis should identify the salient risk factors for a specific area and tailor policy to address those factors. The previous example about Viva Rio illustrates such a combined approach (3). Global coordinated action on both supply and demand factors is possible.

Set Norms and Regulations Appropriate to Health Concerns

Norms and regulations from the international to the local level define boundaries of responsible use of small arms. Health professionals play a crucial role at multiple stages in renegotiating those boundaries to enhance health and safety.

Reframe the debate. The problem of small arms is fundamentally a health and humanitarian problem. Law enforcement and national security strategies are not sufficient to ensure effective prevention of injury and death. A paradigm shift must be engaged to view the problem as a health issue, ie, an epidemic, to be managed urgently with public health and humanitarian expertise.

Advocate measures to allow sufficient access to data. Public health research requires access to relevant data kept in records of law enforcement, military, and other agencies. Linked data systems and informative serial numbers applied to automobiles have been instrumental in efforts to research and reduce traffic accident injuries in the United States. A similar system of transparency, with data-sharing and standardized marking, is necessary for small arms and their associated injuries.

Question the norm – shift the burden of proof. Descriptive epidemiological information coming from conflict areas can call into question whether policies

of arms transfer and military intervention are actually helping their ostensible intended beneficiaries. As occurred with the issue of landmines, credible, non-exaggerated medical research may ultimately put the burden of proof on military and government authorities to document why a particular use, transfer, or type of weapon is necessary.

Propose higher standards or better enforcement of existing norms. Public health and medical organizations can inform local, national, and international advocacy efforts for legislation to restrict arms transfer and use based on considerations of health and human security. Existing international law, including humanitarian and human rights law, provides an initial basis for such considerations, but measures must be clarified, elaborated, and enforced by the international community. Ongoing education and development work can help redefine norms for responsible and ethical use of weapons at the cultural and individual level.

Monitor and evaluate progress. An effective, coordinated medical and public health network for research and analysis can provide accurate monitoring of efforts to reduce the health impacts of small arms. Such a network can evaluate progress and setbacks in the field based on rates of health impact, and can play a "watchdog" role by alerting attention to cases where policy measures are ineffective or counter-productive in reducing injury and death on the ground.

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This editorial attempts to not only accurately convey the salient themes of the presentations, but also to conceptually organize and interweave them into a common framework. Presenters covered an unusually wide range of topics, from war killings amid extreme poverty to individual acts of suicide among affluent populations. Thus, the author's task was to discern and highlight common themes and relationships between concepts ordinarily left separate. The author hopes that this editorial may provide a conceptual framework useful for preventive health approaches to gun violence at a local and international level anywhere in the world.

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