ACCESS TO MEANS SUCH AS ALCOHOL, DRUGS AND FIREARMS, AND BUILT ENVIRONMENT CHARACTERISTICS: IMPLICATIONS FOR CITIES WITH HIGH RATES OF VIOLENCE

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BACKGROUND PAPER

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Introduction

Individuals grow and develop through a dynamic interrelationship between them and within the different contexts in which they live. These complex factors can have a positive or a negative effect among people. An extreme manifestation of negative consequences is the perpetration of violence and it is important to understand how this phenomenon occurs. This complexity can be better explained and hence prevented within a solid theoretical framework such as the socio-ecological model (Bronfenbrenner, 1979). This model allows us to explain and understand violence contextually and as a phenomenon expressed in different ways through events that are modulated by individual, family, community, and social factors.

A. Individual-level Factors: Several individual-level factors may influence the likelihood that individuals get injured in violent events. Increased vulnerabilities (physical or psychological), perceptions, attitudes and behaviours can vary depending on age and gender factors and consequently modulate the likelihood of a violent outcome affecting a person or a group of people. Individual biological and personal characteristics include age, sex, educational attainment, income status, physical or psychological impairments, use and abuse of substances and previous exposures to violence or maltreatment and neglect.

B. Family-level Factors: These can influence the risk of violence in the home and include certain parental behaviours and poor parenting practices, parental mental health issues, parental substance use, parental use of or carrying of firearms, or witnessing violence at home.

C. Community and Institutional-level factors: Exposures to violence in school settings or in neighbourhoods can increase the risk of violence against children. Many community and neighbourhood characteristics include poverty and increased social vulnerability, geographic segregation, physical environments with certain characteristics, high population density, increased rates of transient populations linked to low social cohesion, and local increased rates of crime. Increased interpersonal violence injuries have been associated to lower educational levels and occupational social class mostly during childhood and youth (Cubbin, LeClere, and Smith, 2000; Dougherty, Pless, and Wilkins, 1990).

D. Social-level Factors: In addition to individual, family, and community or neighbourhood factors, larger social factors play an important role in changing the risk of violence among populations. The presence of policies increasing inequalities that affect health, education, access to work and employment opportunities, as well as gender inequalities, have been associated with increased rates of violence. Conversely, the absence of adequate social protection for vulnerable populations, poor enforcement mechanisms, weak or absent justice systems, weak accountability systems and poor governance either endemic or as a
consequence of conflict and disasters have also been linked to increased likelihood of different expressions of violence.

Preventative actions consequently have looked also at interventions either within each of these different levels or in a few cases interventions that aim at addressing factors at different levels. Interventions aimed at preventing violence can also focus on three different types of approaches or a combination of them. These include interventions aimed at modifying behaviours, interventions aimed at changing the social or the physical environment, and interventions aimed at controlling violence through legislative and enforcement approaches. Studies have looked at multiple contextual social factors including socio-economic status (Kim, Subramanian, Kawachi, and Kim, 2007; Simpson, Janssen, Craig, and Pickett, 2005), social disparities (Shenassa, Stubbendick, and Brown, 2004), and social neighbourhood effects (Sellstrom and Bremerberg, 2006), and their association with different injuries and violent outcomes (Sampson, Raudenbush, and Earls, 1997) and designed interventions to modify risk factors. Other studies have focussed more on individuals or their families and their behaviours linking the perpetration of violence to previous exposures to abuse or neglect in early life (Sullivan, Kung, and Farrell, 2004) or to the biological consequences of abuse and how it can affect brain development (Andersen, Tomada, Vincow, Valente, Polcari, and Teicher, 2008; Panzer, 2008) or epigenetics (Tyrka, Price, Kao, Porton, Marsella, and Carpenter, 2010; Shalev et al., 2013). Studies that have focussed on enforcement and legal interventions are usually aimed at entire populations though in many cases they specifically address children.

Many interventions addressing legal approaches have focussed on changing risk factors that increase the lethality of violent behaviours or reduce the likelihood of high-risk behaviours associated with violent outcomes. It is these types of legal and enforcement interventions that are the main focus of the first part of this paper. This first part synthesises findings that show that reducing or changing access to means can be an effective tool in preventing violence or reducing the likelihood of severe outcomes of violence. The focus of this section is on exposures to alcohol and the incidence of violence as well as effective interventions aimed at controlling alcohol and reducing violence, exposures to drug abuse and violent behaviours, engagement in drug markets and the effect of illegal drug markets in the perpetration of violence, and the availability of firearms and their relationship with increased likelihood of lethal violence.

The second part of this paper focusses more on the existing evidence of interventions aimed at changing the physical environment. The premise here is that the physical environment modulates behaviours in certain ways by either favouring or hindering certain behaviours by design. Consequently, studying the characteristics of the built environment can be informative for prevention but also intervening in certain modifications of the physical environment can reduce the likelihood of violence in communities. These interventions are a complement to all other interventions at the individual, family, and community or institutional levels.
Access to Means

There are three important exposures that have a large global impact on increasing the occurrence and severity of injuries due to violence. The largest one by far is the exposure to alcohol, which can have serious consequences on health and wellbeing from the prenatal stages and throughout the lifespan. To a lesser degree in terms of overall magnitude other substances (i.e. drugs – legal or illegal), can alter behaviours, family interactions, communities and whole societies. Both of these exposures are associated with the generation of addictive behaviours with well-documented physical and psychological consequences. A third exposure refers to firearms, which have the capacity to increase the lethality of violent acts and are associated with thousands of deaths yearly affecting mostly younger populations. These three groups of exposures are often related to each other and can interact to either increase the likelihood or violence in addition to its lethality in several ways.

From a policy, safety, legal, economic, and social and public health perspective, key measures for prevention would focus either on reducing, regulating, or impeding the access to these means. These measures, for example, can be oriented towards reducing parental exposures that have a negative effect on children and youth and family interactions in general, direct regulation that restricts access and exposures by youth, or restrictions in the delivery or availability of these means. There are, however, biological and legal differences between alcohol and drugs that add to the complexity of these problems. As for firearms, legal frameworks in specific settings can modulate what types of prevention efforts can be implemented or not. Fortunately, there is considerable international evidence suggesting that regulating firearm access can be associated with reduced lethality of violence. Following is a review of key preventative policies and interventions by type of exposure that highlight the wide array of possible responses that cities or countries can implement for the benefit of children and youth.

Exposures to Alcohol

According to the WHO, in 2012, about 3.3 million deaths, (5.9 percent of all deaths), were attributable to alcohol consumption (WHO, 2014). Among all populations, monthly binge drinking was reported to be more prevalent among young people ages 15–19 years old (11.7 percent) compared to the total population ages 15 years or older (7.5 percent) (WHO, 2014). Populations that are more vulnerable for individual, family or social reasons tend to be more likely to develop alcohol-related problems (Schmidt, Mäkelä, Rehm, and Room, 2010). Children and adolescents constitute two groups that are especially vulnerable (Midanik and Clark, 1995). In addition to this, early initiation of alcohol consumption in life (before 14 years old) is a predictor of negative health consequences linked to increased dependence, abuse at later ages (Agrawal et al., 2009) and is further complicated by the fact that youth typically are more likely to engage in risky behaviours and as noted, engage more frequently in heavy drinking episodes (U.S. Office of the Surgeon General, 2007).
Apart from individual behaviours, youth, especially at younger ages, are exposed to parental alcohol consumption. When alcohol abuse among parents is present, it tends to impact family environments negatively and can increase the probability that children will develop drinking problems. Furthermore, alcohol abuse among parents can negatively affect family interactions, parent and child communication and general parenting practices (Latendresse et al., 2008). Another consequence of alcohol abuse among parents is child maltreatment, physical and sexual abuse, and neglect, which can further increase children’s vulnerable states but also are associated with increased alcohol abuse later in life (Shin, Chung, and Rosenberg, 2016).

The abuse of alcohol has been associated with several expressions of violence throughout the lifespan. At early ages it has been linked to child maltreatment, sexual and physical violence among adolescent populations, and violence within the home (Butchart et al., 2006). Evidence suggests that alcohol consumption especially when associated with binge drinking can be linked to suicidal behaviours or perpetration of violence (Cherpitel, 2013). Consequently, policies and legislation that limit or regulate access to alcohol by children and adults alike are a sound strategy for prevention.

While there is considerable literature on all of the health and social and economic consequences of alcohol abuse, this section will focus more on interventions aimed at limiting alcohol exposures as a strategy to reduce the likelihood of occurrence of violent events either in the home, school, or the community with specific focus on legislative approaches. There are multiple types of alcohol laws or policies useful in preventing violence. These can include taxation measures, laws aimed at regulating retail sales, laws limiting blood alcohol concentration (BAC), underage drinking laws, alcohol control systems, alcohol beverage pricing, laws related to pregnancy and alcohol, and laws aimed at addressing healthcare and financing. An example of several of these laws can be found in the U.S. National Institute of Alcohol abuse and Alcoholism, Alcohol Policy Information System (Alcohol Policy Information System, 2010).

The effectiveness of these laws in preventing violence differs. Among all of the existing laws for controlling alcohol exposures, a review of 87 studies over several decades and in 12 countries stated that the most effective ones in preventing violence are increasing the price of alcohol, implementing restrictions on the days and hours of sales of alcohol and reducing the clustering of alcohol outlets. The same study shows unclear evidence from the effects of tax reductions, restriction of on-premises re-entry, and different outlet types on violent crime (Fitterer, Nelson, and Stockwell, 2015).³⁴

**Increasing Prices of Alcohol**

A study from the USA reported that a 1 percent in state level excise beer tax was associated with a 0.33 percent reduction in child abuse rates (Markowitz and Grossman, 2000) and 3.10 percent to 3.50 percent reduction in domestic abuse cases (Markowitz, 2000). Conversely, a study from Finland showed that reduction in alcohol prices led to increases in alcohol-related hospitalisations in 16 percent (4.8 monthly hospitalisations) among persons 15-39 years old (Herttua, Mäkelä, and
Matikainen). A study from England and Wales showed a significant association between the price of beer and violent events reporting that increases in price were related to reduced violence, assaults, and the probability of being assaulted (Sivarajasingam, Matthews, and Shepherd, 2006). Other studies showing relaxation of taxes failed to demonstrate significant changes in violence (Gustafsson and Ramstedt, 2011).

**Modifying Trading Hours of Alcohol Outlets**

A study from Cali, Colombia concluded that changing by two hours the closing time for alcohol outlets reduced homicide by 25 percent in that city (Sanchez et al., 2011). A study from Australia showed that late trading was associated with both increased violence and increased levels of alcohol consumption. The study suggested that greater numbers of patrons and increased levels of intoxication contributed to the observed increase in violence (Chikritzhs and Stockwell, 2002). Two studies from Brazil showed significant reductions in homicide by reducing alcohol trading hours in the cities of Diadema and Sao Paulo respectively (Duailibi et al., 2007). The studies that showed increased violence with longer trading hours highlighted that most of the populations involved were younger and had higher levels of BAC.

**Reducing Alcohol Outlet Density**

There is considerable evidence focused on understanding the effect that alcohol outlet density has in relation to violent events (Gorman, Zhu, and Horel, 2005, 2004; Laranjeira and Hinkly, 2002; Livingston, 2008, 2010, 2011). These interventions are focused more on applying land use policies that foster or hinder such concentrations in urban settings and consequently modulate violence. Existing literature on alcohol outlet density and injury events has focused mostly on establishing the association of density of outlets with underage drinking (Chen, Grube, and Gruenewald, 2010; Chen, Gruenewald, and Remer, 2009; Freisthler, Byrnes, and Gruenewald, 2009; Kuntsche and Kuendig, 2005; Reboussin, Song, and Wolfson, 2011) or with violence-related outcomes, including violence in the home but evidence is mostly from high-income countries. A systematic review of 10 alcohol outlet density studies in relation to alcohol related harms found that there is evidence suggesting a correlation between increased alcohol outlet density and violent events (Campbell et al., 2009). Studies have shown that a density of less than 25 outlets per postal code in the USA was associated with less violence in the community and in the home (Livingston, 2008; McKinney et al., 2009).

A U.S. Centers for Disease Control task force concluded that there is sufficient evidence that increased alcohol outlet density is associated with greater alcohol-related harms (intentional injuries) (Task Force on Community Preventive Services, 2009). A second systematic review of 44 studies also reported a similar association between increased alcohol outlet density and increased alcohol-related harms (Popova et al., 2009). Despite the large number of studies evaluating alcohol outlet density and alcohol-related harms, with few exceptions, researchers have not accounted for socio-
economic characteristics of the locales where the outlets are located (Zhu, Gorman, and Horel, 2004; Gruenewald et al., 2006). Moreover, most of this research has not been conducted in middle-income or low-income countries.

**Increasing the Minimum Alcohol Purchasing Age**

An important legal mechanism targeting younger populations is the establishment of minimum age purchase limits. These have been shown to be effective in reducing alcohol consumption among youth (Wagenaar, Toomey, and Erickson, 2005). A study of population of an American Indian tribe showed males and younger clerks were more likely to sell alcohol to minors (Lynne-Landsman et al., 2016). Additional research shows that setting higher age limits for legal drinking are more effective in deterring youth alcohol drinking compared to younger age limits (Wechsler and Nelson, 2010). Globally there is variability in such age limits. The majority of countries have established age limits for purchasing alcohol at 18 years. In addition to these laws, BAC laws that are stricter for younger individuals complement strategies directed towards limiting alcohol consumption by young persons. As with other legislations, the effect of these measures is also dependent on the degree of effective enforcement of these policies (WHO, 2014).

**Regulating Alcohol Serving Practices**

Previous research regarding alcohol server laws and injury outcomes is scant. Two reviews suggest that server-training programmes are effective in reducing patron intoxication (Shults et al., 2001; Ker and Chinnock, 2010). One study examined police-reported violence occurring in the alcohol outlets and found that an intervention including community mobilisation, training in responsible beverage service for servers and stricter enforcement of existing alcohol laws lead to a 29 percent decrease in violent events (Wallin, Norstrom, and Andreasson, 2003). There are also several evaluations of server training interventions, a few of which correlate findings to crime reductions and other injury outcomes (Felson et al., 1997; Holder et al., 1990; Lacey, Jones, and Anderson, 2000). There is also evidence that multicomponent community interventions (Ramstedt et al., 2013) might be effective in reducing sales to minors and improving identification of minors by alcohol servers (Wagenaar et al., 2000). A programme in Sweden, for example, reported an 8 percent reduction in violent events with a multicomponent programme (Brannstom, Trolldal, and Menke, 2016). When properly implemented and enforced, interventions regulating serving practices in outlets such as restaurants and bars can have positive effects in violence reduction (Trolldal et al., 2013). A study from Stockholm found that interventions with more effective enforcement of existing alcohol laws tied with server interventions and the use of doormen to screen potential customers in licensed premises, were less likely to sell alcohol to minors (Wallin and Andreasson, 2004).

Obtaining information from the population attending alcohol outlets (bars, night clubs, liquor stores) can provide useful insights into how the population perceives safety in relation to alcohol consumption as well as attitudes, knowledge, and reported practices in relation to alcohol control
measures. This is key to assess the likelihood that laws will be followed or not readily accepted and as such is also an important element for evaluating effectiveness. Passage of these laws in urban settings should not be done in isolation but thoroughly communicated and explained to communities overall. It is not uncommon that some of these measures will elicit negative reactions from owners of alcohol outlets. Owners of such outlets can be key allies for complying with not only server laws but also age limit laws and a variety of other effective measures. As such, these stakeholders are important so that evidence-based practices can be more effectively applied. This implies not only showing the benefits for health and society of controlling abuse of alcohol but also the economic benefits of prevention.

Overall, calculating the economic costs of alcohol use and misuse is important to effectively plan and prioritise city policies. To date, comprehensive cost-benefits analyses at city levels are scarce or non-existent but greatly needed. Indeed, these policies cannot be disaggregated from national and international policies. However, comprehensive evaluations should include all or as many measurable private and external costs and benefits as depicted in figure 1, adapted from the UK’s Cabinet Office Strategy Unit (Cabinet Office Strategy Unit, 2003).

Figure 1: Private and external costs and benefits of alcohol use/misuse

![Figure 1: Private and external costs and benefits of alcohol use/misuse](image)

Source: Adapted from UK’s Cabinet Office Strategy Unit (2003).
**Urban Strategies for Prevention**

The WHO has developed strategies that address the availability of alcoholic beverages, the demand for alcoholic beverages, appropriate responses to address the harms caused, and the need to develop mechanisms to facilitate and sustain efforts to reduce alcohol-related harm. Among these strategies, strengthening legislation and enforcement, the regulation of advertisement and production, raising awareness of alcohol problems, addressing drinking and driving, developing information systems, and providing support resources for community actions are key and necessary especially in settings where such legislation does not exist, is weak, or where enforcement is not sufficiently effective.

Still, as highlighted by the WHO and PAHO reports, actions to reduce alcohol related harms are insufficient. Currently, certain urban settings, or in some cases, countries, focus mostly on campaigns addressing youth drinking, alcohol and health, drink-driving, and social harm related to alcohol use highlighting domestic, sexual, or family violence. Legislation in many countries is applied at the national level with some exceptions of Federal nations that apply laws at subnational levels. Still, many of these laws can be supplemented, strengthened or enacted through city ordinances. At all levels there is still little information about how people perceive alcohol laws as a whole. Research suggests that perceptions of legislation as well as of enforcement can impact adoption and understanding these perceptions can facilitate prevention activities too (Lipperman-Kreda, Grube, and Paschall, 2010; Beck, Fell, and Yan, 2009). Ultimately, reductions in alcohol-related injuries and fatalities will come from the consumer and thus it is important to understand the factors that impact adoption of policies or safe drinking behaviour. However, the role of city governments in integrating or applying these laws affectively is key to modulate perceptions, consumption and compliance with the law.

**Exposure to Drugs**

As with alcohol, drugs can affect individuals from the prenatal stages, through childhood into adulthood and shorten the lifespan. The wide variety of substances that exist can have different physiological and psychological effects on individuals. However, exposure to addictive drugs in general, as in the case with alcohol, can produce long-lasting negative consequences for individuals, families, communities and societies alike. Parental substance abuse is associated with a more than twofold increase in the risk of exposure to both childhood physical and sexual abuse (Walsh, MacMillan, and Jamieson, 2003). The health and social consequences of drug abuse are also staggering and include use and misuse of legal and illegal drugs. Changes in pain treatment practices in the USA, for example, have greatly increased mortality due to use or misuse of prescription medications (REFS). Many of these prescription medications are addictive and hence pose the same threats as substances like tobacco and alcohol, both of which are associated with millions of dollars of expenditures and thousands of years lost due to premature morbidity and mortality. Some of the drugs available to youth or to parents can be cheap and easy to obtain. This situation adds to the high profits of an incredibly lucrative addition business.
As opposed to alcohol and tobacco, not all addictive drugs are legal. This poses additional challenges for measuring the magnitude of the problem, for controlling use, or for regulating or adapting interventions aimed at preventing drug abuse or reducing harm. A large group of drugs affecting some countries are legal prescription drugs. In the USA, these are mostly narcotic pain medications, while in European cities those, plus drugs linked to opioid substitution therapies for heroin, such as buprenorphine or naloxone which in some places have been linked to illegal consumption within highly regulated systems (Villaveces, Taylor, and Kilmer, 2013). It is also important to note that while many of these drugs create serious health and social problems, not all are linked to violence outcomes. Still, even those that are not, when consumed by parents, can seriously increase the risks and vulnerabilities of children and youth and secondarily their exposure to violence early on in life. The links between drugs and violence has been explained as violence coming as a direct consequence of ingesting drugs, violence as a result of addictive compulsive behaviour towards obtaining drugs or resources to acquire them, or systemic violence as a consequence of the social disorganisation and crime related to the manufacture and commercialisation of drugs.81 While it is well known that there is a relationship between drugs and violence, the nature of this relationship is still not clear.

**Drugs and Violence**

A recent review by McGinty and colleagues (McGinty, Choksy, and Wintemute, 2016) indicated that aggregate measures of controlled substance use were associated with increased interpersonal violence and suicide, but evidence regarding the relationship between specific substances and violence was mixed. It also reported that involvement in illegal drug sales was consistently associated with interpersonal violence. A few theories relating drugs to violence have been proposed especially in relation to illegal drug trade. The markets for illegal drugs operate without the usual protections against fraud and violence offered by the justice system in a city or a country.

A report from the US National Institute of Justice proposed four mechanisms that could explain the high rates of violence associated with illegal drug trade; a) The rates of violence are higher among persons ages 15 – 25. Young individuals are more likely to engage in risky behaviours and solve conflict through violence. Many sellers and distributors also tend to be young; b) Illegal drugs can be costly. A bag of cocaine or heroin can be worth thousands of dollars and this increases the risks for situational violence overall; c) Because of law enforcement activities, transactions are conducted under considerable uncertainty and enforcement increases the incentives for violence by raising the adverse consequences of identifying someone as a potential informant; and finally d) Users can be more violent and aggressive, and this encourages drug trade to happen in protected settings and under unreliable behaviours both from users as well as distributors, increasing the likelihood of retaliatory violence (U.S. Department of Justice Office of Justice Programs, 2003).

While these manifestations of violence have been documented in several high-income consuming countries, the nature of systemic violence in producing countries that are middle-income is considerably larger. The involvement of youth in organised crime has led to incredibly high rates of
homicide in several Colombian, Brazilian, Central American, and more recently, Mexican cities. While not all violence occurring in these places is always linked to drugs or drug markets, the capacity of these illegal enterprises to subvert the state, especially when the state is economically and socially weaker is too big. Illegal drug trade is one of the most profitable in the world but because it is illegal it is also very difficult to know the global value of the trade due to its inherent underground characteristics. The United Nations Drug Control Program estimates that it is worth $400 billion per year, equivalent to 8 percent of world trade (UNODC, 2015).

In Latin American cities, other social conditions that favour the occurrence of violence further aggravate the situation. In cities with large inequalities, a profitable illegal market can easily grow among persons that otherwise would have very few employment and educational opportunities. In both producing as well as transition countries that are in the routes of international drug distribution, youth with few educational and job opportunities can be more easily tempted to participate in this lucrative business. Increasing evidence from municipalities in countries like Honduras or El Salvador, suggest that certain gangs in key geographic regions increasingly work more with organised crime linked to the drug markets. Evidence of this is more palpable in Colombia and in certain cities of Mexico.

The extremely high rates of violence that Colombian cities experienced in the decade of the 1990s as a consequence of a war on drugs led to thousands of deaths due to firearms or bombs acquired by illegal networks thanks to the high profits of the drug business. In Colombia, furthermore, the local insurgent groups have used this trade as a major source of funding for their military operations and with less support than other insurgent groups from countries that depended more on supporting external governments, in the fashion of the cold war.

**Legal and Illegal Drugs**

The legality or illegality of drugs generates problems for governments at different levels of magnitude. The international framing of the drug problem has focussed on a war on drugs targetting mostly producers and with weaker strategies for prevention and harm reduction that target consumers. Legalising or keeping certain drugs illegal is still highly debated and additional evidence is needed. Currently there are arguments and evidence both in favour as well as against legalisation of certain drugs.

Opponents to decriminalisation and legalisation of illicit drugs state that proceeding this way would increase their use, as well as the burden to health and society. They rely on evidence from the commercialisation and global dissemination of alcohol and tobacco, which are legal and cost societies billions of dollars. Additional evidence supporting these arguments comes from programmes that have legalised certain drugs such Marijuana in the Netherlands. These experiences report a doubling in consumption of the drug among youth 18 to 20 years old as an example and in addition to drug tourism (MacCoun and Reuter, 2001). Furthermore, there is also evidence from
recent experiences with prescription drugs like Oxycodone and other analgesic opioids. These are highly regulated drugs and dispensed under supervision. Despite this, there have been huge increases in overdose fatalities between 1990 and 2016 mostly in relation to these narcotic pain relievers (Friedman, 2006). The idea that legalising drugs will lessen drug abuse in some ways contradicts research, showing that misperceptions of prescription drugs as less harmful can actually contribute to their abuse (Friedman, 2006).

As for the countries more linked to production, given the illegality of the problem, accurate costing is difficult to establish. Nonetheless, the consequences of illegal trade in terms of corrupting governments, weakening institutions, creating local drug markets and directly or indirectly affecting youth pose an important question in terms of how best to proceed. Increasingly in Latin American settings more discussions about legalisation of drug are being considered because of the failures of the drug war in reducing production and consumption in the last 30 years.

**Preventative and Regulatory Strategies**

Independent of the legality or illegality of drugs, several actions can be taken to address the health of children and protect them from exposures to drugs and consequently reduce the likelihood that they will be victims of violence or become perpetrators of violence. These include strategies targeting pregnant women with substance abuse disorders and combining dependence treatments with parenting training. Because of the risks to the foetus, treatment during pregnancy should be a priority (Niccols et al., 2012).

As with alcohol and with many other social problems that increase parental and family vulnerability, home visitation programmes have been shown to have long lasting positive effects among children and reducing the likelihood that they will be involved in violence perpetration at later stages in life (Olds et al, 1997; Olds et al., 1998). These home interventions can be complemented with early childhood education aimed at improving the social and cognitive development of pre-school children (2-5 years old), in communities that are more vulnerable. These programmes can also contribute to reductions in consumption of drugs at later stages while also preventing engagement in risky behaviours and reducing crime (D’Onise et al., 2010).

In addition to these developmental strategies aimed at individuals and families, other measures aimed at the community and social levels include legal and regulatory approaches that are similar in rationale to those applied to alcohol control. These measures apply mostly to drugs that are legally sold and include increasing the prices of the drug to limit youth access, reduce dependence and addiction, and possibly concomittant consumption with other exposures such as alcohol. Additional measures include creating a government monopoly for delivery also aimed at restricting access, reducing dependence and addiction, and controlling product quality. In the same vein, restricting and monitoring licenses and licensees contributes to regulating exposures at population levels. These
measures are also complemented with limiting the types of products sold and their marketing and finally restricting public consumption (Pacula et al., 2014).

As noted before, despite the lack of evidence of the total costs related to implementing policies that legalise, regulate or forbid the use of drugs, cities can implement comprehensive programmes that address children and youth needs at all stages of development. These programmes need to integrate government and civil society organisations in order to be most effective.

Implementing policies based on these structures will not only benefit preventative actions aimed at drugs but can also be used for alcohol abuse or misuse and additionally can be integrated to information systems that address other forms of violence, including firearm violence and integrate these systems with information involving other health and social outcomes. This level of city organisation can set good examples for local practices or contribute to scale up efforts at national levels. A schematic representation of what city governments could implement is proposed in figure 2 and is adapted from UNODC policies at national levels (UNODC, 2015).

Figure 2: Schematic Representation of an Urban Drug Prevention System.

Source: Adapted from national policy structures from International Standards of Drug Use Prevention, UNODC, 2015.
In synthesis, increased exposure or access to alcohol and drugs has negative social, health, and economic consequences for children and youth. Fortunately, there are several proven effective prevention strategies that, when applied to local settings and integrated as policy within city governments, can yield beneficial effects for all populations.

**Exposures to Firearms**

Violence due to firearms has serious lethal consequences worldwide. According to James Mercy of the U.S. Centers for Disease Control and Prevention (CDC), in an average day, there are approximately 4,000 violent deaths across the globe. In 1 week, there are 26,000, and in 1 month, 120,000. A recent WHO Global Status Report on violence prevention highlighted that in 2012 there were approximately 475,000 homicides perpetrated globally (WHO, 2014). In a U.S. Institute of Medicine workshop, Mercy stated that the more lethal a given mean or method of violence, the more likely that it will cause a higher burden of both self-directed and interpersonal lethal violence (Flavahan, 2015).

The UNODC Study on Homicide report from 2013 also describes the unequal distribution of violence and its concentration in certain geographic areas. In Latin America where 9 percent of the global population lives, 30 percent of all global homicides are committed (UNODC, 2013). Moreover, these are concentrated in some urban areas and within those urban settings they are limited to some neighbourhoods the frequently increase people’s vulnerability due to poor access to services, lower socio-economic level, and less social cohesion. The population that is most affected as victims or perpetrators are youth, mostly males, and most of the violence occurs due to firearms, where percentages of firearm homicide vary from about 45 percent in Mexico to almost 90 percent of all homicides in Guatemala but with a majority of countries reporting percentages of firearm homicide above 60 percent of all homicides in most countries (Inter-American Development Bank, 2015).

As a consequence of the violence in these countries, Latin American cities have been leaders in developing urban information systems and exploring legal approaches aimed at curbing firearm violence with a variety of results ranging from effective measures when restricting the concealed carrying of firearms, to not effective measures such as firearm buy-back programmes (Santaella-Tenorio et al., 2016). Cities like Bogotá and Cali in Colombia, and subsequently other cities in that country, have also applied combined legislative and control approaches that address limiting exposures to alcohol and to firearms simultaneously and monitoring their effectiveness by means of existing information systems.

Published literature suggests that firearm exposures are associated with substance abuse though the evidence is mixed. This might be in part due to the different substances being evaluated and the different ways in which the use of firearms has been defined. Two recent reviews indicated that while there is an association, the association is not clearly explained by substance and firearm presence alone (McGinty, Choksy, Wintemute, 2016; Chen and Wu, 2016). However, when looking at specific
substances, it is clearer that the concomittant access to alcohol and firearms, for example, can significantly increase the risk of lethal violence, and therefore, restricting their simultaneous exposures is desirable.

There are multiple legal approaches aimed at controlling or reducing exposures to firearms by children and youth. These can be towards parents and families and their context or focus more specifically on firearms. In addition to the many interventions aimed at improving parenting, school, and community interventions to reduce risks among youth, measures targeted towards firearms are complementary, useful, and desirable. A study in the USA found that firearm ownership and firearm safety behaviours were linked to other safety practices and all of those likely arise from a more general family context related to child health and safety (Martin-Storey, Prickett, and Crosnoe, 2015).

A wide variety of legal measures have been tested and some have shown significant effects in reducing lethal violence among children and youth. Many of these laws have been initially evaluated in cities mostly due to the fact that violence hotspots or critical areas are very localised. However, legislation usually always applies to entire urban settings.

In places where restricting access to firearms is legal, such measures have been widely applied in several ways. In other places where national or local legislation is weaker in terms of its capacity to regulate firearm exposures, measures aimed at firearm storage have shown to have beneficial effects in reducing child and youth lethal injuries. There are several effective legal measures for reducing firearm deaths among children and youth.

**Effective Legal Approaches to Curb Firearm Deaths**

*Limiting youth access to weapons including firearms*

Existing evidence suggests that even legal purchase of a handgun appears to be associated with a long-lasting increased risk of violent death (Cummings et al., 1997; Kellermann et al., 1993). To reduce youth exposures, there are laws determining minimum ages to possess or purchase a gun that typically set it at 18 years old with some country variability. A review study of several laws indicated that restrictive overall gun control policies by limiting adult ownership or focusing on youth are associated with a reduced likelihood of youth gun carrying (Xuan and Hemenway, 2015).

*Firearm bans*

A study that evaluated two decrees issued by mayors in Cali and Bogotá, Colombia found a 14 percent and 13 percent reduction in overall homicide associated to an intermittent ban on carrying concealed firearms in public areas during periods considered of high risk of violence, mostly weekends, paydays and some holidays (Villaveces et al., 2000). Studies in the United States have also found reductions in homicide associated with bans of assault weapons as well as cheap, low-
caliber pistol or revolver, easily obtained and concealed, known as Saturday night specials (Santaella-Tenorio et al., 2016).

Child Access Prevention (CAP) Laws

In the USA where firearm regulations are more lax relative to other countries, prevention and legislative efforts to reduce child and youth firearm injuries have focused on safe storage practices. A study by Grossman and colleagues showed that four practices of keeping a firearm locked, unloaded, storing ammunition locked, and in a separate location are each associated with a protective effect and constitute a possible strategy to reduce suicide and unintentional injuries in homes with children and teenagers where guns are stored (Grossman et al., 2005). Evidence related to interpersonal violent injuries is not clear.

Child Access Protection (CAP) laws have been enacted in several settings. These laws make firearm owners liable if children manage to access their guns. They are intended to foster safe storage practices and thus reduce the likelihood of exposure of children and youth to firearms in the home. Several studies have shown that these laws are effective in reducing child and youth firearm injuries but again evidence related to violence outcomes is weak (Cummings et al., 1997; DeSimone, Markowitz, and Xu, 2013).

Existence of these laws can be improved by more comprehensive legislation on firearms. A study found that unsafe storage was least likely among families in states with both CAP laws and stronger firearm legislation (Prickett, Martin-Storey, and Crosnoe, 2014). Other studies suggest that interventions aimed at counselling on safety in general including safe firearm storage enhanced by safe storage device provision can effectively encourage individuals to store their firearms safely (Rowhani-Rahbar, Simonetti, and Rivara, 2016).

Background checks

Several studies have found these laws are associated with significant reductions, mostly among intimate partner homicide (Santaella-Tenorio et al., 2016).

Combinations of laws

Seven studies from Brazil, Australia, Canada, USA, Austria, New Zealand and South Africa have found that a combination of measures around licensing and firearm circulation are associated with homicide reductions. The study from five South African cities (Cape Town, Durban, Johannesburg, Port Elizabeth, and Pretoria), demonstrated a 13.6 percent significant homicide reduction associated with the implementation of the full implementation of the Firearms Control Act (FCA), which increased restrictions for licensing and possibly the overall firearm circulation in communities (Matzopoulos, Thompson, and Myers, 2014).
**Legal Approaches with Mixed Effects**

“Castle doctrine” laws and “stand your ground” laws

These are laws intended to remove civil liability in situations of self-defense or when assailed in a home and evidence of their effect is mixed. One study showed homicide reductions of nine percent (Lott, 1998) while two showed increases in homicide ranging from 6 percent to 15 percent (Cheng and Hoekstra, 2013; McClellan, 2012).

“Right to carry laws”

A recent review summarised results from 25 studies that show mixed effects of these laws ranging from above 10 percent decreases in homicide to increases in homicide of up to 7 percent (Santaella-Tenorio et al., 2016).

**Legal Approaches that are not Effective**

Several studies have shown no effect in homicide reduction associated with the application of voluntary rendition of firearms through firearm buy-back programmes (Santaella-Tenorio et al., 2016).

**Operationalisation and Enforcement of Laws**

The effectiveness of these laws is important and still there is missing evidence in some cases on the relationship between the law that is enacted, its implementation and its enforcement. It is possible that in some cases laws were enacted but not sufficiently enforced. According to the 2014 WHO Global Status Report on Violence Prevention, a review of 133 countries showed that legislation against weapons on school premises exists in 84 percent of these countries but is only fully enforced in 57 percent of them (WHO, 2014). Still with all of the available evidence, more research is needed in regard to illegal possession of firearms and their circulation among youth.

**Recommendations for Cities**

As with alcohol and drugs, monitoring firearms through the creation of integrated information systems that capture data from institutions such as police, health, justice, forensic sciences and communities is essential to understand the spatial and temporal distribution of violence associated with these different exposures. Alcohol and drug attribution is not always easy and few cities have complete and reliable information on violence events linked to them. However, there is sufficient evidence to suggest that a combination of interventions aimed at families and educational institutions starting from prenatal care all the way through young adulthood are necessary complements of legal measures aimed at controlling, reducing or banning exposures to alcohol, drugs, and firearms.
All of these interventions can rely on the same surveillance systems at city levels. The key element is the integration of the different sources of information that can allow for more sound evaluations of the causes and correlates of violence. These same infrastructures will allow for future evaluations of interventions. However, having an information infrastructure in place is not sufficient. This needs to be complemented with proper capacity building on the collection, interpretation, and dissemination of data from surveillance. To manage these actions effectively a coordinating agency within cities is key. Evidence from several crime information systems in Latin America suggests that with these models data are not only improved in terms of completeness and reliability, but their use in policy making is more effective (Dammert et al., 2014). In fact as data are disseminated, this increased communication with society overall strengthens mechanisms of accountability and can strengthen the sustainability of evidence-based policy-making.

**Built Environment and Violence Prevention**

Another important set of factors useful in understanding violence refers to the built environment. The design of the built environment modulates human behaviour and is also a physical expression of how societies are structured and function. In applying the socio-ecological model, the individual, family and community behaviours all occur within a social milieu and happen in distinct geographic physical locations. Each of those locations has a set of characteristics that foster or discourage certain behaviours and create safe or unsafe environments. Studying the characteristics of those environments is thus informative because it can provide information on not only the spatiotemporal distribution of violence, but also how it relates to features of the specific localities where it occurs more.

Because the features of the built environment affect every individual, evidence associating the occurrence of violence to features of the environment is not disaggregated by specific ages or subtypes of populations but is rather focussed on the effect on entire populations. The level of aggregation or disaggregation of information in studies is also important. Well-disaggregated information can help pinpoint reliably where and when different acts of violence are occurring. In doing so it can be very helpful in orienting enforcement activities. It is through the identification of spatial clusters of violence (hotspots), that many police actions have been implemented around strategies known as hotspot policing or community-oriented policing. While the former focusses more on enforcement, the latter addresses more the service and preventative components that police actions can take in different settings. Review studies suggest that a combination of both efforts can significantly reduce crime and violence in urban settings (Braga, Papachristos, and Hureau, 2014). By looking at the physical environment, several cities have managed to optimise and focus their enforcement and prevention activities towards areas and populations where control or services are needed most. There are several studies from different cities that describe the unequal distribution of violence in urban settings. A study from the city of Goiânia in Brazil highlighted that the spatial distribution of homicide was associated with urban areas with a higher proportion of people with the lowest educational status, lowest income, and poor housing conditions in comparison to the
remainder of the municipality (Minamisawa et al., 2009). A hospital-based study from Cape Town, South Africa documented hotspots and used these data for improving access to service based on patterns of referral (Nicol et al., 2014). A study in Philadelphia, PA, (Wiebe et al., 2016) collected detailed activity paths of urban youth to investigate the relation between their lived experiences, time spent in different environments, and risk of violent assault and found that that firearm injuries were related to being alone. Additionally, acquiring a gun and entering areas with more vacancy, violence, and vandalism was linked to higher risk of getting shot shortly thereafter. Another study from Vancouver, BC, (Bell, Schuurman, and Hameed, 2009) documented adjoining neighbourhood clustering associated with assaults.

A model from the city of Cardiff in Wales (Florence et al., 2011; Warburton and Shepherd, 2006) integrates police and health information about violent events and describes the individual characteristics of victims as well as the circumstances, and time and place of occurrence of events. In doing so it informs police and social services where and when different types of violent events are more likely to occur. The model has also been shown to be cost effective by reducing an estimated US$10 million (£6.9 million) in costs due to violence in 2007 (Florence et al., 2014).

As shown above, proper spatiotemporal documentation of violent events complemented with a description of their occurrence can be a powerful tool to inform and even predict where violence is more or less likely to happen. Looking at the built environment and violence in a city can also help identify the spatial and temporal characteristics of hotspots.

Unpublished analyses from the World Bank using geospatial urban data on crime and violence in Bogota, Colombia has not only confirmed the unequal distribution of violence that other cities have described (figure 3), but has also shown that typically these hotspots tend to be quite small in area but also persist over long periods of time (up to 70 months – figure 4) (Villaveces and Fox, 2013).

Similar findings of spatial features have been described elsewhere for Seattle, WA in the USA (Weisburd, Groff, and Yang, 2012). This information is very useful for planning purposes because the specific environmental modifications that could be put in place in addition to the enforcement efforts don’t have to be too large and can have long-lasting effects.
Figure 3: Hotspots of homicide in Bogota, Colombia, 2008 – 2013 (Villaveces and Fox, 2013).

Figure 4: Spatial and temporal covariances of hotspots of homicide in Bogotá, Colombia, 2008 – 2013 (Villaveces and Fox, 2013.)
**Types of Built Environment Interventions**

There are three overall strategies that have been evaluated to address the built environment in relation to youth violence. These include urban upgrading initiatives, resettlement interventions, and diversification. The latter two are strategies for poverty deconcentration (Cassidy et al., 2014). Urban upgrading initiatives focus on small, localised changes of the built environment or large changes of infrastructure over wider city areas. Resettlement refers to encouraging poor families to move to less poor neighbourhoods while diversification is a strategy to get wealthier tenants and homeowners to move into a poor area (Cassidy et al., 2014).

**Urban Upgrading and Violence Prevention**

*Crime prevention through environmental design (CPTED)*

This approach is moderately effective and ideally should incorporate proper community participation and feedback, especially when working in public spaces. CPTED follows principles that improve visibility for persons so as to increase surveillance and take action on potential threats, persistent maintenance of physical structures, land use reinforcement allowing for multiple uses, and complements it with proper enforcement (Cozens, Saville, and Hillier, 2015). It is typically focussed in very concrete physical structures.

*Vacant lot greening*

The principle with these strategies is to give vacant plots of land a community use and thus get the community to fill in empty spaces. With more community presence and hence passive surveillance there is less probability of serious crimes. A study by Kondo and colleagues in Youngstown, OH, USA (Kondo et al., 2015) found that community-initiated vacant lot greening had a greater impact on reducing serious violent crimes but not property crimes.

*Improved park or city lighting and CCTV cameras*

Welsh and Farrington conducted a systematic review of 13 evaluations of the effects of light and crime in 2007 (Welsh and Farrington, 2007). Their findings indicated that improved street lighting should be considered strategy in any crime reduction programme in coordination with other intervention strategies. The interventions are feasible, inexpensive, and effective methods of reducing crime. They also found that these interventions economically efficient. A study from Newark, NJ, USA (Caplan, Kennedy, and Petrossian, 2011) using CCTV cameras showed statistically significant reductions in crime and shootings in some streets. Another study from the United Kingdom showed that CCTV cameras alone were effective in train stations and car parks but not in residential areas (Farrington et al., 2007).
**Upkeep and presence of green spaces**

A study from the City of Baltimore found that evaluated areas of land with more trees were associated with less crime with few exceptions where there is an extensive interface between industrial and residential properties. It is possible that in those areas a significant proportion of trees were growing in abandoned lands between these two land uses (Troy, Grove, and O'neil-Dunne, 2012).

**Large-scale urban modifications**

Local authorities in the City of Medellin, Colombia built a large public transit system integrating rail, buses and cable cars and more recently trams to improve access of citizens who lived in some areas with historically poor infrastructure and away for services and employment opportunities. In the areas connecting to these low-income neighbourhoods parks, libraries and community centres were also built. A quasi-experiment conducted to evaluate the effect of these upgrades on violence found significant reductions in homicide and violent events 66 percent and 74 percent less respectively in intervened neighbourhoods relative to control neighbourhoods (Cerda et al., 2012).

**Zoning interventions**

Zoning interventions are intended to use land for specific or multiple purposes, for example as exclusively residential, commercial, industrial or recreational, or a combination of those (mixed uses). A study from Los Angeles, CA found that mixed commercial- and residential-zoned areas were associated with lower crime than are commercial-only areas (Anderson et al., 2012). Another study from Columbus, OH, USA found that beyond a threshold, increasing commercial and residential density served to reduce the likelihood of homicide and aggravated assaults (Browning et al., 2010).

**Safe and accessible transport for journeys to school**

These interventions typically rely on a combination of urban upgrading changes including CPTED, increasing green spaces, and mapping abandoned locations that could increase the risk of situational crime. Additional interventions include increasing the walkability of neighbourhoods. These principles are applied to increase the presence of people in streets and the use of those spaces by communities and in doing so increase the passive surveillance of the community against crime.
**Poverty Deconcentration**

**Resettlement**

These strategies can be achieved by force or voluntarily. The former usually implies litigation and displacement of populations usually without positive solutions for those who are displaced as entire communities and existing networks are frequently destroyed. Voluntary programmes, for example, the US’ Moving to Opportunity programme found that resettlement does not necessarily lead people to move to wealthier neighbourhoods but rather to other poor neighbourhoods. This programme also documented psychosocial effects of inequality as a consequence of relocating poor families into wealthier areas and exposing them to stigmatisation and feelings of isolation (Cassidy et al., 2014).

**Diversification**

Experiences from the UK, Netherlands, Sweden, and in some US cities have promoted these strategies, encouraging people of higher resource to move to areas that are poorer and in doing so, to promote development in theory for the benefit of entire communities. Some studies have shown to be moderately effective in reducing youth violence, but a potential pitfall is gentrification that leads to wealthier people moving to poor areas and eventually displacing the poor people who live there (Cassidy et al., 2014).

**Conclusions**

Cities worldwide have many tools to engage in proven effective strategies for the prevention of child and youth violence. Those strategies are diverse and include engaging individuals, families, institutions, entire communities and changing overall social characteristics of entire urban settings. Achieving these objectives is possible and cost-effective but requires that local governments work closely with communities as well as more efficiently with the different sectors of local government. This requires organisational changes in local governments as well as including violence prevention as a common policy aimed towards improving quality of life.

Apart from working with people, there are a wide variety of legislative measures that are useful and complementary to interventions aimed at improving people’s lives. These legislative measures can include direct targeting of risk factors of violence such as regulating the access to means like alcohol, drugs, and firearms. More indirectly, city planning measures can be used to change zoning laws useful to prevent alcohol related violence or to reduce overall serious crime by providing multiple uses to land. Other measures can involve reorganising city governments so as to facilitate more cooperative and efficient work.

Strategies aimed at generating high quality information systems are useful when they integrate multiple sources of data and are perceived as useful and actually used by a variety of sectors. Given
that violence can occur anywhere in the community or in the home, sectors such as health, justice, education, transport, social services, require coordinated actions and common violence prevention goals to achieve more efficient objectives of violence prevention and control. Creating high quality information systems implies also having policies and resources for capacity building at city levels and engagement with communities provides additional resources for evaluation, for possible solutions, for possible interventions and for accountability purposes. Engagement with the academic sector is for example important in contributing to reduce the gap between evidence-based interventions and policy-making. Engagement with communities is key because it can orient responses to the actual needs of specific localities and contribute to adapt evidence-based interventions to local contexts and practices.

Finally, understanding the urban context is essential not only from the social aspect but also from its physical characteristics. For the latter, incorporating seemingly different sources of information can contribute to enrich our understanding of where and when violence happens. At city levels good cadastral and census information can be very useful when integrated with police and health data. Some cities have achieved very high quality standards to understand these physical contexts. Urban cadastral information in many large Brazilian, Colombian, and Mexican cities is of high quality. In Bogota, Colombia, for example, the local cadastral office has created an institute that incorporates all physical information about the city into a Reference Map (IDECA, 2015) for the entire city that is then used by all government agencies for planning purposes. Using this map in conjunction with police and census data can be extremely helpful to understand crime patterns locally.

However not all cities with high rates of violence can afford such infrastructure. In these settings community engagement is essential for diagnosing problems and for describing the overall urban landscape. Once integrated, this information can be used for multiple purposes. An advantage of setting these measures either through high levels of technology or with community involvement at lower levels of technology and resources is possible and can contribute to address a wide variety of problems associated with the occurrence of violence. Achieving these objectives is a sound strategy as it saves costs but more importantly, can save many lives.
References


