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Homicide of children and adolescents in Mexico (1990–2013)

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ABSTRACT

The trends and correlates of child and juvenile homicide rates in three developmental age groups (0–5, 6–11, and 12–17) during 1990–2013 in Mexico are examined by using vital statistical data. Homicide rates for adults and children were calculated yearly and the place where homicides occurred and the means used to commit homicide examined. Changes and continuities in homicide rates during 2002–2007 and 2008–2013 and their association with socio-economic, status of women, public security efforts, and firearm availability variables were studied. Homicide rates increased rapidly for adults and children in 2008 as did the rates in which a firearm was used. Rates for adults and children 0–5 years were particularly correlated. In some states, the youngest children's rates increased by 75% or more than the rates for adults. High-increase states for younger children were closer to the U.S. border, were farther from abortion services, and had growing rates of female-headed households.

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Homicide of children; Mexico; developmental perspective; children; war against drugs; homicide

Introduction

According to a recent UNICEF report, in 2012, child and juvenile homicides represented almost one in five of all global homicide victims that year (2014). The highest homicide levels among children and adolescents, as well as adults, are found in Latin and Central America. Although mortality rates in general have decreased over time for children and adolescents in this region, violent deaths during childhood and adolescence seem to have increased over time (Viner et al., 2011). Therefore, there is a need to study youth homicides. More than half of worldwide child and adolescent victims of homicide in 2012 were killed in just 10 countries, Mexico being one of them (UNICEF, 2014). Nevertheless, in Mexico, as in other low- and middle-income countries, child and adolescent homicides have received limited attention (Mathews, Abrahams, Jewkes, Martin, & Lombard, 2012).

Since Felipe Calderón became Mexico's President in 2006, there has been a noticeable increase in the number of homicides in Mexico. National and international news are replete with stories regarding brutal murders of migrants, people involved in drug cartel activities, feminicides, and children killed by military personnel or as *collateral damage* in the *War on Drugs* (Guerra contra las Drogas), a policy initiated by President Calderón consisting of a military offensive against Mexico-based drug cartels and a zero-tolerance drug use policy (Daly, Heinle, & Shrik, 2012; Pereyra, 2012) with the objective of guaranteeing public security (Chabat, 2010; Escalante, 2011).

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The *War on Drugs* was initiated first in Michoacán and later in the northern states of Baja California, Sinaloa, Durango, Nuevo León, and Chihuahua and the southern state of Guerrero, with the objective of guaranteeing public security and the normal conduct of citizens' lives (Chabat, 2010).

The explanation of the Mexican government, subscribed to by most mass media, was that the increase in the homicide rates was due to the open competition among drug cartels aimed at controlling international trafficking routes and national drug markets (see Escalante, 2011). Existing research has tended to attribute the increase in homicide rates to the War on Drugs itself and the militarisation strategy followed by the Mexican government (Barra & Joloy, 2011; Escalante, 2011; Pereyra, 2012).¹ It has also been argued that homicides of children of all ages have been occurring as a result of this strategy and as a result of their participation at young age in narco groups (see REDIM, 2014). While the increase in the overall homicide rates in Mexico has been well documented (Echarri, 2013; Escalante, 2011), little attention has been devoted specifically to juvenile homicides because most analyses do not differentiate between children in these important age groups or even differentiate between children and adults.

Questions need to be raised, such as what percentage of overall homicides involve children and juveniles; what are the characteristics of children and juvenile homicides; and how much of a link is there between adult and child homicide rates. Using vital statistical data from the Mexican National Institute of Statistics and Geography (INEGI, Instituto Nacional de Estadística y Geografía), this paper has three main objectives: (a) to examine the trends in child and juvenile homicide rates during the period from 1990 to 2013; (b) to show the heterogeneity within states in Mexico regarding both child and adult homicide rates in four 6-year periods (1990–1995, 1996–2001, 2002–2007, and 2008–2013) (might be a valuable source of data, see Table A1); and (c) to study, at the state level, the changes and continuities in homicide rates during 2002–2007 and 2008–2013 and their correlates (socio-economic condition, status of women, public security efforts, and firearm availability).

The need for studying children and juvenile homicides in Mexico

Mexico is one of the countries with high levels of homicides of children and juveniles. Table 1 presents child and youth homicide rates for several nations for 2013 (data for Australia, El Salvador, Colombia, and Venezuela were not available for 2013 and the last available year was used). It shows that Mexico's homicide rate for youngest children 0–4 (1.73 per each 100,000) was only surpassed by the United States' (3.08 per each 100,000) and El Salvador's (1.75 per each 100,000) rates. However, the difference between the rates of El Salvador and Mexico is very small. For children 5–9 years old, Mexico also has the third highest homicide rate (0.68 per each 100,000) among these selected countries, only surpassed by Colombia and South Korea (1.09 and 0.96 per each 100,000, respectively). For those between 10 and 14 years old and 14 and 19 years old, Mexico and other Latin American countries (El Salvador, Brazil, Colombia, and Venezuela) occupy the higher ranks. Table 1 suggests the need to study the homicides of children in Mexico and, especially, those of the youngest children since Mexico is ranked high compared to other countries.

From a developmental perspective, the study of child homicides needs to be divided into three different groups: young pre-school children including infanticide (0–5 years), elementary school-aged children (6–11 years), and teenagers (12–17 years) (Finkelhor, 1997). The developmental perspective argues that children are at different levels of emotional, physical, cognitive, and social development according to their age. Concerning the homicide of children, different levels of development are theoretically associated with differential risks of homicide and different relationships with perpetrators. Homicide of very young children including infanticides tends to be associated with child abuse, violence by parents and family members, as well as with unwanted pregnancies and abortion restrictions (Finkelhor, 1997; Sen, Wingate, & Kirby, 2012). Homicide rates of middle childhood tend to be lower than those for other age groups, since they “have

Table 1. Child and adolescent homicide rates in selected countries (2013).

| 0–4 years | | 5–9 years | | 10–14 years | | 15–19 years | |
|--------------------------|------|--------------------------|------|--------------------------|------|--------------------------|-------|
| United States | 3.09 | Colombia ^a | 1.09 | El Salvador ^a | 6.82 | Venezuela ^a | 62.37 |
| El Salvador ^a | 1.75 | South Korea | 0.83 | Brazil | 4.20 | Brazil | 56.04 |
| Mexico | 1.73 | Mexico | 0.68 | Colombia ^a | 3.62 | El Salvador ^a | 54.22 |
| Colombia ^a | 1.66 | El Salvador ^a | 0.66 | Venezuela ^a | 3.35 | Colombia ^a | 46.96 |
| Brazil | 1.61 | Brazil | 0.60 | Mexico | 1.46 | Mexico | 15.07 |
| South Korea | 1.34 | United States | 0.55 | Argentina | 0.80 | South Africa | 10.93 |
| Venezuela ^a | 1.19 | Ecuador | 0.53 | United States | 0.71 | Costa Rica | 9.51 |
| Argentina | 0.57 | Venezuela ^a | 0.49 | Ecuador | 0.53 | Argentina | 8.86 |
| Ecuador | 0.50 | Japan | 0.24 | Costa Rica | 0.51 | Ecuador | 7.57 |
| Chile | 0.47 | Chile | 0.24 | South Korea | 0.46 | United States | 6.62 |
| South Africa | 0.44 | Argentina | 0.22 | Chile | 0.46 | Honduras | 1.91 |
| Japan | 0.36 | Spain | 0.16 | South Africa | 0.43 | Turkey | 1.76 |
| Norway | 0.32 | South Africa | 0.14 | Turkey | 0.39 | Norway | 0.91 |
| Spain | 0.29 | Honduras | 0.11 | Spain | 0.31 | Chile | 0.72 |
| Costa Rica | 0.28 | Turkey | 0.11 | Japan | 0.19 | Australia ^b | 0.60 |
| Honduras | 0.24 | Australia ^b | 0.07 | Egypt | 0.16 | Spain | 0.37 |
| Australia ^b | 0.20 | Egypt | 0.06 | Honduras | 0.11 | South Korea | 0.32 |
| Egypt | 0.17 | Costa Rica | 0.00 | Australia ^b | 0.07 | Egypt | 0.26 |
| Turkey | 0.16 | Norway | 0.00 | Norway | 0.00 | Japan | 0.18 |

Source: own calculations based on mortality cases by age group available at the WHO Mortality Database (http://www.who.int/healthinfo/mortality_data/en/). Population estimates for Latin and Central America from ECLAC (<http://www.cepal.org/es/estimaciones-proyecciones-poblacion-largo-plazo-1950-2100>). Population estimates for the United States, Spain, Japan, and Turkey available at their governmental statistical offices, census bureaus, statistics institutes, or equivalent (U.S.: <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>; Spain: <http://www.ine.es/prensa/np813.pdf>; Japan: <http://www.e-stat.go.jp/SG1/estat/ListE.do?lid=000001118081>; Turkey: <http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=15844>). All other population estimates were gathered at the World Bank, *Health Nutrition and Population Statistics: Population Estimates and Projections* (<http://databank.worldbank.org/data/reports.aspx?source=Health%20Nutrition%20and%20Population%20Statistics%20Population%20estimates%20and%20projections>). All these webpages were last accessed on 20 December 2016.

^a 2012 data.

^b 2011 data.

outgrown some of the characteristics that create vulnerability for the very young, but have not begun to engage in the activities that make the rate so high for adolescents” (Finkelhor, 1997, p. 26). Teenagers’ homicide rates (12–17 years) tend to be higher and to follow similar patterns to adult homicides and are more likely to be related to youngster’s participation in delinquent behaviours and association with violent individuals.

Published research regarding child homicide in Mexico tends not to differentiate between children in these important age groups (Fernández et al. 2013; González Cervera & Cárdenas, 2004; Hernández and Narro 2010; Hijar-Medina et al., 1994; González-Pérez, Vega-López, Vega-López, Muñoz de la Torre, & Cabrera-Pivaral, 2009; Vega-López et al., 2003) or even differentiate between children and adults (Echarri, 2013; Escalante, 2011; Morales, 2013).

This research concurs with the age-pattern homicides found in other countries (see Finkelhor & Ormrod, 2001; Mathews et al., 2012; Viner et al., 2011). In Mexico, young children (0–5 years) are at greater risk of being killed as a result of being exposed to child abuse acts perpetrated by a family member. Homicides of children in the middle childhood ages tend to be less frequent than those for younger children. The rates tend to increase significantly among teenagers, and their homicides are more likely to be related to youngster’s participation in deviant behaviours.

Analytical strategy and methods

In this research, we analysed homicide rates for adults and children divided into three groups according to a developmental perspective (0–5, 6–11, and 12–17). We calculated the homicide rates for these groups yearly from 1990 to 2013 and examined the places where the homicide

occurred and the means employed. Next, we focused on the two most recent periods (2002–2007 and 2008–2013) to assess changes and continuities in the homicide rates; 2008 was an inflection point year that brought to an end a pattern of decreasing homicide rates. Hope (2013) suggests that both international and national changes might be behind the surge in homicide rates. In the U.S., cocaine retail prices are doubled between 2007 and 2008 due to a change in the Colombian strategy in the war on drugs consisting in emphasising interdiction of drugs rather than the destruction of crops (see Castillo, Mejía & Restrepo, 2013 cited in UNODC, 2013), commercialisation of assault rifles was resumed in the U.S., and the number of ex-convicts deported between 2002 and 2008 increased by 35%. It has been argued that interdiction efforts in Colombia created a negative supply shock and “competition in drug trafficking activities in Mexico had an extended effect on violence, with a strong relationship between homicide rates and the number of cartels in a given municipality in 2007–2010” (UNODC, 2013, p. 31).

At the national level, Hope (2013) argues that in Mexico, five specific governmental actions might unwittingly be associated with an increase of homicides. First, in 2006, the governor of Michoacán requested the federal government the involvement of the military in security matters due to the increase in crime rates. By 2008, the number of states in which the military was involved in public security matters increased. Second, in 2007, the federal government began an active strategy of decapitating and splitting up drug cartels. Third, between the end of 2007 and the beginning of 2008, the federal government emphasised the interdiction of drugs and stipulated that all private aircrafts coming from Central and Latin America had to land for drug inspection purposes. Fourth, the extraditions to the U.S. associated with drug-related crimes increased since 2006, and fifth, the number of governmental agencies responsible for fighting drug-related crimes in Mexico also increased (details in Hope, 2013). These national and international changes are associated with an increase of homicide rates in 2008. For that reason, we study the changes before and after 2008.

Three main sources of data were used. First was mortality statistics published by the INEGI.² These are more reliable than data provided by the Executive Secretariat of the National Public Security System (Secretariado del Sistema Nacional de Seguridad Pública)³ which tend to underestimate the number of homicides since not all are reported (see Hernández-Bringas and Narro-Robles 2010). Mortality databases were downloaded and merged into a single database (only homicide cases were analysed⁴). Causes of death were classified from 1990 to 1997 according to the 9th International Classification of Diseases (ICD-9), codes E960 to E968, and from 1998 to 2013 according to the ICD-10, codes X85 to Y09. Both ICDs are comparable (Anderson, Miniño, Hoyert, & Rosenberg, 2001). Homicide cases with unspecified ages were excluded from the analyses. The second source of data is population estimates drawn from the National Council of Population (CONAPO).⁵

Finally, possible correlates of the variation and stability in homicide rates were selected based on previous research aimed at explaining child and/or adult homicide rates. Among those, a first group addressed socio-economic conditions and the status of women in society: Gross Domestic Product (GDP), unemployment, food poverty, female-headed households, and children born to teenage and single mothers (González-Pérez et al., 2009; Morales, 2013; Ramírez de Garay, 2012; Valdivia & Castro, 2013). Second were variables related to governmental public security efforts and firearm availability that might capture some outcomes of the *War on Drugs*: rate of firearms seized, rate of people arrested for drug-related crimes, and distance from the U.S. border (where there is higher availability of firearms) (Alzheimer & Boswell, 2012; Dube, Dube, & García-Ponce, 2013; González-Pérez et al., 2009). Finally, distance from Mexico City aimed to capture the effect of non-restrictive regulations on pregnancy interruption since these may be linked to the homicides of very young children (Sen et al., 2012). These data were found in censuses, administrative records, and surveys conducted and/or gathered by the INEGI or the National Council for Social Policy Evaluation (Consejo Nacional de Evaluación de la Política de Desarrollo Social).

Results

Trends in adult and children's homicide rates

Figure 1 reveals that adults have the highest homicide rates, followed by adolescents (12–17 years), infants and young children (0–5 years), and elementary-aged children (6–11 years). The trend for adolescents, although lower than that for adults, follows a similar pattern. From 1990 to 2007, the homicide rates showed a decreasing trend for all age groups. In 2008, however, the tendency reversed, especially for adults and adolescents. For adolescents, the homicide rates showed a decrease from the mid-1990s until 2007. By 2012, though, the adolescents' homicide rate was triple the 2007 rate (3.18 per 100,000). Adult homicide rates followed a similar pattern. Compared to the 2007 rate (11.67 per 100,000), the adult homicide rate increased by 59% in 2008, almost doubled in 2009 and tripled by 2012 (9.51 per 100,000). In 2013, the rates decreased but were still twice as large as at the 2008 inflection point. Although less pronounced, Figure 1 also reveals a rise in the rates for the youngest children after 2007. Compared to the rate in 2007 (1.07 per 100,000), the rate more than doubled by 2010 (2.31 per 100,000). After 2010, the rate declined, but by 2013 was still 53% above 2007.

Compared to 2012, the rates for 2013 seemed to decrease for all age groups except the 0–5 group, but this might be the result of data not yet recorded and cases still under investigation. After several years of decline, adults and adolescents' rates were still higher in 2013 than in the early 1990s. In contrast, the rates for younger and elementary school-age children in 2013 were lower than in the early 1990s, but had nonetheless increased since 2007.

The trend patterns for different age groups are linked to differing degrees. The adult homicide rate from 1990 to 2013 is highly correlated to that of young adolescents ($\rho_{adult, 12-17} = 0.96$) and to a somewhat lesser extent to that of young children ($\rho_{adult, 0-5} = 0.75$). The strength of the correlation, however, is much lower between adults and elementary-aged children (6–11 years) ($\rho_{adult, 6-11} = 0.35$).

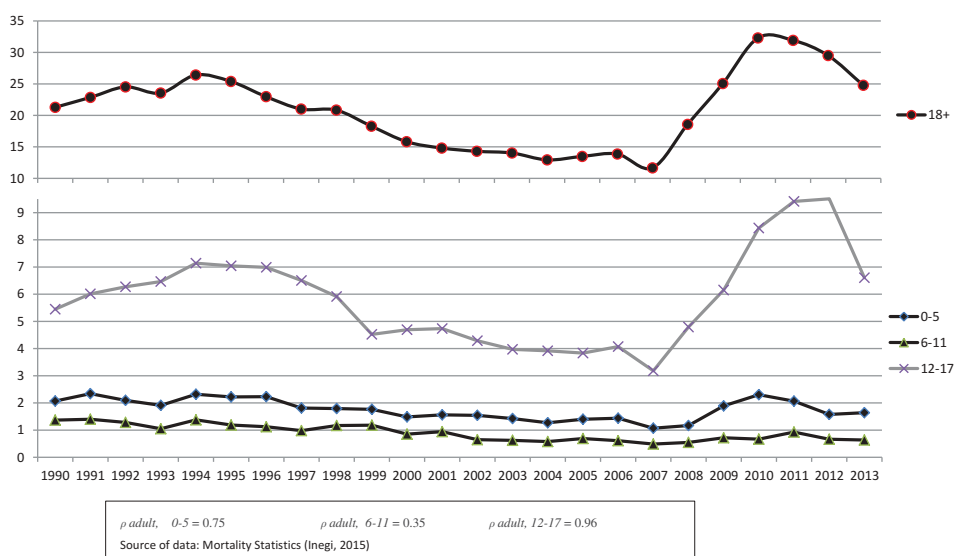


Figure 1. Infant, children, juvenile, and adult homicide rates in Mexico, 1990–2013 (per 100,000).

Means to commit homicide and location

Figure 2 shows the homicide rates according to the means used to commit homicide. The rate of homicides perpetrated with firearms declined from the mid-1990s until 2007 for most age groups. After that year, the rates of firearm-related homicides increased for all age groups. For adults and teenagers, more than half of all homicides were due to firearms. Homicides of children under 12 years, in contrast, tended not to be committed with a firearm. With the exception of 2011, for the youngest children, homicides with a firearm comprised only 10–25% of the homicide rate. For elementary-age children, the firearm percentage varied between 20% and 40% over time. An

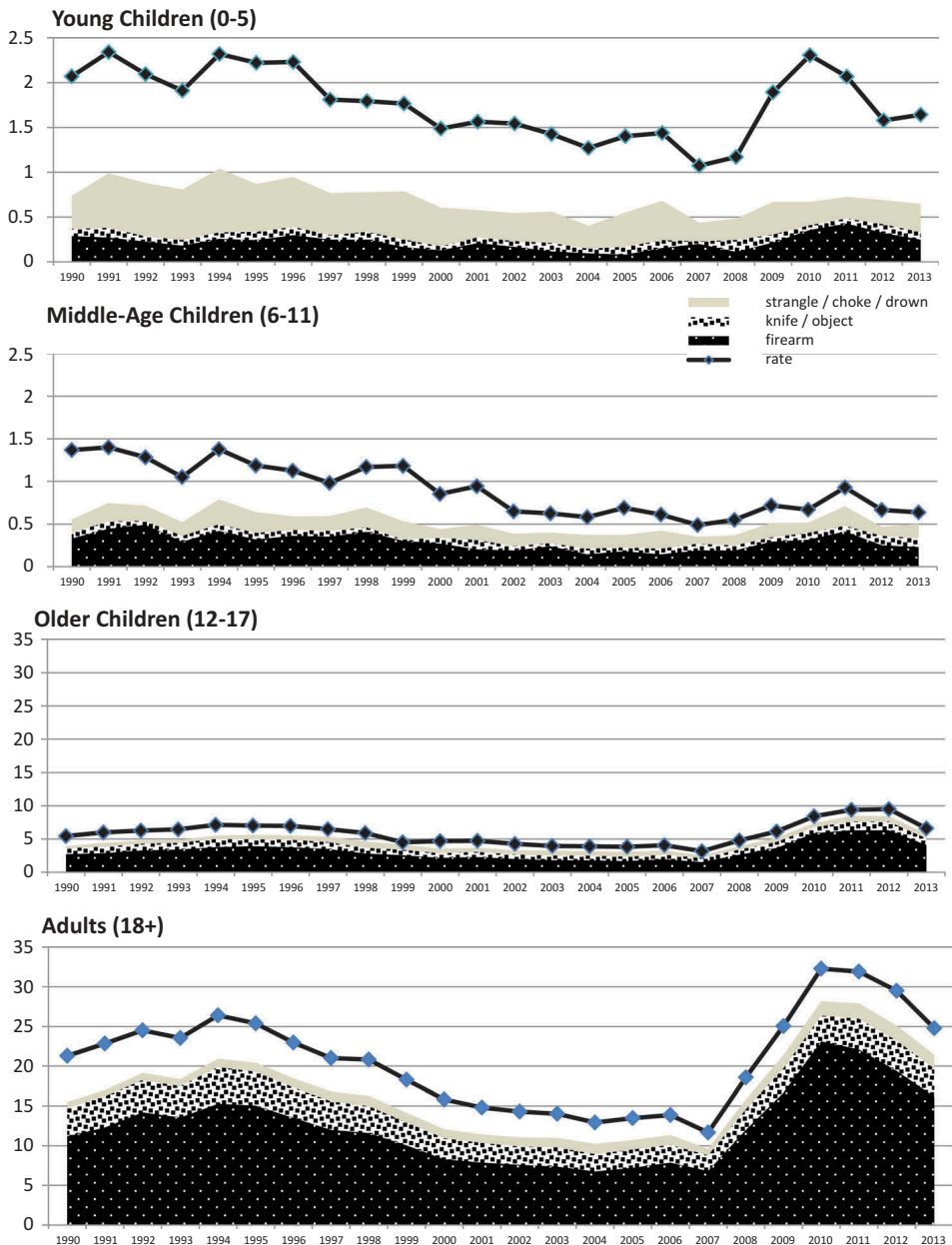


Figure 2. Child homicide rates in Mexico by means of homicide and developmental stage, 1990–2013 (per 100,000).

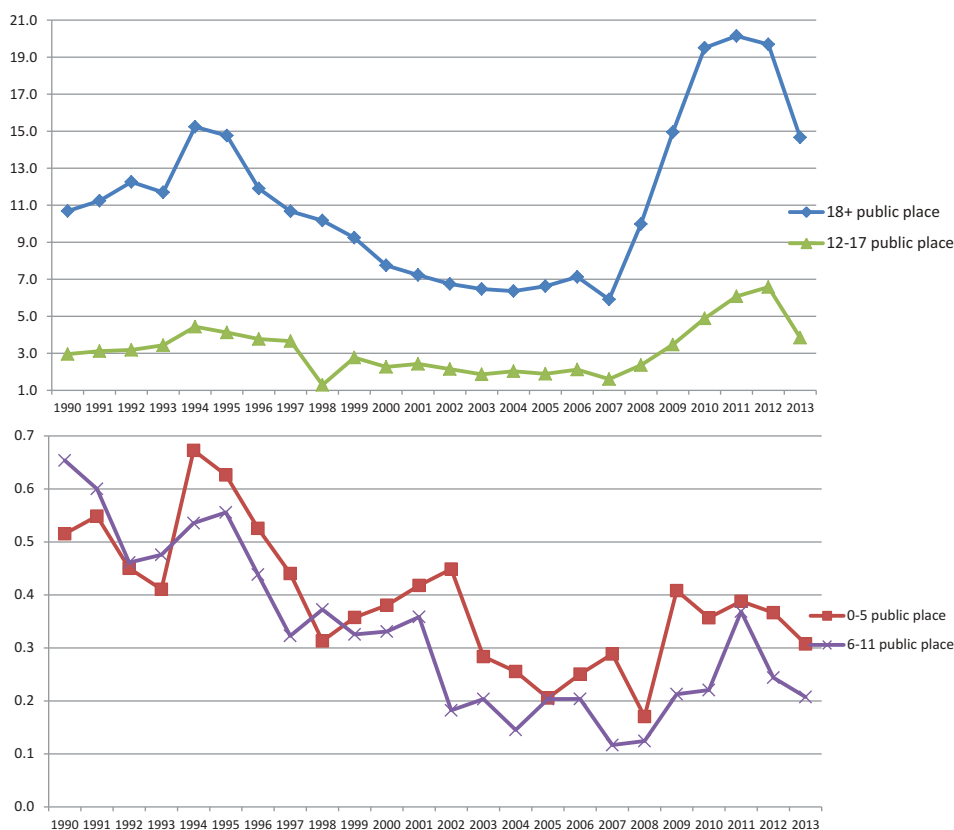


Figure 3. Juvenile and adult homicide in public spaces rate, 1990–2013.

increase in firearm homicides, however, was behind the growth in the homicide rates for the youngest children. Compared to 1990, the rate of those being killed by a firearm increased for all groups except for elementary-age children.

Over time and for all age groups, the rate of homicides committed in public spaces – street, roads, plazas, parks, highways, or equivalent; sport; entertainment; and service and retailing facilities – fell until 2007, but grew after that, especially among older children and adults (see Figure 3). For example, the rates of homicides in public spaces for adults and oldest kids in 1990 were, respectively, 10.68 and 2.96 (per 100,000); in 2007, the rates were down to 5.91 and 2.72; and in 2012, they augmented, respectively, to 19.69 and 6.58 (per 100,000). For children under 12 years old, although the rates have increased since 2007, they have not reached the levels of the early nineties.

We examined the rates of children, juveniles, and adults murdered with a firearm in households and in public spaces during four 6-year periods (1990–1995, 1996–2001, 2002–2007, and 2008–2013). The growth in firearm homicide in the most recent period was associated mostly with episodes that took place in public spaces for adults and all groups of children (see Figure 4). For the youngest children, however, the growth in firearm homicides occurred not only in public spaces but also within households after 2007.

Heterogeneity, changes, and continuities

There were large differences in homicide rates for children and adults across the 32 states that compose Mexico. The specific analyses of differences and similarities within states and across time go beyond the scope of this paper and are presented in Table A1.

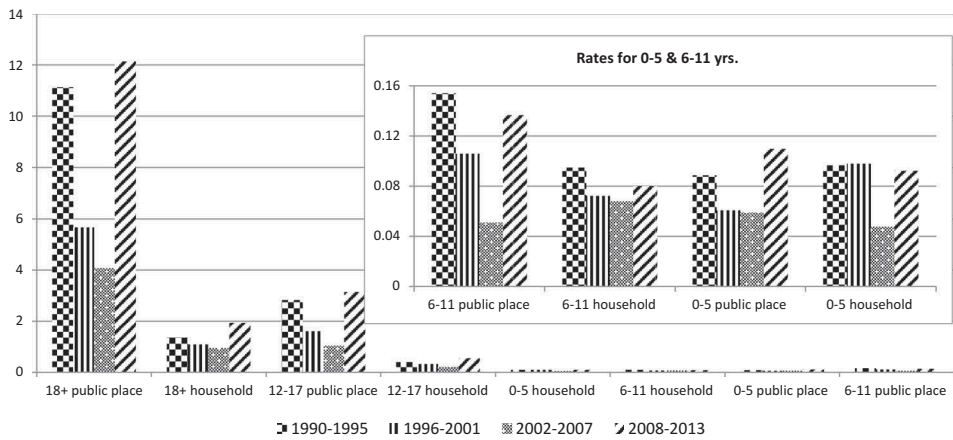


Figure 4. Juvenile and adult homicide rates using a firearm by age group, place of occurrence, and period.

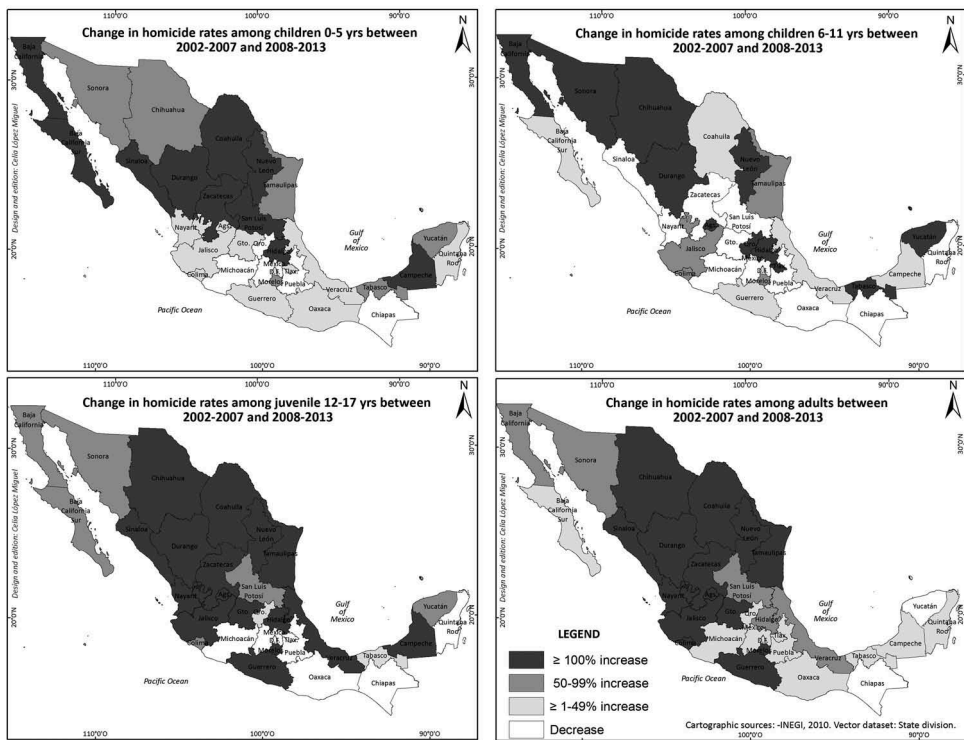


Figure 5. Change in homicide rates among infants, children, juvenile and adults from 2002-2007 and 2008-2013.

To understand the possible factors behind recent increases in rates of child homicide, we compared the two periods before and after the surge (2001–2007 and 2008–2013). Figure 5 presents information regarding changes and continuities in homicide rates by comparing the average rates during these two periods. States with the highest percentage of increase are coloured in the darkest shades of grey. All four maps – three for children and one for adults – reveal that for all age groups homicides experienced the sharpest increase in the northern states.

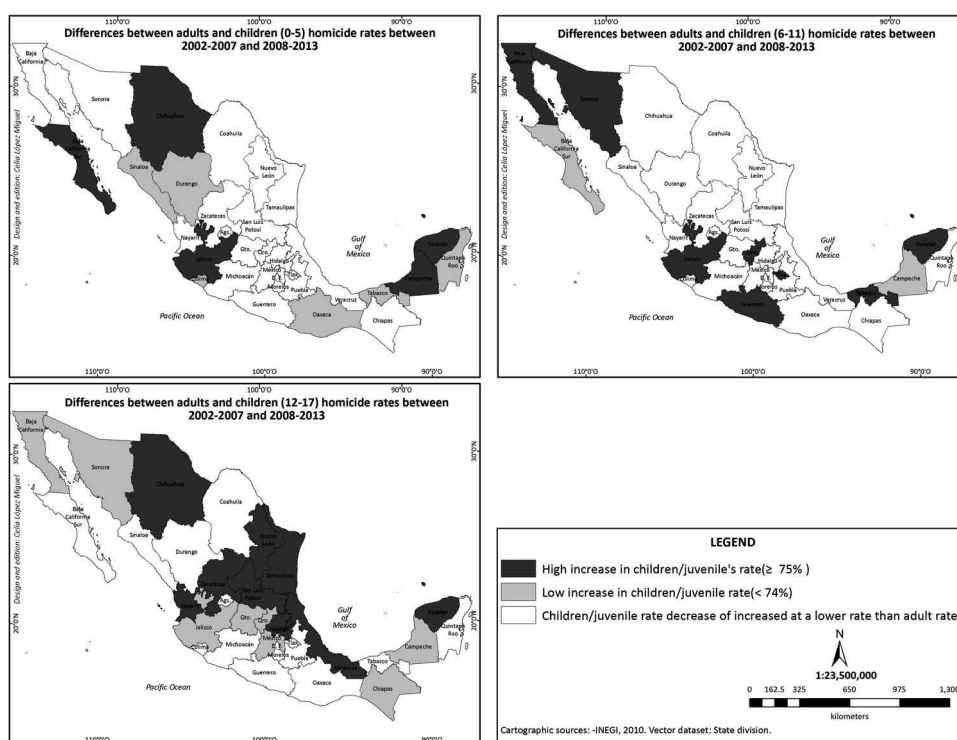


Figure 6. Differences between adults and children (0-5, 6-11 and 12-17 years) homicide rates.

For the youngest children (0–5 years), the homicide rates for the 2008–2013 period increased for all states except in five (84% of states). The homicide rate for the youngest children grew by more than 100% in Baja California, Southern Baja California, Sinaloa, Durango, Coahuila, Nuevo León, Zacatecas, San Luis Potosí, Hidalgo, and the southern state of Campeche.

For elementary-age children (6–11 years), there were even more states (11) with declines than for the youngest children (28% of states). In contrast, in northern states, including Durango and Nuevo León, as well as in the central states of Querétaro, Aguascalientes, Hidalgo, and Tlaxcala and the southeastern states of Tabasco and Yucatán, the homicide rates for children 6–11 years increased by more than 100%.

For children 12–17 years, the homicide rates grew in all states except for a few located mainly in the central and southwestern part of the country. The majority of states experienced more than a 100% increase in the homicide rates for the oldest children. The last map reveals that adult homicide rates increased during the last period for all states except two, Chiapas and Yucatán. The state of Chiapas was the only state where homicide rates declined for all age groups. Conversely, Yucatán's rate for the three groups of children increased by between 50% and 99%, but decreased for adults. In other states such as Nuevo León or Durango, the growth in the rate during the last period increased by over 100% for all groups of children and adults.

Child homicide rates increasing more than adult homicide rates

In Figure 6, we compare the most recent trends for children versus adults. We highlight in darker shades of grey the states where the increase in rates for children has been greater than the increase for adults. In most states, youngest children's homicide rates did not increase more than those of adults or, if

Table 2. Correlates of child homicide rates and percentage of change in homicide rates in Mexico, 2002–2007 and 2008–2013.

| | 0–5 years | | 6–11 years | | 12–17 years | |
|---|----------------------------------|-------------------------|----------------------------------|-------------------------|----------------------------------|-------------------------|
| | Decreased or increased up to 50% | Increased more than 50% | Decreased or increased up to 50% | Increased more than 50% | Decreased or increased up to 50% | Increased more than 50% |
| Socio-economic condition & status of women | | | | | | |
| GDP 2012 ^c | 99/796.9 | 176/982.5 | 156/200.1 | 120/579.3 | 120/144.6 | 146/682.9 |
| % Change 2005–2012 | 44.91 | 49.5 | 48.2 | 49.2 | 53.5 | 44.4 |
| Unemployment rate 2012 ^b | 2.8 | 3.1 | 2.7 | 3.2 | 2.8 | 3.0 |
| % Change 2005–2012 | 54.3 | 84.0 | 56.7 | 81.7 | 41.0 | 81.8 |
| % Food poverty 2012 ^f | 22.2 | 15.3 | 21.0 | 16.5 | 23.6 | 16.6 |
| % Change 2005–2012 | 13.8 | 57.3 | 12.0 | 59.13 | 14.7 | 45.1 |
| % Female-headed household 2010 ^d | 24.6 | 23.6 | 24.0 | 24.2 | 24.2 | 24.0 |
| % Change 2005–2010 | 6.3 | 8.5 | 7.4 | 7.3 | 8.2 | 7.0 |
| % Female employment 2012 ^b | 18.5 | 18.0 | 18.4 | 18.1 | 17.8 | 18.4 |
| % Change 2005–2012 | 8.6 | 10.1 | 9.8 | 8.9 | 7.7 | 10.1 |
| Children born from teenage mother 2012 ^a | 21.5 | 22.0 | 21.8 | 21.6 | 20.3 | 22.4 |
| % Change 2005–2012 | 33.6 | 21.3 | 29.1 | 25.8 | 29.7 | 26.4 |
| % Children born from single mothers 2012 ^a | 9.9 | 11.3 | 9.8 | 11.4 | 10.0 | 10.9 |
| % Change 2006–2012 | 13.4 | 21.3 | 21.9 | 21.9 | 8.5 | 28.0 |
| Public security efforts and weapon availability | | | | | | |
| Weapons rate 2011 ^e | 19.3 | 59.9 | 23.6 | 46.6 | 15.4 | 50.6 |
| % Change 2007–2011 | 4263.7 | 6041.3 | 5295.3 | 5009.5 | 4479.8 | 5448.1 |
| Arrested drug rate 2011 ^e | 59.8 | 48.5 | 38.8 | 69.4 | 28.7 | 65.7 |
| % Change 2007–2011 | 979.94 | 497.8 | 431.2 | 1046.5 | 1288.5 | 489.0 |
| Km from U.S. border | 1132.5 | 840.8 | 1121.6 | 851.7 | 1216.0 | 882.2 |
| Access to pregnancy interruption | | | | | | |
| Km from Mexico City | 432.4 | 1039.3 | 652.4 | 819.3 | 423.7 | 877.7 |
| Analysis of variance: | | | | | | |
| * $p < .05$; † $p < .10$. | | | | | | |

Source of data: ^a2006 and 2012 INEGI's vital statistics.^b2006 and 2012 National Survey on Employment and Occupation.^cGDP and Mexico National Accounts.^d2005 and 2010 Census Data.^e2007 and 2012 Mexican State's Statistical Yearbook.^f2005 and 2010 National Council for Social Policy Evaluation.

increased, did so at a lower rate. However, in Chihuahua, Baja California Sur, Jalisco, Campeche, and Yucatán, the youngest children's rates increased by 75% or more than the rate for adults. In some other states – Quintana Roo, Sinaloa, Durango, Colima, Oaxaca, and Tabasco – the increase for the youngest children was also greater than for adults, but not by as much. In almost one-third of the states, the homicide rates for the oldest children (12–17 years) grew much more than adult rates. In contrast, in other states, the older children's rates decreased or increased at a smaller pace than adult rates.

Correlates of child homicide rates changes

Table 2 examines the relationship between the change in children's and adolescents' homicide rates and selected socio-economic, crime, geographic, and women's status variables. The coefficients shown in Table 2 represent the mean value for each variable in the most recent period – in 2010 or 2012 depending on when information was available – and the percentage change of these variables. The states were divided into two groups: those in which the mean homicide rates in the more recent period (2008–2012) increased 50% or more (50+) from the previous period (2002–2007) and those with less of an increase or a decline (<50). We examined whether or not there were statistically significant differences of means among groups (analyses of variance): 50+ and <50.

The 50+ states for youngest children (0–5 years), socio-demographically, had smaller percentages of population in food poverty situations than the <50 states (15.3% vs. 22.2%). In these states, the percentage of female-headed households grew more than the <50 states (8.5% vs. 6.3%) and experienced a lower increase in the rate of children born to teenage mothers (21.3% vs. 33.6%). For the youngest children (0–5 years), the states 50+ had a higher rate of firearms seized in 2011 in drug-related crimes (59.9 vs. 19.3 per 100,000 inhabitants) and were significantly closer to the U.S. border. Although non-significant, the 50+ states also experienced increases in the percentage of population experiencing food poverty, unemployment, and children born from single mothers.

For elementary-age children, none of the variables were significantly different. The data suggest, however, that for 50+ states for elementary age children, poverty increased almost five times more and the unemployment rate also experienced a larger increase than the other states.

The 50+ states for teens (12–17 years) had in 2012 a smaller percentage of population experiencing food poverty (16.6% vs. 23.6%) and a bigger percentage of children born from teenage mothers (22.4% and 20.3%). These states also experienced a larger increase in the percentage of children born to single mothers than <50 states (28.0% vs. 8.5%). For teen homicide, +50 states were closer to the U.S. border. Although not significant, on average, these 50+ states had more poverty, unemployment, and an increasing rate of firearm confiscation. Conversely, they also had less GDP per capita growth.

For the youngest and oldest group of children, the 50+ states were farther from Mexico City (the only state where abortion is legal during the first trimester) and closer to the U.S. border. While the distance from Mexico City could be related to homicides of youngest children due to unwanted pregnancies, it is not clear its association with increases for the oldest children.

Conclusion

In Mexico, 2008 was a turning point for both children and adult homicides. After a long period in which the homicide rates for children and adults decreased (1990–2007), in 2008 the homicide rates increased for all age groups and for both sexes (see Figure A2 for homicide rates by sex). During 2012, every week, four children 5 years old and younger were killed, almost two children from 6 to 11 years old, and around 25 children 12–17. In some states, such as the northern state of Chihuahua, the homicide rate of younger children was higher than that of the United States, the developed country with the highest levels of children aged 0–5-year victim homicide.

Adult homicide rates and older children's rates (12–17 years old) were correlated, which is not surprising since gang and drug activity homicide contexts are shared by adolescents and young adults alike. However, there was also a correlation between adults' and younger children's homicide rates during the period under study (1990–2013).

During the last two periods examined (2002–2007 and 2008–2013), there has been an alarming increase in the homicide rates for both children and adults. In some states, however, the growth in younger children's homicide rates (0–5 years) has been much greater than that of adults (Baja California Sur, Chihuahua, Jalisco, Campeche, and Yucatán). This finding for the youngest group of children may call into question the official account regarding the increases in homicide rates related to the open competition among drug cartels. Correlates associated with homicide and its growth vary depending on the developmental age of the children. Future studies need to address the phenomenon using a developmental perspective.

Homicide rates with firearms increased over time for both children and adults, which might be linked to greater firearm availability. Previous research has shown the link between the availability of firearms and children's homicides (Nance, Krummel, & Oldham, 2013). One factor in the increasing number of firearms in Mexico may be the expiration in 2004 of the U.S. Federal Assault Weapons Ban that has been associated to the trafficking of arms. It is estimated that in Mexico, only 1% of the firearms are legally registered (see McDougal, Shirk, Muggah, & Patterson, 2015). The availability of firearms in Mexican municipalities near to U.S. states with no or loose regulations has been confirmed as a factor in homicide rates (Dube et al., 2013) and might be also linked to those occurring over time in other Mexican states.

In average, the states with big increases of homicide for the youngest children were those in which the rate of firearms confiscated in drug-related crimes increased the most – likely reflecting some of the effect of the *War on Drugs*. We also found that high increase states were closer to the U.S. border, which may imply more availability of firearms. Future studies should examine link between the availability of firearms and youngest children homicide, as well as the circumstances in which these homicides occurred.

This study calls into question the *War on Drugs* as the full explanation for the increase in the youngest children homicide rates. Unfortunately, there are no current official data available about whether individuals were killed in crossfires or drug cartel confrontations. A recent study (Morales, 2013) found that the overall increase of homicides at the state level was associated not only with the military control of public security but also to unemployment rates, decreases in the GDP per capita, and political competition.

The states with the largest increase for the youngest children's homicide were closer to the U.S. border, were farther from Mexico City, and had growing rates of female-headed households. One might hypothesise that access to pregnancy interruption and economic hardships related to female-headed households might be associated with changes in youngest children homicide rates. Another hypothesis regarding the increase of youngest children's homicides that needs to be tested in future studies is exposure to domestic violence, as found in other studies (Jaffee, Campbell, Hamilton, & Juodis, 2012).

The homicide rates for children, especially young children, might be higher than those reported here because such homicides often masquerade as deaths due to accidents and other causes (Finkelhor, 1997). In addition, in 2007, in 22.6% of the deaths of children under 5 years old from very-low-income communities, no death certificates were issued (Hernández et al., 2012). Another source of undercounting is the limited number of forensic physicians, responsible for determining the cause of death in suspected cases of homicide that reach State Attorneys' Offices (Heisler, Moreno, DeMonner, Keller, & Iacopino, 2003). It is plausible that an increase in the number of forensic experts, more capable of performing death examinations and identifying homicide cases, could have affected some of the trends. Future studies will have to test this alternative hypothesis.

There are other limitations related to the use of secondary data such as missing data, the incomplete registration of deaths for the most recent years – homicides might be registered in a different year than the one that occurred – the limited data for examining correlates of homicide, and the difficulty to compare data internationally because studies of child homicides tend not to adopt a developmental perspective. Male over-mortality is lower among the youngest children (0–5 and 6–11 years) than among the oldest children (12–17 years) and adults (see Figure A2). Future research needs to examine the gender differences and ascertain whether factors associated with the increase in homicide rates after 2007 vary by gender.

This research has several public policy implications. First, given the growth of firearm-related homicides for all groups of age, including children, this research underscores the need of further regulation and implementation of such regulations in Mexico. And second, specific prevention programs that include adults and children of both sexes and in different developmental stages need to be designed and implemented. Rodríguez-Luna found that current homicide prevention programs mostly address adult female homicides and feminicides, while “[prevention] programs targeting males are almost inexistent” (2015, p. 96). The main federal program designed for preventing violence and homicides, the National Program for the Social Prevention of Violence and Delinquency 2014–2018 (extinct in 2017),⁶ contends that youngsters, mostly males, are the main perpetrators and victims of violence. However, there were not specific programs that promote the recognition that men are the main perpetrators of violence and homicides against other men and children (Rodríguez Luna, 2015). As of March 2017, no federal prevention program has taken the place left by the National Program for the Social Prevention of Violence and Delinquency, which was implemented in regions with the highest homicide rates (Chapa Koloffon, Fernández Novelo, & Ley, 2014). Subnational governments allocate negligible resources on crime prevention. Therefore, there is a need for comprehensive federally funded prevention programs that do not only address individual, family, and community factors associated with homicide of both children and adults but also promote deterrence, social integration, and direct prevention (see Chapa Koloffon, 2017).

Homicide of children is a complex problem that needs to be addressed from a developmental perspective since children’s risk of homicide and the characteristics of the homicides vary across the span of the childhood. Future research will have to provide answers regarding the reasons why in some states the youngest children homicide rates have increased at a higher rate than adults and which factors lie behind the heterogeneity in homicide rates across states.

Notes

1. By the end of the 1990s, the drug markets were expanded and the informal model of drug-trafficking regulation had deteriorated in Mexico. Velasco (2005) argues that for decades, drug cartels and the Mexican state – controlled by the same political party (Partido Revolucionario Institucional) for almost 70 years – went through periods of alliances and oppositions, creating a certain stability because of the existence of tacit agreements and selective implementation of the law that regulated drug cartels. This arrangement changed during the 1990s due to democratisation and political pluralism at the state and municipal level to neoliberal reforms that shrank the State. Subnational governments lacked of available resources to fulfil their new responsibilities after the decentralisation processes. This situation generated a power imbalance between drug cartels and governmental institutions. As for the drug market expansion, during the 1990s, the production of heroin and cannabis increased dramatically in Mexico, as well as Mexico’s role in trafficking drugs into the U.S. These two factors led to greater tensions and conflicts among drug cartels (see Pereyra, 2012).
2. In Mexico, when a death occurs, it is mandatory that a medical doctor certifies it with a death certificate (certificado de defunción). This death certificate is essential for the Civil Registry to issue a Death Certificate, which is required in order to carry out a funeral. Death certificates are used to generate statistics. One copy is sent to the Federal Health Department (Secretaría de Salud) and another to the National Institute for Statistics and Geography. Both institutions code the causes of death and, after comparing databases, INEGI publishes mortality statistics databases. Data about homicides were obtained from the INEGI’s vital statistics databases (available at <http://www3.inegi.org.mx/sistemas/microdatos/encuestas.aspx?c=33398&s=est>).

3. Under the Ministry of the Interior, this agency is responsible for coordinating and defining public policy on public security.
4. Homicides related to accidents are not included in the analysis.
5. Available at http://www.conapo.gob.mx/es/CONAPO/Consultas_Interactivas
6. Information available at http://www.normateca.gob.mx/Archivos/66_D_3818_30-05-2014.pdf

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Appendices

Table A1. Children, adolescent, and adult homicide rates in Mexico by state, period, and age group (1990–2013).

| State | Youngest children (0–5 years) | | | | | Middle-age children (6–11 years) | | | | | Adolescents (12–17 years) | | | | | Adults (18+ years) | | | | |
|-------------------|-------------------------------|-----------|-----------|-----------|--|----------------------------------|-----------|-----------|-----------|--|---------------------------|-----------|-----------|-----------|--|--------------------|-----------|-----------|-----------|--|
| | 1990–1995 | 1996–2001 | 2002–2007 | 2008–2013 | | 1990–1995 | 1996–2001 | 2002–2007 | 2008–2013 | | 1990–1995 | 1996–2001 | 2002–2007 | 2008–2013 | | 1990–1995 | 1996–2001 | 2002–2007 | 2008–2013 | |
| Nacional | 2.2 | 1.8 | 1.4 | 1.5 | | 1.3 | 1.0 | 0.6 | 0.7 | | 6.4 | 5.7 | 3.9 | 7.5 | | 23.9 | 18.9 | 13.4 | 27.1 | |
| Aguascalientes | 1.4 | 0.7 | 0.9 | 1.2 | | 0.0 | 0.1 | 0.1 | 0.7 | | 2.3 | 0.9 | 1.0 | 2.5 | | 5.9 | 4.2 | 3.9 | 7.8 | |
| B. California | 1.0 | 1.1 | 0.7 | 3.3 | | 0.5 | 0.6 | 0.4 | 0.9 | | 6.9 | 6.7 | 4.1 | 8.1 | | 26.2 | 29.7 | 23.0 | 45.9 | |
| Baja California S | 0.9 | 0.5 | 0.7 | 1.5 | | 0.0 | 0.3 | 0.5 | 0.6 | | 0.7 | 1.4 | 1.3 | 2.0 | | 9.4 | 8.9 | 8.0 | 8.8 | |
| Campeche | 0.5 | 0.7 | 0.5 | 2.5 | | 1.3 | 1.4 | 0.3 | 0.3 | | 4.8 | 3.5 | 0.9 | 2.4 | | 18.6 | 16.9 | 8.6 | 9.6 | |
| Coahuila | 0.6 | 0.5 | 0.6 | 1.3 | | 0.3 | 0.5 | 0.3 | 0.4 | | 5.0 | 5.1 | 2.8 | 11.5 | | 11.3 | 9.2 | 6.8 | 27.2 | |
| Colima | 1.3 | 3.0 | 1.9 | 2.0 | | 1.2 | 1.1 | 0.7 | 1.4 | | 3.4 | 2.9 | 2.1 | 4.0 | | 22.7 | 15.2 | 11.1 | 30.6 | |
| Chiapas | 1.6 | 1.8 | 0.9 | 0.9 | | 1.9 | 1.1 | 0.6 | 0.4 | | 5.4 | 6.1 | 3.9 | 2.6 | | 23.9 | 22.2 | 11.8 | 10.5 | |
| Chihuahua | 1.8 | 2.0 | 2.0 | 3.6 | | 0.9 | 1.4 | 0.7 | 2.6 | | 10.3 | 14.1 | 9.9 | 40.1 | | 23.5 | 30.3 | 24.5 | 148.7 | |
| Mexico City | 1.4 | 1.4 | 1.5 | 1.7 | | 0.8 | 0.8 | 0.5 | 0.5 | | 6.9 | 5.9 | 6.0 | 4.8 | | 19.9 | 17.3 | 13.2 | 15.2 | |
| Durango | 0.7 | 1.2 | 0.7 | 2.1 | | 0.6 | 0.4 | 0.1 | 1.1 | | 6.9 | 5.2 | 4.1 | 15.4 | | 29.9 | 22.3 | 17.2 | 64.9 | |
| Guanajuato | 0.7 | 1.0 | 0.8 | 1.0 | | 0.4 | 0.4 | 0.4 | 0.4 | | 3.0 | 3.4 | 1.6 | 3.8 | | 10.4 | 8.0 | 5.9 | 13.7 | |
| Guerrero | 0.8 | 1.9 | 1.2 | 1.7 | | 0.9 | 1.4 | 1.3 | 2.0 | | 6.7 | 8.5 | 5.9 | 21.0 | | 42.0 | 48.4 | 32.0 | 81.8 | |
| Hidalgo | 0.5 | 0.6 | 0.4 | 1.0 | | 0.6 | 0.5 | 0.1 | 0.3 | | 2.6 | 1.5 | 0.9 | 1.9 | | 9.8 | 8.4 | 4.2 | 7.4 | |
| Jalisco | 1.0 | 1.2 | 1.1 | 1.1 | | 0.8 | 0.5 | 0.4 | 0.6 | | 4.3 | 3.1 | 2.3 | 5.8 | | 18.2 | 13.9 | 9.9 | 21.3 | |
| México | 10.4 | 6.0 | 4.0 | 2.3 | | 4.5 | 2.2 | 1.3 | 0.8 | | 14.2 | 10.6 | 6.9 | 6.3 | | 39.5 | 26.2 | 17.7 | 20.8 | |
| Michoacán | 1.3 | 1.6 | 1.4 | 1.1 | | 1.3 | 1.7 | 0.9 | 0.4 | | 9.1 | 7.0 | 5.7 | 4.8 | | 45.2 | 27.8 | 22.9 | 26.3 | |
| Morelos | 2.5 | 2.2 | 0.7 | 1.2 | | 1.7 | 0.7 | 0.5 | 0.8 | | 6.3 | 7.1 | 2.6 | 11.2 | | 36.6 | 26.5 | 13.0 | 34.4 | |
| Nayarit | 0.9 | 1.0 | 1.8 | 2.4 | | 1.6 | 0.7 | 0.4 | 0.3 | | 5.9 | 5.5 | 2.6 | 11.1 | | 33.5 | 20.5 | 18.4 | 41.8 | |
| Nuevo Leon | 0.3 | 0.2 | 0.5 | 0.9 | | 0.1 | 0.2 | 0.3 | 0.6 | | 1.5 | 1.5 | 1.8 | 12.1 | | 4.5 | 4.2 | 5.2 | 27.5 | |
| Oaxaca | 2.3 | 1.5 | 1.2 | 1.5 | | 2.3 | 2.3 | 1.3 | 1.3 | | 10.2 | 8.9 | 6.4 | 6.0 | | 59.5 | 37.3 | 23.7 | 25.9 | |
| Puebla | 1.3 | 1.0 | 1.0 | 0.8 | | 1.0 | 0.9 | 0.6 | 0.4 | | 4.5 | 3.9 | 2.4 | 2.3 | | 18.4 | 14.3 | 9.6 | 10.3 | |
| Querétaro | 0.6 | 1.2 | 1.1 | 0.4 | | 0.2 | 0.6 | 0.1 | 0.2 | | 2.5 | 2.9 | 2.1 | 2.7 | | 9.6 | 10.2 | 6.4 | 7.3 | |
| Quintana Roo | 1.2 | 1.6 | 1.1 | 1.3 | | 0.9 | 0.8 | 0.8 | 0.4 | | 3.2 | 2.7 | 3.8 | 2.9 | | 16.6 | 14.1 | 12.9 | 15.5 | |
| San Luis P. | 0.5 | 1.8 | 0.8 | 2.0 | | 0.4 | 1.8 | 0.4 | 0.3 | | 5.6 | 6.9 | 3.9 | 6.3 | | 14.6 | 15.7 | 8.6 | 16.8 | |
| Sinaloa | 0.9 | 0.7 | 0.6 | 1.6 | | 0.8 | 1.1 | 0.8 | 0.8 | | 9.5 | 7.6 | 3.6 | 17.1 | | 39.7 | 33.9 | 24.4 | 74.1 | |
| Sonora | 0.4 | 1.3 | 1.3 | 1.9 | | 0.4 | 0.6 | 0.2 | 0.5 | | 5.2 | 5.8 | 2.6 | 5.2 | | 18.4 | 18.9 | 15.1 | 29.1 | |
| Tabasco | 0.6 | 0.8 | 0.4 | 0.7 | | 0.7 | 0.5 | 0.2 | 1.1 | | 3.2 | 3.4 | 1.9 | 2.3 | | 16.3 | 11.3 | 8.7 | 12.6 | |
| Tamaulipas | 1.3 | 1.2 | 0.9 | 1.4 | | 0.4 | 0.6 | 0.3 | 0.5 | | 4.9 | 4.7 | 3.1 | 11.2 | | 16.7 | 14.6 | 11.7 | 31.3 | |
| Tlaxcala | 0.4 | 2.0 | 2.3 | 2.6 | | 0.4 | 1.0 | 0.1 | 0.4 | | 2.7 | 3.4 | 1.8 | 1.6 | | 7.6 | 9.0 | 5.7 | 8.2 | |
| Veracruz | 0.5 | 0.5 | 0.5 | 0.7 | | 0.7 | 0.5 | 0.4 | 0.4 | | 2.9 | 2.4 | 1.6 | 3.8 | | 15.9 | 10.3 | 7.2 | 12.0 | |
| Yucatán | 0.1 | 0.1 | 0.3 | 0.5 | | 0.4 | 0.2 | 0.1 | 0.2 | | 1.2 | 1.2 | 0.7 | 1.2 | | 5.3 | 3.7 | 3.6 | 3.0 | |
| Zacatecas | 0.9 | 0.7 | 0.3 | 0.8 | | 0.6 | 0.1 | 0.5 | 0.3 | | 5.2 | 2.8 | 3.0 | 9.8 | | 14.7 | 11.2 | 8.7 | 20.8 | |

Source: own calculations based on INEGI's mortality vital statistics.

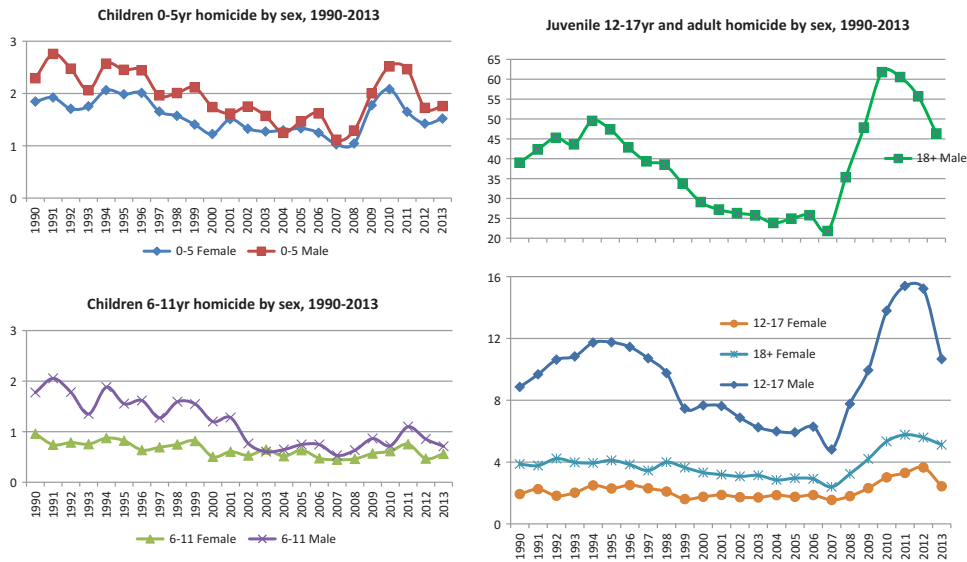


Figure A2. Homicide rates in Mexico by sex, 1990–2013 (per 100,000)