Estimating Potential Gains in Life Expectancy by Reducing Violent Deaths in Selected Countries

By: Brodie Ferguson[‡†], Jorge A. Restrepo[†◊], Adriana Villamarín[†◊1]

Abstract

Injuries account for some 5 million deaths in the world each year, and nearly a third of these (1.6 million) are recognizable intentional. We assess the immediate demographic cost of mortality due to intentional violence in over 90 countries using population and mortality data collected from international organizations and country statistical offices for the year 2004, and attempt an economic costing valuation. We employ multiple decrement life table analysis to estimate the potential gains in life expectancy (PGLEs) that could be achieved by reducing the risk of intentional injury deaths to a proposed "regular" level of 1.27 deaths per 100,000 persons. Regional PGLEs range from 0.44 years for men in the Americas to 0.02 years for women in the Western Pacific. Violence prevention programs are likely to have the highest overall impact in countries such as Jamaica, Colombia, and Brazil characterized by both relatively high life expectancies and high levels of homicides.

Key words: Potential Gains in Life Expectancy, Homicides, Violent Deaths, Costing Armed Violence

1 Introduction

With more than 5 million deaths every year, injuries account for 9% of global mortality, more than HIV, malaria, and tuberculosis combined (World Health Organization 2008). Just under a third of injuries worldwide (1.6 million) are recognizably intentional; half of these are self-inflicted and half result from interpersonal violence and war. While there are a number of challenges associated with the cross-national comparison and interpretation of data on violent injuries, researchers have conducted several cross-national and historical analyses of police and public health statistics on intentional homicide (Gartner and Parker 1990; LaFree 2005; Stamatel 2008). Such studies have identified statistical links between homicide and other forms of violent crime (van Wilsem 2004) as well as correlations with political, economic and social variables that have served to support or refute criminological theories and to identify different determinants of homicide (Fajnzylber, Lederman et al. 1998; Collier and Hoeffler 2004; Bye 2008).

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At the same time, other work has addressed the range of direct and indirect costs associated with violent crime and injury mortality (Mayhew 2003; Cameron and DeShazo 2005; Florquin 2006; Corso, Mercy et al. 2007). Direct costs traditionally include costs associated with hospital stays or property damage, for example, while indirect costs are incurred through incapacity such as lost productivity in the workplace or inability to care for a child. As one of the leading causes of premature deaths, assessments of the non-monetary, indirect costs of violent injuries are often expressed in terms of summary measures that highlight the impact of mortality at younger ages, such as disability-adjusted life years (DALYs) or potential years of life lost (PYLLs). However, although widely used for this purpose, these measures are not ideal for assessing the impact of injury mortality risk on a population.

In this paper, we assess the human cost of mortality due to intentional violence in over 90 countries for which detailed information is available, by using multiple decrement life table analysis to estimate the potential gains in life expectancy (PGLEs) that could be achieved by reducing the risk of intentional injury deaths to a regular level of societal intentional violence. PGLEs represent the added years of life expectancy the population would receive if the deaths from a particular cause were reduced or eliminated as a competing risk of death (Lai and Hardy 1999). Unlike PYLLs, PGLEs properly take competing risks into account; if an individual does not die of cause *j*, he or she is still exposed to other disease and injury risks over the course of the lifespan and may still die of cause *k*. Furthermore, PGLEs are more comparable across countries, since the measure is independent of both the size and age structure of the population.

Section 2 describes the data and data sources used in this paper. Section 3 explains the method of multiple decrement life tables and associated single decrement life tables. Section 4 describes the main results. Finally section 5 includes a discussion about advantages of PGLEs compared to other measures. Section 5 also includes a discussion about possible biases in the results for some countries.

2 Data

Multiple decrement life tables require population and deaths data typically disaggregated by sex and five-year age group. Population estimates by country, sex, and five-year age group for the year 2004 were obtained from the United Nations Population Division (United Nations Population Division 2008). Estimates of total deaths (from all-causes combined) for the same year by country, sex, and five-year age group come from the World Health Organization (World Health Organization 2004). These data have already been adjusted for completeness by the respective organizations providing the data, and are sufficient to prepare abridged life tables by sex for the year 2004 for each country included in the study.

Associated single decrement life tables, however, require further information on cause-specific mortality. In order to assess the impact of intentional violent injury deaths (homicide) on overall survivorship, we collected estimates of homicides by country from a variety of sources. First, we included all homicides reported to the WHO by Member States through annual reporting commitments (World Health Organization 2008). While such deaths are typically reported by age group and sex, not all countries report, and those that do report exhibit varying degrees of detail and completeness of registration. Next, we reviewed the results of the WHO Global Burden of Disease Study (World Health Organization 2002), which draws on a wide range of data sources and includes deaths due to violence among other causes analyzed. While data from this study have been adjusted for incompleteness, they are not available by age group and only for the year 2002.

In an effort to validate and supplement the WHO mortality data, we conducted an extensive search of government websites for additional data on homicides. Reported homicides for the year 2004 were available for Pakistan (Government of Pakistan 2008), Bolivia (Government of Bolivia 2008), Canada (Government of Canada 2008), Paraguay (Government of Paraguay 2008), Serbia (Government of Serbia 2008), Yemen (Government of Yemen 2008), Argentina (Government of Argentina 2008), Russia (Government of Russia 2008), Malaysia (Government of Malaysia 2008), and Brazil (Government of Brazil 2008). Other websites providing valuable homicide information included the Cleen Foundation (Nigeria) and the Central American Observatory Against Violence (El Salvador, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Belize and the Dominican Republic) (Cleen Foundation 2008; OCAVI 2008). Lastly, we draw data from the 9th Survey of the United Nations Office on Drugs and Crime (UNODC) covering 69 countries during 2003-2004 (United Nations Office on Drugs and Crime 2004).

3 Methods

3.1 Inclusion Criteria and Assumptions

In order to focus the analysis on countries in which violence prevention programs are likely to have a meaningful impact, we limit our analysis to those countries that rank in the 5th percentile or above globally in terms of either population size or total number of homicides. In addition to these countries, we chose to include Guatemala, Iraq, and Jamaica due to their very high homicide rates, even though they failed to meet either of the selection criteria.

Although homicide rates may be very low or even zero in small countries in a given year, it is unreasonable to expect violence prevention programs to reduce the underlying risk of violent injury death in a society to zero. In this analysis, we investigate the potential impact in terms of life expectancy that would be observed by reducing the homicide rate in a given society to a "regular" societal level. In this case, we define "regular" to be the average rate reported across a set of twenty-seven low-violence countries, or 1.27 homicides per 100,000 inhabitants (see Table 3 for a list of these countries).

While information on total reported homicides was available for all countries included, data was not always specifically available for 2004, although this was the most recent year with greater data availability. In cases where data was available for other years but not 2004, we made every attempt to interpolate or extrapolate in order to arrive at a sound estimate. For 39 of the 94 countries included in the study (41%), estimates from the WHO Burden of Disease study (2002) were the only data available, and it was necessary to assume that the level of homicides in 2004 was equal to that reported for the year 2002. These homicides represent 32% of all homicides included in the study.

Similarly, it was necessary to make certain assumptions regarding the distribution of a country's homicides by age group and sex, since data disaggregated by these attributes was rarely available. The distribution of homicides by age and sex was assumed to be the same for all countries included in the study. We estimate this distribution by averaging the values of the age-sex distributions for four countries for which such data was available: Colombia, Brazil, India, and the United States (see Figure 1Figure 1: Distribution of Homicides by Age Group). The data available for these countries are consistent with patterns reported in other settings in which injury mortality is largely concentrated among young adults, and particularly among young men (Wilson and Daly 1985; Lester 1986; Wilson and Daly 1997).

3.2 Multiple Decrement Life Tables

We employ a multiple-decrement life table to measure the extent to which homicidal violence impacts life expectancy at birth in the selected countries. Multiple decrement life table analysis allows "removal" of deaths due to a particular cause (cause attribution), such as deaths attributable to external injuries or intentional external injuries. We begin by extending survivorship from the terminal 80+ age group to a 100+ hypothetical age group using the method proposed by Coale and Guo (1989).

We denote the probability of dying of cause *i* in the interval [*x*, *x*+*n*) as ${}_nq_x^i$. The probability of mortality from the *i*th cause can be calculated directly from the master life table simply by multiplying this master probability by the ratio of the observed number of deaths in cause *i* to the total number of deaths for the age interval: d_x^i

$$ {}_nq_x^i = {}_nq_x \frac{{}_nD_x^i}{{}_nD_x}, \quad (0.1) $$

assuming the period mortality rate, ${}_nM_x$ is a reasonable approximation of the cohort mortality rate ${}_nm_x$.

While these probabilities are interesting in and of themselves, as a measure of ex-post risk, in terms of the cost of violence and violence reduction interventions it is more convenient to consider levels instead of risk. We thus center our interest in a more tangible quantity of l_x^i, the number of individuals of exact age *x* who will ultimately exit the population via cause *i*. This value is simply the sum of the number of exits from cause *i* at all ages greater than *x*:

$$ l_x^i = \sum_{y=x}^{\infty} {}_nd_x^i, \quad (0.2) $$

where ${}_nd_x^i = l_x\,{}_nq_x^i$.

3.3 Associated Single Decrement Life Tables

From a multiple-decrement life table, we can also calculate the associated single-decrement life table (ASDLT), where cause of death *i* is removed. The ASDLT allows us to calculate the difference in life expectancy that would arise in the hypothetical situation of entirely removing cause of death *i*.

We employ Chiang's (1984) proportional hazards method for calculating the ASDLT. Following this approach, the key calculation converts ${}_np_x$, the overall probability of surviving from age *x* to age *x*+*n* to ${}_n^*p_x^{-i}$ the (hypothetical) probability of surviving the interval if cause *i* were eliminated. To make this conversion in the proportional hazards framework we raise ${}_np_x$ to the power of R^{-i}, where R^{-i} is the complement of the proportion of deaths arising from cause *i*:

$$ {}_n^*p_x^{-i} = {}_np_x^{R^{-i}}, \quad (0.3) $$

$$R^{-i} = \frac{{}_nD_x - {}_nD_x^i}{{}_nD_x}. \qquad (0.4)$$

Calculation of the ASDLT also requires an assumption for the ${}_na_x$ schedule, the average number of years lived by people dying in the interval x to $x + n$. When a force of decrement in an interval is high, the age distribution of deaths in that interval will be young, so care must be exercised in specifying this schedule. The ${}_na_x$ schedule is the linchpin that allows us to move from the observed rates to the probabilities that comprise the life table. We employ a mixed strategy for specifying ${}_na_x$. For countries (or lower geographical areas) where violent death is relatively rare, for ages below 15 and above 75, and for women more generally, we simply use the ${}_na_x$ schedule of the master life table. For all other ages and classes we use the quadratic graduation suggested by Preston et al. (2001). Attempting to graduate the ${}_na_x$ schedule for populations experiencing very low levels of violent death or in age classes where the number of deaths is changing very rapidly, causes the values of ${}_n^*a_x^i$ to be very unstable because of the very small numbers in the denominator of Equation 1. When the number of decrements from cause i is a very small fraction of the total observed deaths, the assumption that cause i has the same within-age-class age pattern is not unreasonable.

4 Results

The 94 countries included in the sample experienced a total of 447,490 homicides in 2004, equivalent to a rate of approximately 7 per 100,000 population. Average life expectancy across all countries included in the analysis was 62.39, which is notably less than the official global estimate of 65.4 (both sexes combined) for the period 2000-2005 (United Nations Population Division 2005). This is consistent with the inclusion criteria described above whereby countries with the lowest levels of population and/or homicides were not considered.

World life expectancy would be expected to increase to 62.54 if homicides were reduced to the regular level. That is, on average, global citizens could expect to live slightly less than two months longer if excess violence were addressed through effective policies of control and prevention. This is a highly conservative estimate that reflects a considerable degree of incompleteness of registration and masks substantial differences by gender and country. For example, potential gains in life expectancy (PGLEs) for men overall equal 0.16 years. Among women, life expectancy without homicides was 66.87 years while life expectancy with homicides was 66.78, representing a potential gain of 0.09 years (See Figure 5**¡Error! No se encuentra el origen de la referencia.**). Thus, on a global scale, the burden of intentional violent injury deaths borne by men is roughly twice that borne by women.

Calculation of PGLEs for each of the six WHO Regions reveals substantial differences at the regional level. In 2004, the Americas experienced both the highest number of reported homicides and the highest regional homicide rate per 100,000 inhabitants with 132,355 homicides corresponding to a rate of 16 homicides per 100,000 inhabitants (Figure 4). Regional male life expectancy without homicides (E_x2) and with homicides (E_x1) were 69.54 and 69.10 years respectively, (see Table 1 Figure 5), while females the corresponding values were 74.96 and 74.70, respectively. These represent potential gains in life expectancy of 0.44 years for males and 0.26 years for females, the highest values among the regions studied. We estimate that for North America specifically, 16,770 homicides occurred during 2004, implying a homicide rate of 5 per 100,000 inhabitants. This high regional rate in the Americas is driven largely by high levels of homicides observed in high-population countries of Latin America, particularly Colombia, Venezuela, and Brazil. Nonetheless, other countries in the region, such as Jamaica, El Salvador, Guatemala, Honduras, and Bolivia, register the highest homicide rates in the world (see Figure 6). Jamaican men, for example, show the largest potential gains in life expectancy of any country in the study, from 69.20 years to 71.01 years, a difference of 1.81 years.

Africa shows the second highest level of homicides with 91,359, just behind the Americas and ahead of Southeast Asia; however, the regional homicide rate (13 per 100,000) is similar to that of the Americas and over twice that of Southeast Asia. Unlike the Americas, however, a high proportion of violent deaths in Africa can be attributed to armed conflict. Africa shows the lowest life expectancy of any region by far, with inhabitants living some two decades less than their counterparts in the Americas, Europe, and Western Pacific. Male life expectancy would be expected to increase from 48.06 to 48.34 (0.29 years) in the absence of excess violent deaths, while female life expectancy would be expected to increase from 50.62 to 50.78 (0.16 years). The meager gains in life expectancy relative to other regions can be attributed to a variety of competing risks present in the African context, such as HIV, malaria, and tuberculosis. Somalia, South Africa, Sudan, and Angola ranked particularly high in terms of potential gains in life expectancy for both men and women.

A total of 54,626 homicides were reported in for the European Region in 2004, concentrated largely in the countries of Eastern Europe, particularly the Russian Federation, Kazakhstan, Ukraine, and Belarus. The rate per 100,000 population was 8, considerably lower than that observed in both the Americas and Africa. Male life expectancy was found to increase 0.22 years from 69.63 to 69.85 with violent deaths reduced to the regular level, while female life expectancy was observed to increase from 76.21 to 76.35 (0.13 years). Females in Europe show the highest life expectancy of any population included in the study. Nonetheless, females in the Russian Federation could expect to live nearly six months (0.46 years) longer in the absence of homicide. Russian life expectancy for men was observed to increase from 59.68 years to 60.28 years, a potential gain of 0.61 years.

The three least violent regions in terms of reported homicides were Southeast Asia (83,978 homicides), the Eastern Mediterranean (28,276 homicides), and the Western Pacific (43,364 homicides). Southeast Asia and the Eastern Mediterranean both registered rates of approximately 5 homicides per 100,000 inhabitants (approximately equal to the rate of North America), while the Western Pacific was the region with the lowest homicide rate at 3 per 100,000. The Southeast Asia and Western Pacific Regions include India and China, respectively, which themselves account for over 40% of the global population. Both India and China register negligible potential gains in life expectancy (0.04 years and 0.03 years for males, respectively) due to low levels of reported homicides. Life expectancy was observed to increase 0.11 years (males) and 0.06 years (females) through reduction of homicides in Southeast Asia, while potential gains in the Eastern Mediterranean and Western Pacific were even less (0.1 years for males and 0.06 for females in the Eastern Mediterranean). On average, women in Southeast Asia would expect to live only 0.02 years (about one week) longer in the absence of homicides.

5 Discussion

Although not widely used in assessing premature mortality, potential gains in life expectancy (PGLEs) offer a number of advantages relative to other demographic summary measures. First, unlike PYLLs, they enable comparison of the impact of a particular risk across countries by taking the size and age structure of a population into account. Second, by including information on other types of mortality risk present in the population, they more accurately estimate the true impact of a mortality risk in terms of overall life expectancy. In high-mortality contexts characteristic of many of the African countries included in this study, a standard PYLL approach would overestimate the impact of reductions in violence in improving life expectancy by failing to properly account for the possibility that the "saved" individual dies of another cause over his or her lifespan.

Nonetheless, care must be taken in interpreting the results of the study due to the nature of the data on which it is based. The quality of mortality statistics varies widely across different settings, and some areas may completely lack systems of registration of vital events. This study employs national level estimates obtained from national and international registries of police and health statistics. When compared with police recorded figures, Van Dijk (2007) notes that differences between health and police statistics are especially marked in developing countries, in which health statistics are around 45 percent higher than police-recorded figures and his figure drops to 19% for middle income countries, while for higher income countries, such as West and Central Europe, differences between the two appear to follow no set pattern. Aguirre y Restrepo (2007) found smaller differences in the case of Colombia. While police and health statistics do measure different phenomena, large differences between the two may indicate significant weaknesses in the capacity of police and law enforcement information systems to identify and record homicide events.

In particular, estimates of PGLEs in this paper are likely to be substantially downwardly biased for African countries, where information is particularly lacking. While the all-cause mortality estimates were adjusted for coverage by the WHO prior to publication, the intentional injury deaths were used as reported without modification by the authors. Thus, the countries and regions with the lowest levels of registration of vital events are likely to be the most biased in our analysis. Countries such as Colombia and Brazil have both high levels of homicides as well as relatively functional systems of vital registration, whereas other countries, such as Somalia and Sudan, are likely to have artificially low PGLEs given the under-registration of deaths in these settings.

However, differences in the rankings of these four countries in terms of PGLEs can also be attributed to the fact that while their age distributions of violent deaths are likely to be similar, Colombia and Brazil show much higher life expectancies than Somalia and Sudan. This is due to the fact that other causes of death, such as AIDS or complications during childbirth, show a stronger presence as competing risks in the African countries. This has important implications with respect to the design of policies and programs aimed at curbing violence and encouraging development. Violence prevention programs will be most effective, in relative terms of overall population health and development, in settings such as Cali or Rio de Janeiro where there are relatively few competing risks of mortality at young ages. Improved security in the African context, however, must be pursued in conjunction with other efforts to address other causes of premature death and disability, such as HIV/AIDS.

Similarly, changes in the lethality of violence and differences in the nature or typology of violent injuries experienced by the countries included in this study warrant particular attention. Research shows that, despite the proliferation of increasingly dangerous weapons and an increase in the number of serious criminal assaults in developing countries since 1960, the lethality of such assaults has dropped dramatically thanks to developments in medical technology and related medical support services both in North America and Western Europe (Harris, Thomas et al. 2002; Aebi 2004). Similarly, there is consistent evidence on the overall reduction in the number of intra-State and interstate conflicts and significant medium-term reductions of the number of direct casualties due to conflicts. In contrast, there is no consistent evidence on evolution of intentional homicide rates and its impact on societies. Most likely, post-conflict settings and those in which processes of violence transformation -from organized group violence towards more unstructured, are the ones contributing the burden of life lost due to violence.

6 Annexes

6.1 Figures

Figure 1: Distribution of Homicides by Age Group (Males, 2004)

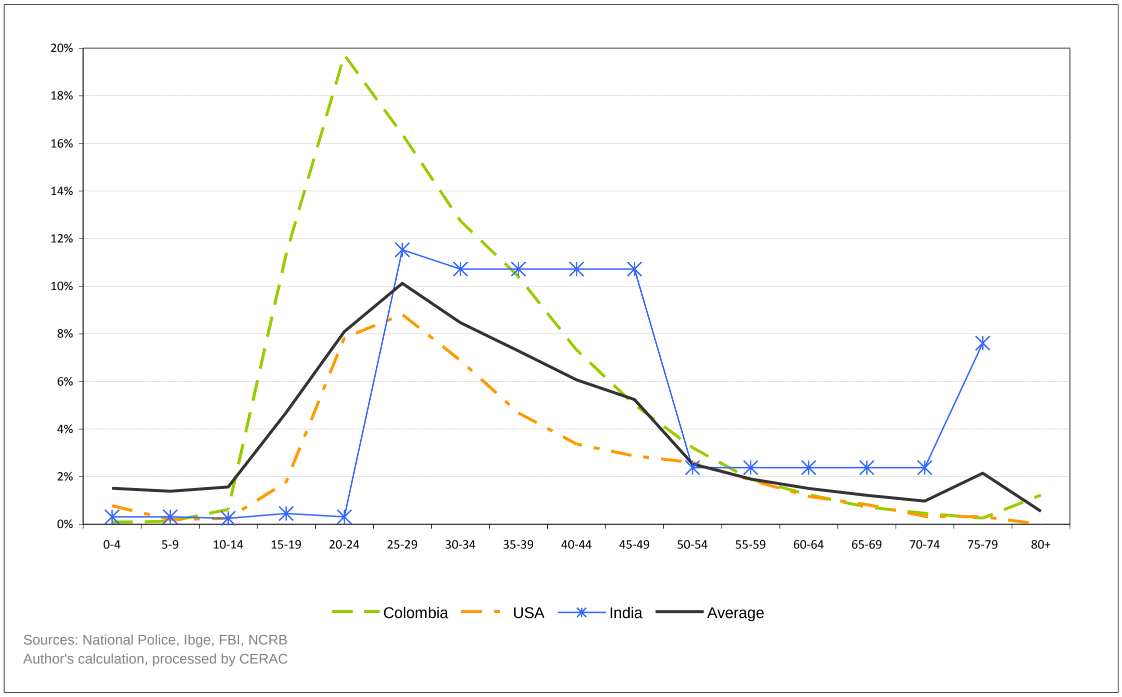


Figure 2: Distribution of Homicides by Age Group (Females, 2004)

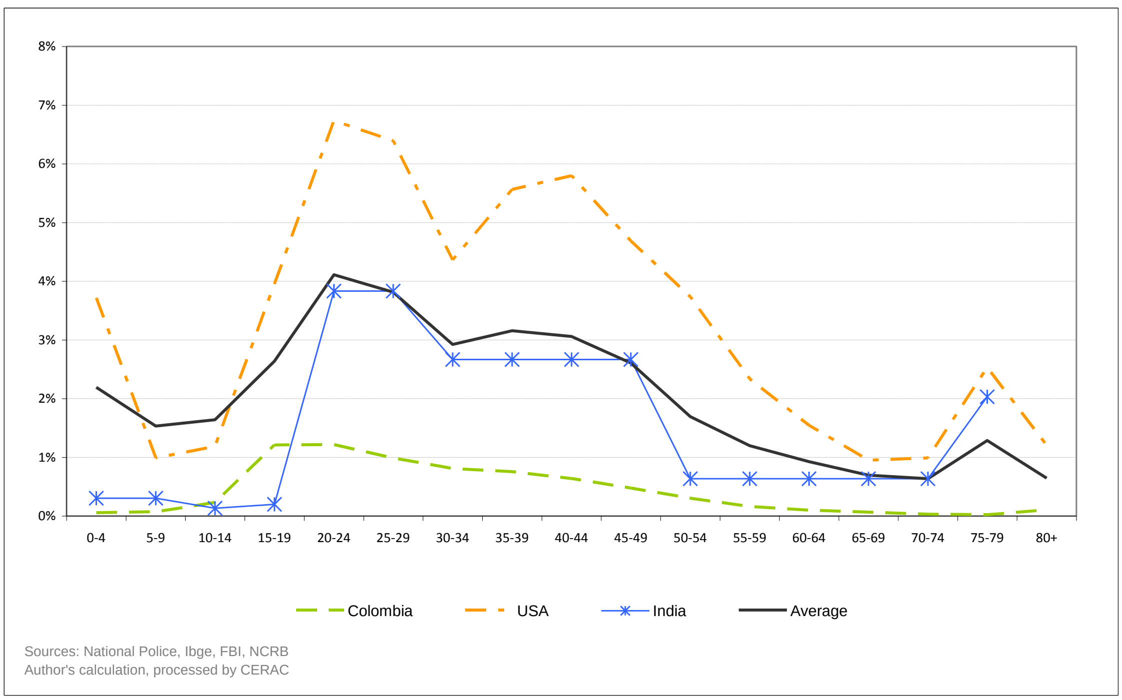


Figure 3: Log Death Rate and Log Homicide Rate by Age Group and Gender

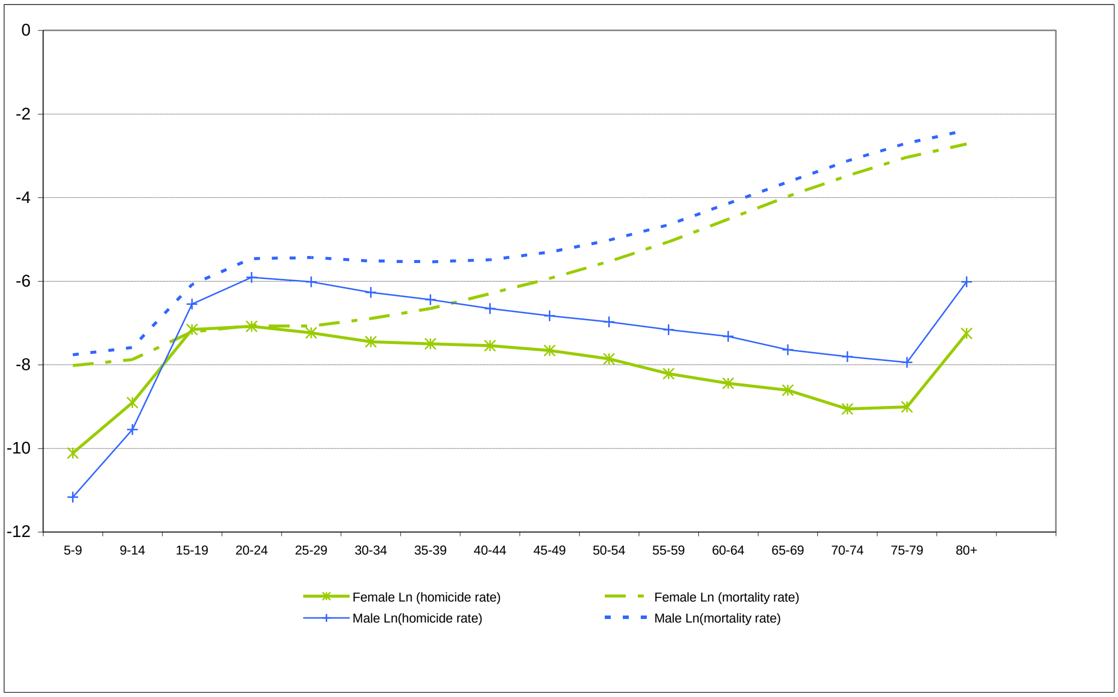


Figure 4: Total Homicides and Homicide Rate (per 100,000) by Region

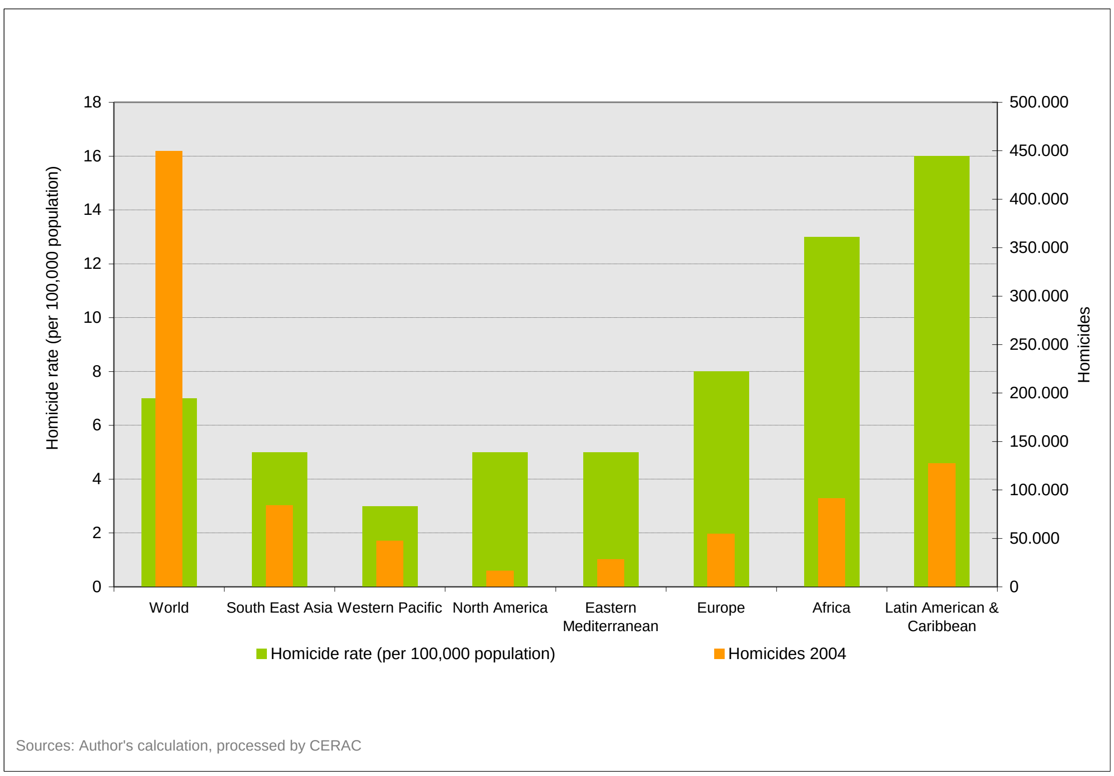
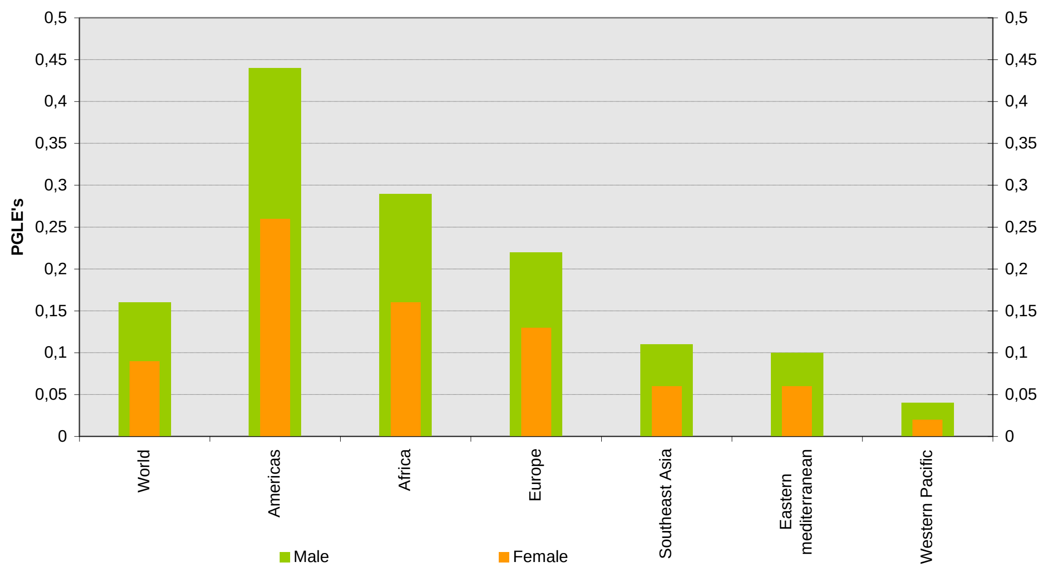
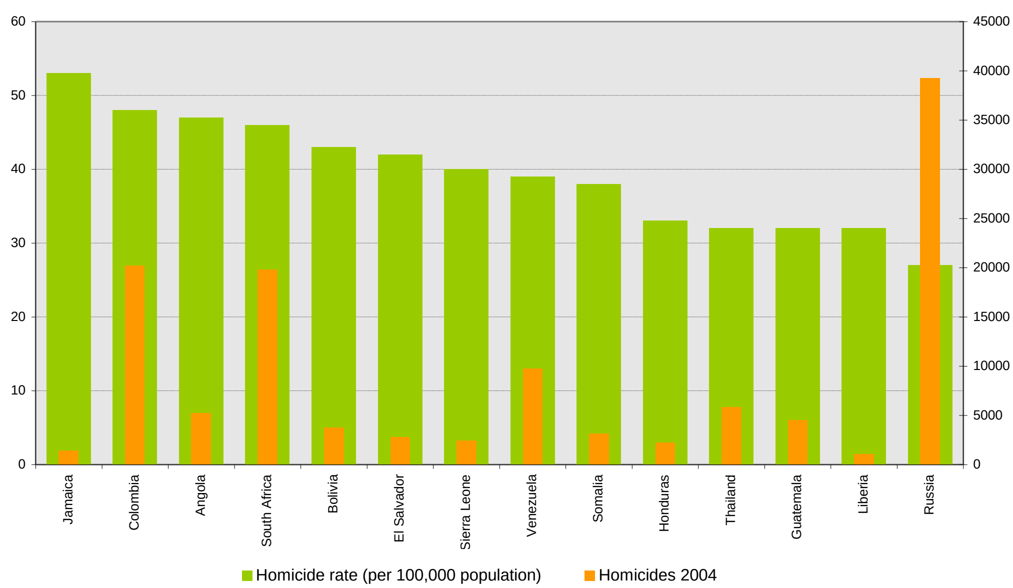


Figure 5: Potential Gains in Life Expectancy (PGLEs) by Region



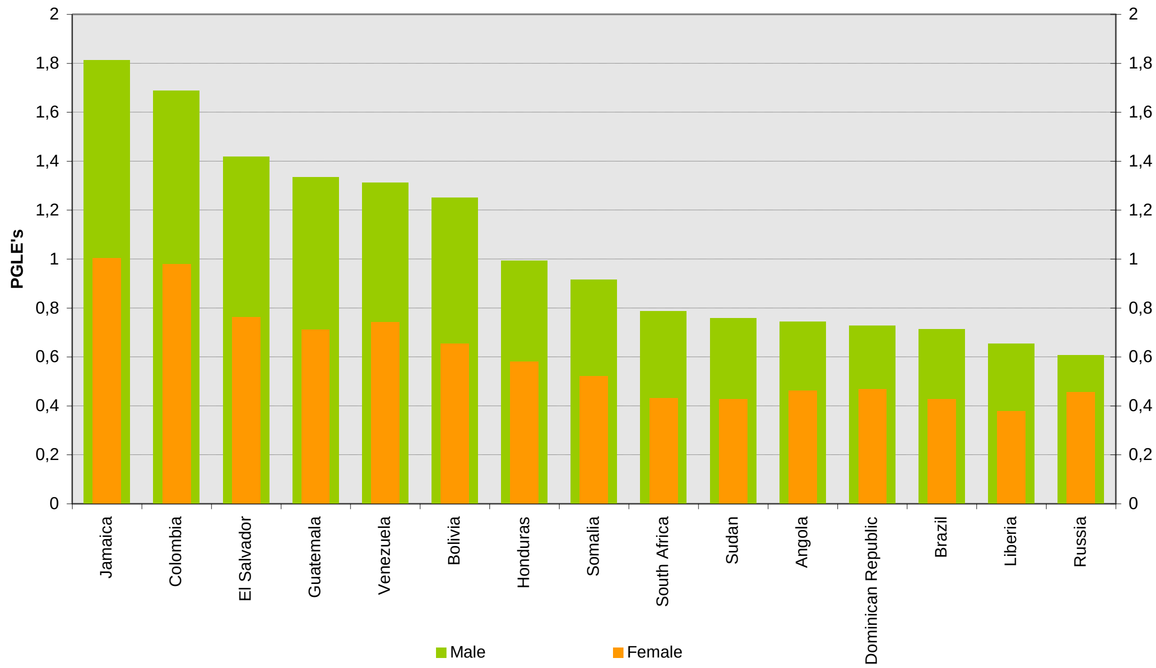
Sources: Author's calculations, processed by CERAC

Figure 6: Total Homicides and Homicide Rate (per 100,000) for Selected Countries



Sources: Author's calculation, processed by CERAC

Figure 7: Potential Gains in Life Expectancy (PGLEs) by Gender and Country



Sources: Author's calculation, processed by CERAC

6.2 Tables

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Table 1: Databases of Countries Included in the Analysis

Country	UNODC	WHO-GBD 2002	WHO SAS 2004	Other Sources
Aaland Islands				
Afghanistan		X		
Albania	X	X	X	
Algeria		X		
American Samoa				
Andorra		X		
Angola		X		
Anguilla				
Antarctica				
Antigua And Barbuda		X		
Argentina		X		X
Armenia		X		
Aruba				
Australia		X		
Austria	X	X	X	
Azerbaijan		X		
Bahamas		X		
Bahrain		X		
Bangladesh		X		
Barbados		X		
Belarus		X		
Belgium		X		
Belize		X		X
Benin		X		
Bermuda				
Bhutan		X		
Bolivia		X		X
Bosnia And Herzegowina		X		
Botswana		X		
Bouvet Island				
Brazil		X		X
British Indian Ocean Territory				
Brunei Darussalam	X	X		
Bulgaria	X	X	X	
Burkina Faso		X		
Burundi		X		
Cambodia		X		
Cameroon		X		
Canada		X		X
Cape Verde		X		
Cayman Islands				
Central African Republic		X		
Chad		X		
Chile		X		
China		X		X
Christmas Island				
Cocos (Keeling) Islands				
Colombia	X	X	X	X

Country	UNODC	WHO-GBD 2002	WHO SAS 2004	Other Sources
Comoros		X		
Drc		X		
Congo, Republic Of		X		
Cook Islands		X		
Costa Rica	X	X	X	X
Cote D'Ivoire		X		
Croatia (Local Name: Hrvatska)		X		
Cuba	X	X	X	
Cyprus		X		
Czech Republic	X	X	X	
Denmark		X		
Djibouti		X		
Dominica		X		
Dominican Republic		X		X
Ecuador	X	X	X	
Egypt		X		
El Salvador		X		X
Equatorial Guinea		X		
Eritrea		X		
Estonia	X	X	X	
Ethiopia		X		
Falkland Islands (Malvinas)				
Faroe Islands				
Fiji		X		
Finland	X	X	X	
France		X		
French Guiana				
French Polynesia				
French Southern Territories				
Gabon		X		
Gambia		X		
Georgia		X		
Germany	X	X	X	
Ghana		X		
Gibraltar				
Greece	X	X	X	
Greenland				
Grenada		X		
Guadeloupe				
Guam				
Guatemala		X		X
Guinea		X		
Guinea-Bissau		X		
Guyana		X		
Haiti		X		
Heard And Mc Donald Islands				
Honduras		X		X
Hong Kong			X	
Hungary	X	X	X	
Iceland	X	X	X	
India		X		X

Country	UNODC	WHO-GBD 2002	WHO SAS 2004	Other Sources
Indonesia		X		
Iran		X		
Iraq		X		
Ireland	X	X	X	
Israel		X		
Italy		X		
Jamaica		X		X
Japan		X	X	
Jordan		X		
Kazakhstan	X	X	X	
Kenya		X		
Kiribati		X		
Korea, Democratic People's Republic Of		X		
Korea, Republic Of		X	X	
Kuwait		X		
Kyrgyzstan	X	X	X	
Lao People's Democratic Republic		X		
Latvia	X	X	X	
Lebanon		X		
Lesotho		X		
Liberia		X		
Libyan Arab Jamahiriya		X		
Liechtenstein				
Lithuania	X	X	X	
Luxembourg	X	X	X	
Macau	X			
Macedonia		X		
Madagascar		X		
Malawi		X		
Malaysia		X		X
Maldives		X		
Mali		X		
Malta	X	X	X	
Marshall Islands		X		
Martinique				
Mauritania		X		
Mauritius	X	X	X	
Mayotte				
Mexico	X	X	X	
Micronesia, Federated States Of		X		
Moldova, Republic Of	X	X	X	
Monaco		X		
Mongolia	X	X		
Montserrat				
Morocco		X		
Mozambique		X		
Myanmar		X		
Namibia		X		
Nauru		X		

Country	UNODC	WHO-GBD 2002	WHO SAS 2004	Other Sources
Nepal		X		
Netherlands	X	X	X	
Netherlands Antilles				
New Caledonia				
New Zealand		X		
Nicaragua		X		X
Niger		X		
Nigeria		X		X
Niue		X		
Norfolk Island				
Northern Mariana Islands				
Norway	X	X	X	
Oman		X		
Pakistan		X		X
Palau		X		
Palestinian Territory, Occupied				
Panama	X	X	X	X
Papua New Guinea		X		
Paraguay		X		X
Peru		X		
Philippines		X		
Pitcairn				
Poland	X	X	X	
Portugal		X		
Puerto Rico				
Qatar		X		
Reunion				
Romania	X	X	X	
Russian Federation	X	X	X	X
Rwanda		X		
Saint Helena				
Saint Kitts And Nevis		X		
Saint Lucia		X		
Saint Pierre And Miquelon				
Saint Vincent And The Grenadines		X		
Samoa		X		
San Marino				
Sao Tome And Principe		X		
Saudi Arabia		X		
Senegal		X		
Serbia And Montenegro		X		X
Seychelles		X		
Sierra Leone		X		
Singapore	X	X		
Slovakia	X	X	X	
Slovenia	X	X	X	
Solomon Islands		X		
Somalia		X		
South Africa	X	X	X	X
South Georgia And The South Sandwich Islands				
Spain	X	X	X	

Country	UNODC	WHO-GBD 2002	WHO SAS 2004	Other Sources
Sri Lanka		X		
Sudan		X		
Suriname		X		
Svalbard And Jan Mayen Islands				
Swaziland		X		
Sweden		X		
Switzerland	X	X	X	
Syrian Arab Republic		X		
Taiwan				
Tajikistan		X		
Tanzania, United Republic Of		X		
Thailand		X		
Timor-Leste		X		
Togo		X		
Tokelau				
Tonga		X		
Trinidad And Tobago		X		X
Tunisia		X		
Turkey		X		
Turkmenistan		X		
Turks And Caicos Islands				
Tuvalu		X		
Uganda		X		
Ukraine	X	X	X	
United Arab Emirates		X		
United	X	X	X	
United States		X		X
United States Minor Outlying Islands				
Uruguay		X		
Uzbekistan	X	X	X	
Vanuatu		X		
Vatican City State (Holy See)				
Venezuela (Bolivarian Republic Of)		X		X
Viet Nam	X	X		
Virgin Islands (British)				
United States Virgin Islands				
Wallis And Futuna Islands				
Western Sahara				
Yemen		X		X
Zambia		X		
Zimbabwe		X		

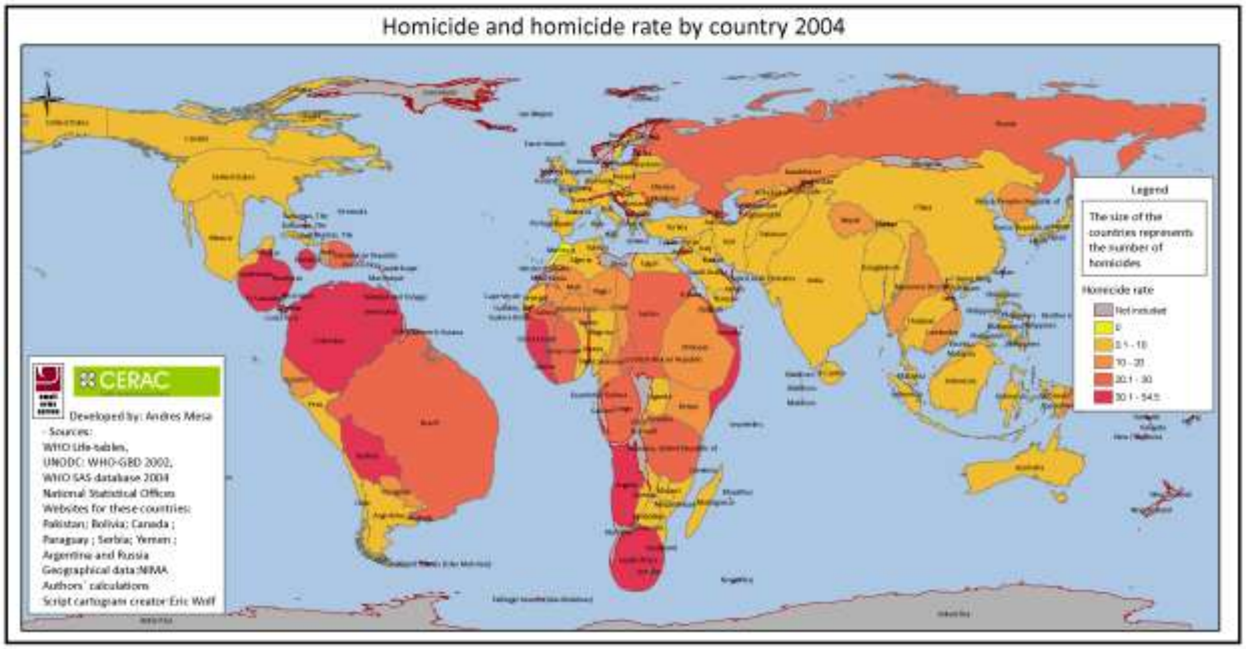
Source:WHO life-tables; UNODC; WHO-GBD 2002; WHO SAS database 2004; National Statistical Offices Websites for these countries: Pakistan, Bolivia, Canada, Paraguay, Serbia, Yemen, Argentina and Russia.

Table 3: Homicide Rates for Selected Low-Level Countries, 2004

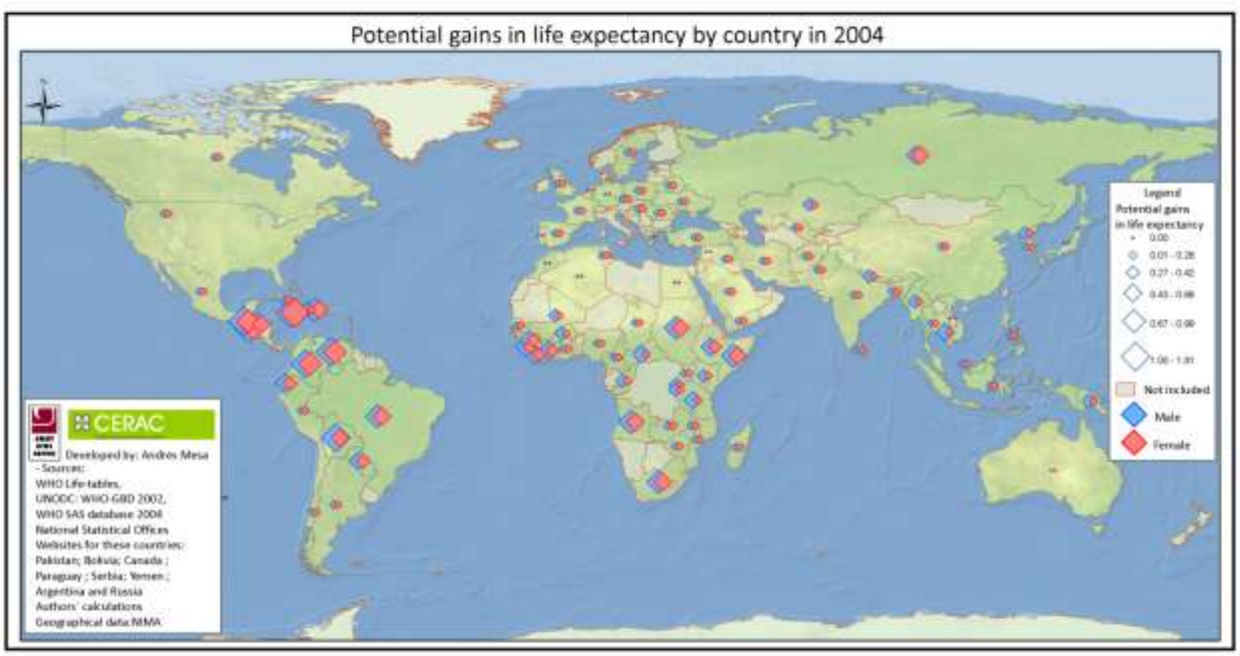
Country	Homicide Rate (2004)	Country	Homicide Rate (2004)
Canada	1.95	Italy	1.23
Croatia	1.83	Syria	1.14
Portugal	1.79	Iceland	1.03
Malta	1.75	Germany	0.98
Chile	1.71	Bahrain	0.98
Cyprus	1.70	Ireland	0.91
Poland	1.64	Denmark	0.79
France	1.64	Norway	0.78
England	1.62	Qatar	0.77
Bermuda	1.56	United Arab Emirates	0.63
Slovenia	1.47	Hong Kong	0.63
Algeria	1.39	Singapore	0.49
Brunei	1.37	Morocco	0.47
Australia	1.28	*Average*	*1.24*

6.3 Maps

Map 1: Total Homicides and Homicide Rate for Selected Countries, 2004



Map 2: Potential Gains in Life Expectancy (PGLEs) by Country, 2004



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