Civil Wars Kill and Maim People—Long after the Shooting Stops

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Abstract

The human suffering caused by civil war extends well beyond the direct casualties and beyond the span of the war. We examine these longer-term effects in a cross-national (1999) analysis of World Health Organization new fine-grained data on death and disability broken down by age, gender, and type of disease or condition. We test concrete hypotheses about the impact of civil wars, and find substantial long-term effects, even after controlling for several other factors. We estimate that the additional burden of death and disability incurred in 1999, from the indirect and lingering effects of civil wars in the years 1991-97, was approximately equal to that incurred directly and immediately from all wars in 1999. This impact works its way through specific diseases and conditions, and disproportionately affects women and children.

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The direct and immediate casualties from civil wars are only the tip of the iceberg of their longer-term consequences for human misery. Crime and homicide rates rise in wars, and may remain high afterwards in a culture accustomed to violence. Civil wars destroy property, disrupt economic activity, and divert resources from health care. Large-scale refugee flows put people into crowded conditions without access to clean water and food; refugees become trans-border vectors of infectious disease. Many of these effects continue for years, even a decade, after the fighting ceases.

A preliminary exploration of these effects (Ghobarah, Huth, Russett, and King 2001) began with national-level data on all countries compiled by the World Health Organization on DALE, or disability-adjusted life expectancy. This measure takes into account both years of life lost to disease and injury and years of healthy life lost to long-term disability. A model including health expenditures, educational level, urbanization rates, degree of democracy, income inequality, ethnic heterogeneity, civil wars, and international tensions proved powerful in explaining national differences in DALE. We use that model, with some adjustments, to examine another WHO data set: one on DALYs, or disability-adjusted life-years, giving the impact of 23 major diseases and conditions on categories of the population distinguished by gender and 5 different age groups. We focus on the effects of civil war in increasing the subsequent incidence of death and disability due to particular infectious diseases and conditions in the different population sub-groups. The result should be valuable for explanation and forecasting.

Overall, WHO (2000: 168, 174) estimates that 269,000 deaths and 8.44 million DALYs were incurred in 1999 as direct and immediate effects of all wars, civil and international. We conclude that another 7.15 million DALYs were lost in 1999 indirectly under various disease groups, as lingering effects of civil wars during the years 1991-97.

How civil wars kill and maim

Civil wars kill and maim people. That is hardly surprising. But it is not simply a matter of direct war casualties during the conflict. Civil wars continue to kill people indirectly, well after the shooting stops. These new deaths (and disabilities) are overwhelmingly concentrated in the civilian population.[1]

Civil wars destroy property and infrastructure that cannot rapidly be replaced, disrupt normal economic activity and health care delivery, and divert resources from health care both during the war and afterward for reconstruction (Collier 1999; Stewart 1993). Civil wars reduce the productivity of the entire economy, and especially damage the facilities needed to maintain previous levels of health care. The destruction and disruption from the fighting means the loss of transportation infrastructure (roads, bridges, railroad systems; communications and electricity) to distribute clean water, food, medicine, and relief supplies, both to refugees and to others who stay in place. It also means destruction of hospitals and other health care facilities, and the departure of medical personnel. Military forces often deliberately target health care facilities so as to weaken the opposition. Some of this destruction and disruption may be repaired quickly, others take years to restore. Civil wars typically have a severe short-term (approximately 5-years) negative impact on economic growth (Murdoch and Sandler 2002).

The diversion of government resources from public health care to economic rebuilding may long continue. Within the health care sector, resources may be diverted from normal health needs to the care of disabled and diseased war victims, lowering the health of those not directly affected by the war. State expenditures diverted from health to carrying on the military conflict (see Braveman et al. 2000 on Nicaragua, Grobar and Gnanaselvam 1993 on Sri Lanka) will not readily be restored. Economic decline reduces available employer and individual resources to compensate with private health spending.

Destruction and disruption reduces refugees' access to clean water and food, and the access of others who stay in place. In many countries ravaged by civil wars the crude mortality rates among newly arrived refugees were five to twelve times above the normal rate. The first impact derives from the destruction of health infrastructure that supported surveillance and control programs for diseases like tuberculosis, malaria, yellow fever—sowing the seeds of both short- and long-term health problems. Shortly afterward, other epidemic diseases are likely to emerge from crowding and poor sanitation—measles, pneumonia, cholera, typhoid, paratyphoid, and dysentery. Malnutrition weakens people's defenses against infection. Food supplies to civilian populations may be deliberately interrupted to destroy the opponents' ability or will to resist. This strategy was widely employed in Angola, Ethiopia, Liberia, Mozambique, Somalia, and Sudan (FitzSimmons and Whiteside 1994, Toole 2000). Kates (1993) calls civil war the greatest cause of famine in the twentieth century.

Epidemic diseases may become rampant, extending far beyond the displaced population, with prevention and treatment programs overwhelmed. Just as health delivery breaks down, many refugees wind up in the cities where health delivery systems for the poor are already weak (Foege 2000: 7). Drug resistant strains of tuberculosis require a more sophisticated medical infrastructure than is usually found in developing countries. When even the existing infrastructure breaks down under pressure of civil war and refugee populations, the new strains bloom and spread widely and are very hard to control. It is commonly held that the incidence of AIDS in Africa has been greatly increased by the upheaval of civil wars (Reid 1998, Epstein 2001). Civil wars may be especially damaging to children, due to their greater susceptibility to infectious diseases that follow political upheaval.

Many displaced persons stay within their own countries, but many others flee to neighboring countries as international refugees: their own countries lack the means to care for them, and they often are fleeing political or ethnic persecution from those who have the upper hand in the war. The Rwanda civil war generated not only 1.4 million internally displaced persons, but a total of 1.5 million refugees into neighboring Zaire, Tanzania, and Burundi (Toole 2000: 98). Refugees both present a potential burden on their neighbors' healthcare systems and become new vectors for infectious disease in those countries. A civil war in a bordering state also often imposes military costs on its neighbors (Murdoch and Sandler 2002). Nearby states may fear the contagion of rebellion onto their territory, perhaps including ethnic groups that overlap the borders as happened as a consequence of the fighting that began in Rwanda. They may increase their own military spending and activity, in turn creating the possibility of an arms race. One study estimates that such arms races cost 7.9 percent of a typical African country's GDP as long as the civil conflict lasts (Collier and Hoeffler 2001). Nor does the arms race end as soon as the war is over. So we need to look for an effect of a recent civil war in a neighboring state, whether or not the state has experienced civil war at home.

One other mechanism is through changes in individual and social psychology. Homicide and other crime rates rise during international wars, tending to peak in the first year after the war and then re-equilibrating at a level higher than before the war. The experience of war makes the use of violence within states more common (Stein 1980, Archer and Gartner 1976). If international war has this effect, we should expect the direct and immediate experience of civil war to do the same. The psychological changes are likely to be magnified in effect by the widespread availability of small arms after civil war.

The health effects during specific civil wars are relatively well known,[2] but the general and longer-term impact is not. To discover whether systematic longer-term effects of civil wars can be discerned across the globe, we begin with a theoretical model we previously developed and tested (Ghobarah et al. 2001). We draw on existing theory and evidence regarding the influence of a variety of economic, social, and political variables. The total pattern of linkages doubtless contains interactive elements and proceeds through several stages where one variable affects another not directly but through a third variable. Figure 1 is a schematic representation of many of these links. In this exploratory effort we keep the model structure relatively simple.

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Figure 1 about here

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At the most basic level, populations across and within countries are exposed in varying degrees to the risk of disease and injury. Political institutions and practices can increase these risk factors due to the inequalities, discrimination, and disadvantages confronted by ethnic minorities and lower level income groups. First are private and public decisions about the total level of resources to devote to expenditure for health care. Second, countries vary greatly in their efficiency in utilizing available resources to provide health. Differences in adult education levels influence that. Third, different groups in a society have different access to available health care services. Politics plays a crucial role in determining who has full or limited access to the benefits offered by the health care system, depending on the political marginalization of low income groups and ethnic minorities. Finally civil wars increase risk factors for civilian populations that are caught in the middle of armed conflict, and endanger health care systems in many ways.

We began with an analysis of influences on the total amount of expenditures (public and private) on health, and also looked at influences on private and public spending separately. Since the choice to devote resources—especially public ones--to health care is fundamentally a political one, beyond the pure availability of resources in the whole economy, it is important to know what influences that choice. Having identified total health expenditures as a product largely of the variables we use to model it, we used it as a major explanatory variable in a second model to explain health outputs, notably disability-adjusted life expectancy. This modeling sequence allowed us to ask whether the principal effect of regime type on outputs is direct, or indirect through levels of expenditure. Here we consider only disability-adjusted life expectancy as a dependent variable, omitting the earlier stage of examining influences on health spending.

A model of death and disability

WHO's measure of overall health achievement, Disability Adjusted Life Expectancy (DALE), discounts the total life expectancy at birth in each country by the number of years the average individual spends with a major disability as the burden of disease or injury—the gap between total life expectation and expected years without disability. It is estimated from three kinds of information: the fraction of the population surviving to each age level (calculated from birth and death rates), individual-level data on the incidence and prevalence of various diseases and disabilities at each age, and the weight assigned to debilitation from each type of condition. The result is the proportion of the population dying or suffering from disabilities, given the average number of years of healthy life that a newborn member of the population could expect to live.

The measure taps the concept of years of healthy and productive life, and so is expressed in intuitively meaningful units. It varies substantially by region of the world and income level. In rich countries, more disabilities are associated with chronic conditions of old age—and, at that point, relatively short life expectancies. By contrast, in poor tropical countries infant mortality is much higher, and more health problems derive from the burden of infectious diseases, like malaria and schistosomiasis, which are carried by children and young adults who may live a long time with seriously impaired health and quality of life. Empirically, the share of simple life expectancy lost to disability varies from under 9 percent in the healthiest regions of the world to over 14 percent in the least healthy ones (WHO 2000:28).

This information-intensive measure requires not just vital registration data for births and deaths, but expensive health surveys of death, disease, and disability by age and gender--in principle in each country. These data only began to be collected on a global basis by WHO for the year 1990 (Murray and Lopez, eds. 1996), with the most comprehensive report being its 1999 survey (WHO 2000). Life tables for 1999 for all 191 WHO members were developed from surveys that were supplemented by censuses, sample registration systems, and epidemiological analyses of specific conditions. WHO specialists provided estimates of their degree of uncertainty about the accuracy of the information. They subjected the data to a variety of statistical tests for incompleteness and bias in low-coverage areas, and the information was adjusted accordingly. Then they estimated information on disease-specific disability rates for all countries within each of 14 regions of the world defined geographically and epidemiologically, and used these to adjust available data on death rates at different age levels and life expectancy for each country (Mathers et al. 2000). It is these estimates, for 1999, that we used. The index of expected disability-free life ranges from 74.5 (Japan) to 29.5 (Sierra Leone), with a median of 60.9 (Belize).

While the limitations need to be borne in mind, these data are the best that have ever been available, and do permit us to make some plausible systematic inferences about the influences on health conditions across countries.[3] Civil wars deal a severe blow to human welfare. We seek to get closer to accounting for the full extent of human suffering due to civil wars, which goes beyond stating, for instance, that “10,000 people died in that civil war” to saying that “the people of that country lost more than 300,000 years of healthy life due to that civil war”—which is equivalent of the entire population of St. Louis, Missouri losing their eyesight for over a year.[4]

For the dependent variable in this article we use a more disaggregated measure, from data that produce the summary DALE estimates. This metric, known as DALY, for Disability Adjusted Life Years, measures the effect of death and disability on population groupings comprised of each gender in five age groups (0-4, 5-14, 15-44, 45-59, and 60 and older). These are initially compiled from data on the number of deaths in a year from each of more than 100 categories of disease or health condition. To the deaths are added estimates of the years of healthy life typically lost due to disability from the incidence of the condition and the estimated number of new cases in the period. The number of years of healthy life lost are obtained by multiplying the average duration of the condition (to remission or death) by a severity weight for the disability. Thus the DALYs for 1999—combined into 23 major disease categories for analysis--reflect the life years lost due to deaths from a particular condition contracted during the year plus the expected disability to be incurred by other people who suffered from the same condition in that same year.[5] In other words, these are not disabilities incurred from conditions contracted in earlier years when a civil war was active.[6]

Hypotheses and explanatory variables

* The higher the level of total health expenditures the fewer DALYs lost.

Higher income improves health *through* public and private decisions to spend money on hospitals, preventative and curative health care, sanitation, and nutrition.[7] Previous analysis (Ghobarah et al. 2001) examined the effect of income per capita as well as that of health expenditures. But whereas per capita income does strongly influence the level of health expenditures, it does not directly determine the production of health outputs. Because the two are highly collinear (r = 0.90) we cannot satisfactorily include both in the same regression, and must choose between them.[8] In the economics tradition of production function analysis, we treat income as an uncontrollable variable outside the direct process that produces good public health outputs. Concurring with WHO (Evans et al. 2000a: 13), we use total 1997 health expenditures per capita as a more theoretically satisfying variable because it better captures the effect of political choices and influences.[9]

We use the estimates of health expenditure compiled by WHO, which began with IMF and national sources, supplemented by national accounts data from United Nations and OECD sources and household surveys and WHO estimates (Pouillier and Hernandez 2000). Total health spending per capita ranges from $3,724 (United States) to $11 (Somalia), with a median of $193 (Bulgaria). WHO authors estimate that it is very difficult for countries to provide good health outputs below a total expenditure of about $60 per capita, and that it would cost just over $6 billion per year to bring up to this threshold the 41 countries with lower expenditures (Evans et al., 2000a: 24). Because these distributions are skewed we used the natural logarithms; that also reflects the declining marginal product of additional dollars at higher levels of national expenditure. Following WHO's practice, we use total health expenditures as an explanatory variable in this equation, rather than public or private expenditures alone. There is a degree, though quite incomplete, of complementarity between public and private health spending in achieving health goals, and the measure of total health expenditures has more explanatory power than does either public or private health expenditures alone.

* The more educated the population the fewer DALYs lost.

At higher levels of education, preventive and treatment programs become more widespread and effective; i.e., demand for better health care rises as does more knowledgeable and effective consumption throughout the population. Education is strongly associated with the health of both children and adults in both rich and poor countries. It constitutes the other independent variable, with total health expenditures, in WHO analyses of health attainment (Evans et al. 2000a: 13).

WHO regards average level of schooling in the adult population as the most widely available and sensitive measure, logged to correct skewness and to reflect the declining marginal impact of education.[10] It ranges from only 1.04 years of education (Mali) to 11.5 years (United States), with a median of 6.03 years (Costa Rica).

* The higher the pace of urbanization the more DALYs lost.

New urban residents will be exposed to new disease vectors, and will lack adequate access to care since the supply of health services to large numbers of new residents is likely to lag behind the surge in need. Surveillance, immunization, and the provision of safe water all become more difficult. A high rate of urbanization often reflects the influx of poor and marginalized people from rural areas. These new city dwellers (largely in urban slums) are under-organized in unions and underrepresented in established political parties. They will find it difficult to create effective pressure for health care either politically or in the workplace, leaving a gap between need and delivery. Marginal utility analysis predicts that individuals or groups receiving less than an equal share of health care lose more disability-adjusted life expectancy than is gained by individuals or groups receiving more than an equal share of health care.

Our measure of recent urbanization is the average annual percentage change in the urban proportion of the population, 1990-95 (United Nations 1998: 132-35). It ranges from –0.41 percent (Belize) to 7.35 percent (Botswana), with a median of 0.88 percent (Grenada).

* The more unequal the distribution of income, the more DALYs lost.

The more unequal the income distribution, fewer resources will be committed to the health care system and the more unequal will be access to health facilities. Economically advantaged groups are more able to dominate the political system for their own benefit rather than that of the majority. As a result, state spending is diverted from public to private goods; what is spent will be more heavily concentrated on the privileged and politically powerful segments of the population. The large poor segment of the population will have lower incomes, less leverage with employers, and fewer private resources for health. High quality health care is thus limited to a smaller segment of the general population, producing lower overall levels of health performance. The rich get more access—at low marginal utility, and the poor get less. Previous research found a strong effect of income inequality on levels of total, and especially public health expenditure, and on achievement as measured by DALE. Here too we posit an additional effect on health achievement due to the differential access to services.

Our measure of inequality is the Gini index of inequality of income distribution in 1997. This common index is derived from a Lorenz curve of the actual distribution of income by households, with the index representing the total area between the curve and the 45 degree line representing a totally equal distribution of income. The variable begins with estimates for 111 countries published by the World Bank, supplemented by

WHO with multiple imputation estimates using information on socio-economic development and life expectancy at birth (Evans et al. 2000b). Theoretically the Gini index ranges from zero (complete equality) to 1.00 (one person has all the income); in practice our national Gini indices for income distribution range from a very equal .187 (Slovakia) to .609 (Sierra Leone), with a median of .374 (Uganda).

* The more ethnically/linguistically/religiously diverse the population, the more DALYs lost.

Ethnic differences often result in discrimination and unequal access to political power. Public expenditures will be concentrated on the politically more powerful groups, and politically weak groups will be neglected. Overall, public health expenditures reflect the political weakness of groups discriminated against, and thus will be lower than in more homogenous populations. In addition, groups discriminated against will have lower incomes, less leverage with employers, and fewer private resources for health. Political inequality in turn skews the distribution of resources committed to the public health care system. Care will be concentrated on politically powerful groups. Previous research, however, found the negative effect of ethnic heterogeneity to be primarilyindirect, in reducing levels of public and total health expenditure rather than by a direct impact on health achievement (DALE) due to differential access to services. So we may not find much here on the DALYs.

We use Vanhanen's (1999) index of racial-linguistic-religious heterogeneity. This index, stable over moderate time-periods, measures the percentage of the largest ethnic group identified by each of these three criteria, giving each equal weight by summing the three percentages and subtracting the sum from 300 (a completely homogeneous state by all three criteria). Conceptually this is somewhat different than that of Gurr (1993), when logged correlating with an r of .69 with Gurr's index. But it was created with Gurr's effort in mind, and covers more countries. It ranges from a high of 177 (Suriname) to a low of 0 (North Korea, completely homogeneous), with a median of 38 (Uzbekistan). Because the index is skewed, we use its natural log.

* The more democratic the state, the fewer DALYs lost.

All political leaders wish to retain power. They must form a winning coalition and satisfy a sufficient portion of those who are politically active. To do so they distribute private goods to their supporters, and provide collective goods widely for the population. All leaders provide both private and collective goods in some degree. But because democratic leaders have to satisfy a wider range of supporters, not just a small segment of their cronies and the military, they are less able than authoritarian ones to extract rents for the private benefit of small groups, and must respond more to broad demands for public well-being (Olson 1993, Bueno de Mesquita et al. 1999, Lake and Baum 2001). For example, famines are much more common in authoritarian states (Sen 1981), which spend less either to prevent them or to relieve their consequences. Przeworski et al. (2000: 239) report that the strong effect of democracy in lowering infant mortality operates largely through health expenditures, and our previous research found a strong impact of democracy in increasing public and total health expenditures. We did not, however, find any direct additional effect on health achievement as measured by DALE. Nevertheless we may see some additional effect of democracy in improving health conditions for the disaggregated DALYs.

We measure political system type by the Polity project's average score for 1997 and 1998, using the Polity IV data from their website (www.bsos.umd.edu/cidcm/polity). For the 22 countries in our sample with no regime score in the Polity database we imputed a regime score from the Freedom House scores, which correlate highly (r = .95) with Polity where both exist. Following common practice (e.g., Maoz and Russett 1993) we create a 21-point index for each state from two scales: one degree of autocracy ranging from –10 (most autocratic) to 0 (least autocratic), and one for democracy from 0 (least democratic) to + 10 (most democratic), and then produce the composite index by summing the two components. This scale, which we treat as interval, runs from –10 (e.g., North Korea, Myanmar) to +10 (Japan, Norway), with a median of 7 (Ukraine). Other measures of contemporary democracy correlate highly with it (Vanhanen 2000).

* More DALYs will be lost in states experiencing enduring international rivalries.

By standard criteria there was only a single international war during the period 1989-1997; i.e., the Gulf War 1990-91. This is not enough to give us reliable estimates of the effect of international wars on health, more so as the human effects of that war were vastly compounded by the application of severe international sanctions against Iraq before and especially after the war. So instead we focus instead on international rivalries, an indicator of international conflict and security threats that may affect societies by diverting resources from improving health to military purposes. Our previous research found that whereas enduring international rivalries do divert public health expenditures from the system, they exert no systematic effect on total health spending (private resources tend to compensate for public ones), nor on achievement as measured by

DALE. So we do not hold the hypothesis of a direct impact on the more disaggregated DALYs with much confidence.

An enduring international rivalry is defined as a relationship between two states characterized by at least six militarized international disputes during a 20 year period, and in which fewer than 11 years have elapsed since the last dispute. We extend data from Diehl and Goertz (2000) to recent years from Wallensteen and Sollenberg (2000). We code as 1 each of the 25 countries involved in an enduring international rivalry during the years 1989-97, and all other countries as 0.

This model gives the economic and political specification to which we now add our concern for this article, the effect of civil war:

* More DALYs are lost with the occurrence and increasing severity of civil wars.

We laid out the basis for this hypothesis in the introductory section of this article. As our measure, we use deaths from civil war in the years 1991 to 1997, which becomes a measure of both the existence and severity of civil war when expressed as the number of deaths per 100 people in the country to measure the war's intensity. Civil wars are defined as armed conflicts resulting in 1,000 or more fatalities per year among regular armed forces, rebel armed forces, and civilians directly targeted by either. Civil war years and fatality figures were derived from the leading data sets on civil war compiled by scholars (Singer and Small 1994, Licklider 1995, Doyle and Sambanis 2000, Regan 2000, Wallensteen and Sollenberg 2000). For most countries the value is 0; for the 34 countries experiencing civil war during the period it ranges from .2 to 9.69 (Rwanda).

Using civil war deaths in the years 1991-97 gives us a lag to the DALY rates for 1999. Theory does not tell us that there is a single correct lag. For most infectious diseases--which we hypothesize as the principal cause of indirect civil war deaths--the lag time would seem short. Effects of damage to the health care system would probably last longer, and the lag for cancers could be so long and varied that we cannot reasonably test for it. Experimentation with the lag structure indicates that the coefficient for the effect on DALE of civil wars in the 1977-90 period is only about one-fourth as large as for the 91-97 period, and not statistically significant. If we make a break between 1991-95 and 1996-97 the impact for the latter period is higher, but the standard error is much higher. Eliminating all countries whose civil wars extended past 1997 reduces the impact of wars in 1996-97, but not that of earlier wars.

* More DALYs are lost if a geographically contiguous state has had a civil war.

We also laid out the basis for this hypothesis in the introduction. The explanatory variable is dichotomous, coded 1 if any contiguous state experienced a civil war in the period 1989-1998, and 0 if not. Contiguity is defined as sharing a land border or separated by no more than 12 miles of water.

Before proceeding, two questions should be asked of this model. First, is our measure for the incidence and severity of civil wars simply a proxy for other economic and political variables likely to be associated with civil wars? To answer this fully we would also need a model to explain the incidence and severity of civil wars. The systematic empirical literature remains considerably short of consensus, but several influences emerge as probable contributors to the likelihood of civil war. In a cursory overview of this research we discuss some possible variables to control for the structural conditions that may promote civil wars, and relate them to variables already in our model.

To begin with our civil war measure itself, the influences affecting the initiation of civil war are not necessarily the same as those affecting its continuation or severity. For our purposes the intensity of war is more relevant than its initiation or mere occurrence. Our measure of deaths over the duration of the war, controlled for size of population, captures duration and especially intensity. The control for population also addresses the likelihood that large states will have more potentially-disaffected groups able to mount a war effort.

The initial level of economic development certainly is important, with development raising the opportunity costs of violence. Employment opportunities are better, and governments are likely to have more resources with which to satisfy discontented elements of the population. Whereas some analyses find that a low rate of economic growth contributes to the likelihood of civil war (Collier and Hoeffler 2002), a low level of development seems a more robust influence (Sambanis 2001a,b; Elbadawi and Sambanis 2002). Although we do not include GDP per capita as a direct influence in this model, it makes a prior contribution through its influence on total health expenditures per capita, and also is closely related to educational attainment. Indeed, Collier and Hoeffler (2000) identify low educational level as a key influence. Thus our model controls for level of development.

Political system also matters, especially for ethnic wars since lack of democratic rights can threaten the core of ethnic identity and reduce the possibility for a redress of grievances (Gurr 2000). Whereas there is some evidence that civil wars are more likely to break out in countries that are between the extremes of full democracy and full autocracy (Hegre et al. 2001, Reynal-Querol 2002), that distinction seems less important in the continuation of wars (Elbadawi and Sambanis 2002). So the linear measure of democracy in our specification should suffice for a first cut.

Ethnic heterogeneity contributes, especially to the discrimination associated with the incidence of ethnic wars. Again there is some evidence of non-linearity, in that ethnically polarized societies may be more war-prone than either homogenous ones or highly fragmented states whose small minorities may suffer from collective action problems in organizing for violence (Horowitz 1985, Bates 1999, Collier and Hoeffler 2000, Reynal-Querol 2002). Sometimes the collective action problem may be overcome through external intervention on the side of a minority (Elbadawi and Sambanis 2002). As with democracy, using different functional forms might help, but our linear measure of ethnic heterogeneity is again a useful initial approximation.

Other plausible influences on the ability to sustain a dissident group at war include a rugged terrain and the availability of "lootable" natural resources—particularly for non-ethnic wars (Collier and Hoeffler 2000). Ethnic wars do seem to derive from a different combination of influences than do non-ethnic wars. But since over 70 percent of all civil wars between 1960 and 1999 have been characterized as wars between ethnic groups (Sambanis 2001b), for the purposes of this analysis we should pay more attention to the causes of ethnic wars. Certainly other variables could be included, and interactive relations between variables explored. We can nevertheless proceed on the working assumption that our key explanatory variable—deaths from civil wars—is not simply a proxy for the structural conditions that produce civil wars, and that the diseases bringing death and disability after civil wars are not simply a consequence of those conditions.

We do, however, vary our basic model in one important respect to respond to a second question. Are the diseases likely to be spread by civil wars dominated by infectious diseases known to be associated with poor tropical countries? Tuberculosis, other infectious respiratory and diarrheal diseases, and malaria are often endemic to such countries, where the conditions for their spread are strong and the health system to contain them is weak.[11] If civil wars are more likely to occur in such countries, we risk mistakenly identifying civil wars as the cause of diseases which are already prevalent because of these background conditions.

To protect against this inferential error we turn to WHO and its division of the world into 14 regions according to adult and child mortality rates (Mathers et al. 2000). Those with high child mortality and high or very high adult mortality include two regions which cover virtually all of Africa, one in the Americas (Bolivia, Ecuador, Guatemala, Haiti, Nicaragua, and Peru), one of two "Eastern Mediterranean" regions (with Afghanistan, Azerbaijan, Djibouti, Egypt, Iraq, Morocco, Pakistan, Somalia, Sudan, and Yemen), and one in "Southeast" Asia (Bangladesh, Bhutan, North Korea, India, Maldives, Myanmar, and Nepal). While one might quibble with some of the geographic labels, these groupings quite well identify the states where the most prevalent tropical infectious diseases are endemic. And the 38 percent of all countries in these regions did experience 65 percent of the 34 civil wars in the 1991-97 period. So to control for initial prevalence of these diseases we add a dummy variable, *poor tropical*, with all countries in these five regions coded 1 and all other countries coded 0. If anything, this control variable may contribute to understating the health effects of civil wars.

Who is most affected by civil wars?

We test these hypotheses using cross-sectional least squares regression analysis on data for 177 countries: nearly all the 191 members of the WHO, omitting only some small states lacking data on several of the explanatory variables. Table 1 shows in separate rows ten equations for deaths from *all causes combined* by the five age groups for each gender. Thus ten regressions are presented as rows in this table. The ten explanatory variables are listed across the top, and within each of these columns is the estimated coefficient and the t-ratio (which is a function of the standard error of the regression coefficient). Those coefficients and t-ratios which reach the 0.05 level of significance (one-tailed) are in bold face. Remember that DALY represents years of healthy life *lost*, so we anticipate positive coefficients for all variables except health expenditures and education.

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Table 1 about here

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First, note that most of our hypotheses are supported. For eight of the ten equations, total health spending has a strong and statistically significant impact in reducing the loss of healthy life expectancy. Only for females and males in the 15-44 year age group is there no effect. A high average level of education also strongly reduces DALYs in five of the groups, and more weakly ($p < .06$) in another. For all ten categories the sign for democracy is positive, but it is statistically significant in four (for women 60 and older at $p < .02$; the others more marginal just within the $p < .10$ cutoff).

This is in addition to the primary effect of democracy found in earlier research: operating earlier in the causal chain by increasing health expenditures.

Rapid urbanization is strongly correlated with increased loss of healthy life expectancy (highly significant in six categories, at a lower level in two). So too is a high degree of income inequality (five groups at $p < .05$, and three at $p < .06$). Ethnic heterogeneity has the expected positive sign, for increased loss of healthy life in every group, but for just one group is its direct effect even marginally significant ($p < .09$). This is consistent with previous research that found the effect of ethnic heterogeneity to operate only indirectly, by reducing total health spending. We also see no ill effect from international tensions as manifested in enduring rivalries, except for working age males ($p < .05$). But since previous analysis found no systematic impact of international tension on either total health spending or the aggregate measure of health achievement (DALE), we did not expect much here.

These relationships are not, however, the focus of attention in this article—*civil war is*. And for that, we do see some strong effects. Experiencing a civil war earlier in the 1990s is strongly associated with a subsequent increased loss of healthy life for five groups ($p < .05$ or better), and moderately associated for three others ($p < .09$). Only for the aged does civil war have no significant impact. Three of the five most statistically significant impacts are among children. Furthermore, the substantive impact is very severe for the two youngest groups, females and males under five years of age. For instance, the coefficients mean that the impact of living in a country that had experienced an intense civil war a few years earlier (1 death per 100 people, primarily in 1994) rather than in a median country with no civil war at all is about 4.6 disability-adjusted life years lost for each 100 children under 5 years of age--long after the civil war had ended in a settlement. In Rwanda's extreme case (9.7 deaths per hundred people, primarily in 1994), these subsequent losses amounted to about 45 DALYs per 100 children under 5--and that is over and above the impact of any of the other nine socio-political and economic variables in our model.

Notice that all these effects are independent of simply being in a poor tropical country, which of course had an extremely strong effect, especially on infants and children. The dummy variable for living in a poor tropical country is highly significant for all 10 groups. This is not news, either to the medical literature or to more popular understandings (e.g., Diamond 1997). It affects human life and well-being in many ways that we do not attempt to analyze; we included it merely as a control to avoid exaggerating the effect of civil wars. It provides a baseline for the background conditions of poor tropical countries (for example, about 25 DALYs lost per hundred children under 5) from which we calculate the additional impact attributable to civil war.[12]

Finally, even living in a country adjacent to a state that experienced a civil war made a big difference for some of these groups, namely for men and women aged 15-44 and men 45-59. These huge impacts (substantively, of a loss of healthy life years from more than 4 to nearly 11 per 100 people, depending on age and sex) are over and above the negative effects they experienced if there also had been a civil war in their own country. We can evaluate this better by looking at the impact of civil wars on the incidence of specific diseases and conditions.[13]

The who and how of civil war effects

We proceed to do just that. The WHO data on impacts of various diseases by age and gender allow us to compute 210 equations.[14] Using a threshold of $p < .05$ for a one-tailed test of statistical significance, we would expect, purely by chance, to find that 10 or 11 equations produced a "significant" relationship for civil war's impact on an individual grouping. In fact, we find much more than that: 47 equations in which the civil war coefficient is significant at $p < .05$. Furthermore, most of the significant coefficients make sense in terms of our expectations. Table 2 gives a row for each such equation, with the effects of the variable for preceding civil war deaths. It arrays the equations by major disease/condition groups, and within groups in descending order of the t-ratios. The columns show first the coefficient for the effect of civil wars, and then the t-ratio.

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Table 2 about here

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By far the most common impact is through infectious diseases, as is consistent with our expectations from reviewing the case study material on the effects of civil wars. Eight out of the ten age-gender groups are affected by malaria, all but those aged 60 years and over. In fact, by t-value seven of the 22 groups most impacted by civil wars are from raising the incidence of malaria. At their highest, the coefficients for impact are a little under 2 years (per 100 people) of healthy life lost by very young children, dropping off rapidly thereafter. Not surprisingly, the effect of living in a poor tropical country on the incidence of malaria in children is enormous: 7.8 years (per 100 people) of healthy life lost for very young boys and 6.8 (per 100 people) for very young girls, and more than 1.5

(per 100 people) for both boys and girls in the 5-14 age group, then dropping precipitously and monotonically to .03 (per 100 people) or less for men and women 45-59. We included the poor tropical country dummy variable to prevent exaggerating the effect of civil wars on the incidence of malaria in countries where it was already likely to be endemic. Since civil wars are more prevalent in poor tropical countries, collinearity could bias our estimate of the separate effect of civil wars. But as a check we ran all these equations without the poor tropical dummy, and the impact of the coefficient for civil war was never more than 10 percent higher. Thus we are confident that the coefficients in Table 2 provide a reasonable estimate of the additional effect of civil wars.[15] That impact is small relative to the background conditions, but far from trivial.

The three other most frequently affected disease groups are tuberculosis, respiratory infections, and other infectious diseases--each reaching statistical significance with six of ten possible age and gender groups. The age and gender group effects are strikingly similar, for each category affecting older children and adults 15-59 rather than the very young or the old. The coefficients for the impact of civil war on tuberculosis are generally much lower (ranging around .1) than for malaria, and again are substantial but not large as compared to the effect of the dummy variable for poor tropical country (from about .2 to .8). Almost exactly the same pattern is repeated for respiratory infections, with coefficients of about .1 for civil wars and .4 to .8 for the dummy variable. With “other infectious diseases,” something of a catch-all category, the impact of civil wars is greater (from about .2 to .4), but so too is the dummy for poor tropical countries (1.1 to 7.0). Together, the four groups of infectious disease account for 26 of the 47 equations showing a significant effect of civil wars. In every instance the coefficients for civil war are remarkably stable if the dummy variable for the background conditions of poor tropical countries is omitted.

The next most common effect is from transportation accidents, and is not one that we really anticipated. Nevertheless it may be consistent with our expectations of a breakdown of law and order in post-civil war societies. Or it may be more a consequence of the breakdown of roads and other transportation networks. We simply cannot know the causal relationships from this kind of aggregated analysis, and the impact is quite small (.05 to .15 years). Nevertheless the pattern is common enough to mark, affecting five of the ten potential age-gender groups: mostly young and middle-aged adults. More obvious from an expectation of a breakdown of order and social norms is the elevated homicide rate, the victims being girls between 5 and 14 years old and men between 15 and 44. Substantively the effect (.02 on girls and .14 on men) is similar to that of transportation accidents.

We did not explicitly anticipate an effect of civil wars in raising the rate of cervical cancer. But affecting as it does three of the four female groups above age 4, (plus the other, weakly at $p < .16$ for women aged 15-44) it is probably not a coincidence, even though the development of cervical cancer may be too slow for the time lag used here. It would fit with our expectation of a breakdown in social norms, in this case norms against forced sexual relations, though the coefficients are extremely small (from less than .000 to .05).[16]

Eleven other statistically significant groupings were unanticipated. Save possibly for chronic respiratory diseases not included elsewhere (as tuberculosis and respiratory infections) for boys and girls aged 5-14, there is little pattern.[17] None of them would appear to be plausibly related to civil wars, at least with this lag, and we have no explanation. Most of them may well be due to chance variation—indeed we would expect that many in 210 groups using a $p < .05$ threshold.

Overall, notice that females constitute 29 out of the 47 affected groups, and that the two gender groups of children aged 5-14 account for 17 (chance would mean 9 or 10 groups). Whoever the actual combat deaths during the war may represent, in their long-term impact the victims clearly are women and children.

Contiguous civil wars

Finally, Table 3 shows the effect of civil war in a contiguous country, above any effect of civil war at home. The presentation corresponds to that in Table 2. Our initial analysis found that having a civil war in an adjacent country was itself a major contributor to loss of healthy life expectancy overall. In the disease-specific analysis we found 28 disease-age-gender groups for which a contiguous civil war had a statistically significant effect in increasing death and disability. This too is well above the 10 or 11 such categories we would expect by chance to cross the line of statistical significance in 210 equations.

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Table 3 about here

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The enormous impact of a neighboring civil war on HIV/AIDS is immediately apparent, despite the lack of any significant impact of a civil war at home on the death rate from HIV/AIDS. Of the 12 most statistically significant effects in Table 3, 10 are from HIV/AIDS. If anything, the p values understate the impact. For the susceptible age groups (very young children of both genders, infected largely through their mothers; both genders of young and middle-aged adults) the coefficients are higher than for any other DALY disease or condition in the table. For these groups the average loss of healthy life ranges from more than two years to nearly ten years (for women aged 15-44). For the 15-44 age group (both genders), comparing these coefficients with their equivalents for all causes in Table 1 suggests that about 90 percent of the loss in healthy life expectancy from a neighboring civil war is attributable to the impact of HIV/AIDS.[18]

Recall that, by contrast with the effects of civil wars at home on most infectious diseases, we found no impact of a civil war at home in raising AIDS rates in that state. This is true even in an equation without the variable for contiguous civil war. However, most civil wars have a neighboring civil war as well. At this stage in the analysis, collinearity makes it impossible to sort out fully the relative impact of own and neighboring civil wars where they reinforce each other. Most DALYs from HIV/AIDS are derived from reports of HIV infections rather than deaths. Infections likely are underreported in countries themselves undergoing civil wars.

After HIV/AIDS, the major deleterious effects of neighboring civil wars seem to be on other (than transport) unintentional injuries, with a serious impact (.56 years to 1.12 years per 100 people) on young children of both sexes and to a lesser extent on older children. We have no developed hypothesis to account for this result, other than a possible general effect of political and social tensions in the society. The same would apply to suicides of males, which are statistically most significant for older male children but have the greatest impact among males 45-59 (a non-trivial effect of .27 years) and, to a lesser degree, males over 60. Homicides of older children of both genders also fit the profile of social tension and breakdown, and are statistically significant. But again the impact—the actual number of individuals affected--is low, with coefficients of but .019 for each. The remaining nine groups do not fit any of our expectations, nor do they evidence any real pattern of impact by age or gender.[19] It would not be prudent to attribute much importance to them.

Overall, the strongest effect of civil war in a contiguous country is to boost drastically the rate of infection from HIV/AIDS. Its devastating impact is concentrated in the most economically productive age groups and on very young children, striking both genders more or less equally. When we tally all the effects in this table, however, both genders are affected equally (14 female groups, 14 male), but with 11 in the two gender categories for children aged 5-14 and 7 more for children 0-4. As with civil wars at home, the longer-term victims of contiguous civil wars are again the young.

Conclusion

From a review of analyses and field reports we developed some expectation of the kinds of effects that civil war might have on human misery and well-being, even years after a war was concluded. We then set these expectations into the context of a political-economic model of conditions affecting death and disability cross-nationally. Using newly-available data on disability-adjusted life years lost from various diseases and conditions by age and gender groups, we found that, controlling for the other influences, civil wars substantially increased the subsequent risk of death and disability from many infectious diseases, including malaria, tuberculosis, and other infectious respiratory diseases. These risks substantially exceeded those normally associated with poor tropical countries. We have some evidence, though weaker, that civil wars increase the risk of death and disability through the breakdown of norms and practices of social order, with possible impact on homicide rates, transportation accidents, and cervical cancer. We also found that death and disability from HIV/AIDS was much greater in a country if a neighboring country had recently experienced a civil war.

Overall, women and children were the most common long-term victims of civil war. For all categories we estimate that 7.14 million disability years were lost in 1999 from civil wars during the period 1991-97. That is only slightly below WHO's estimate for the immediate losses from all the wars fought in 1999. The victims will bear these burdens for the rest of their lives.

These results are intriguing, but hardly conclusive. Certainly we need to comprehend better the micro-level political, social, and epidemiological processes. We are also challenged to elaborate theories that accommodate complex interrelations, and to drive backward in the full system of influences to understand how civil wars may interact with income inequality, ethnic diversity, and type of political system to affect people's health and well-being. One improvement in subsequent research should be a more nuanced and medically-informed consideration of the appropriate lag times. Our rather crude one-size-fits-all lag, of civil war deaths from 1991 to 1997 to explain DALYs 1999, is not a bad fit to the descriptive literature on the spread of many diseases, and as noted it gives the best empirical fit for disability-adjusted life expectancy (DALE) overall. Still, something more fine-grained is necessary for further analysis of specific diseases, notably HIV/AIDS and long-term non-infectious conditions (e.g., cancers), that are slow in developing. Cross-temporal analysis will provide better guidance when the necessary data become available.

The kind of information analyzed here must be combined with more contextual information and field reports from countries that have experienced civil wars. In conjunction with other methods, however, further analyses like this one could provide projections on the likely effect of major civil violence that could be used by peacekeeping and post-conflict peace-building missions, national governments, and non-governmental organizations. They could help in predicting the effects of civil violence, and may suggest possible key interventions, such as in caring for refugees and assessing priorities for post-conflict efforts to rebuild devastated and overburdened health care systems.

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[1] Estimates run as high as 90 percent of all war deaths in the late twentieth century being civilians (Ahlstram 1991), but such estimates are not reliable (Goldstein 2001: 399-402). Kuritsky and Davis 2001 report that severe military conflict in sub-Saharan Africa cut life expectancy by 4 to 6 years and raised infant mortality by 30 per thousand.

[2] The one-year impact of infectious disease and health system breakdowns associated with refugees is well-established (Toole 1997). War-related deaths from tuberculosis during the war in Guinea-Bissau are documented by Gustafson et al. 2001; Roberts et al. 2001 report war-derived disease deaths in Congo during the war as 6 times greater than those from direct violence. Effects beyond the war period are less clear, though the longer-term risk from tuberculosis, respiratory infections, and malaria is well-recognized (Centers for Disease Control and Prevention 1992).

[3] See Williams 1999, Murray et al. 2000, Filmer and Pritchett 1999:1312).

[4] This is approximately the ratio used by WHO 2000 (Annex Tables 3 and 4) for the number of deaths to DALYs (1:31.4) due directly to civil wars in the same year. It does not include the indirect and subsequent deaths from civil war that we estimate here.

[5] More information on the procedures can be found in WHO (2000: 145-46), and DALYs are displayed by disease category, gender, and region in WHO (2000: 170-75).

[6] Though our civil war data stop at the end of 1997, in 10 of the 34 cases the civil war did continue as late as 1999, and our analysis takes it into account.

[7] Earlier work by economists such as Pritchett and Summers (1996) showed that "healthier is wealthier;" and we build on their findings with a wider set of countries and a finer-grained causal argument about *how* higher income leads to better health.

[8] Whereas either alone shows a very high t-value in virtually any multiple regression equation to explain DALEs, when entered together both t-values typically drop to about 2.00 and their coefficients are cut in half. We checked for using GDP per capita in place of health expenditures; the substitution makes no material difference.

[9] Note that 1997 comes at the end of the time for which civil wars are measured. Since it picks up the indirect effect of civil war in reducing income and health spending, it probably contributes to understating the full effect of our civil war variable.

[10] Some observations were estimated by multiple imputation from other data on educational attainment. For sources and methods see Evans et al. (2000b).

[11] WHO (2000: 164) reports that, among infectious disease categories, the major causes of deaths in Africa are, in descending order, HIV/AIDS, respiratory infections, malaria, diarrheal diseases, measles, and tuberculosis.

[12] The metrics are only approximately comparable between the continuous variable for civil war deaths and dummy variables like presence of a civil war in an adjacent state or living in a poor tropical country. One death from civil war per 100 population represents the 95th percentile of civil war deaths (34 countries out of 177 experienced civil wars, of which 9 were at or above this level of severity), so the comparison is reasonable but underestimates the effect of severe civil wars at home.

[13] This analysis shows the effect of an adjacent civil war whether or not the country itself had a civil war. Previous analysis (Ghobarah et al. 2001) found the effect is robust to inclusion or exclusion of countries that themselves experienced civil war.

[14] Twenty three disease or condition groups, times five age groupings and two genders, would give 230 equations. Some categories, however, are empty: for males, five each for maternal conditions, breast cancer, and cervical cancer; three for maternal conditions for females under 15 and over 44; two for suicide by children under 5 years.

[15] The same pattern (no more than 10 percent higher coefficient for civil war without the dummy variable) applies to all the infectious diseases discussed below, so there too we have a reasonably true estimate of the additional impact of civil war, and overall omitting the regional dummy makes little difference. Confirming that our decision to use the dummy is conservative, the specification without it picks up civil war as significant for three additional disease-age-gender groups, and moves the civil war coefficient for two all causes values up from $p < .07$ in Table 1 to $p < .05$.

[16] Human Papillomavirus (HPV) infection is necessary for development of low-grade squamous intra-epithelial lesions (LSIL), which in turn may develop into cervical cancer. Every new sexual partner greatly increases the risk of HPV, with the risk of developing LSIL in the first three years after HPV infection (Moscicki et al. 2001). A further progression to cancer is, however, slower.

[17] One exception may be unintentional (not transportation) injuries. With a lower level of statistical significance ($p < .11$), three more adult age groups would fit, and this might be attributable to a higher level of social tensions induced by civil war.

[18] One third of all DALYs lost from communicable disease in Africa are due to HIV/AIDS (WHO 2000: 170). Of course not all such losses stem from civil war. Conditions of urbanization, and income and ethnic inequality—included in our model—may be causally related to both AIDS and civil war.

[19] The impact of lung cancer on children is very low, and barely significant at $p < .05$. The entry for war is for civil or international war occurring in 1999.

The Conceptual Framework for Studying The Impact of Armed Conflict on Public Health

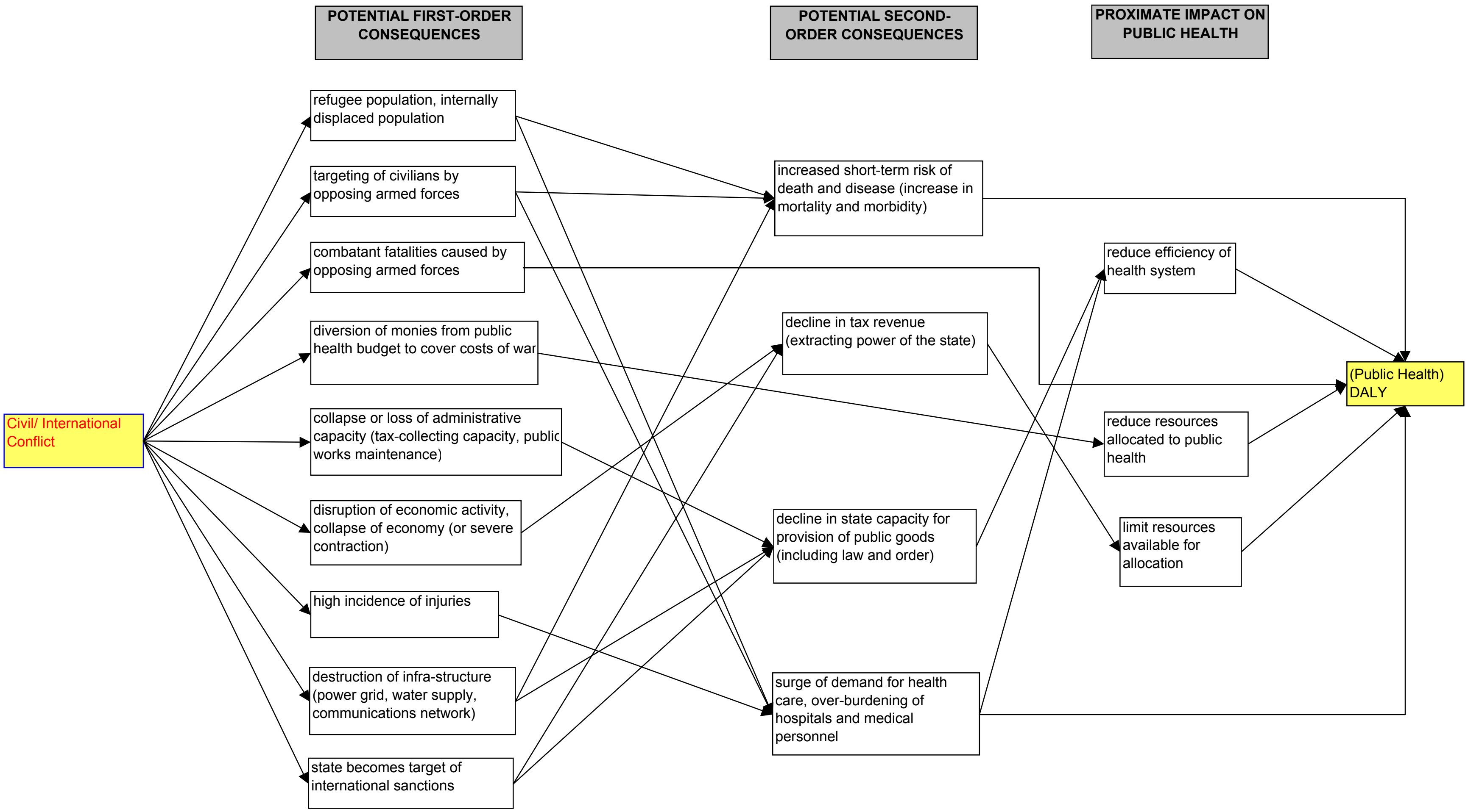

Table 1: DALYs lost to all disease categories

Gender	Age Group	Mean DALYs lost per year per 100 people	Intercept	Total health expenditure	Education	Urban growth	Income Gini	Ethnic hetero-geneity	Polity score	Enduring rivalry	Civil war deaths 1991- 97	Contiguous Civil War	"Tropical Poor" dummy	Adjusted R-square	Sigma
Male	04 or less	63.57	**213.3010**	**-14.58**	**-55.45**	-0.09	-0.12	1.62	0.43	-1.18	**5.22**	2.43	**26.08**	0.71	36.85
			(6.65)	**(-4.10)**	**(-6.08)**	(-0.03)	(0.00)	(0.59)	(0.87)	(-0.14)	**(1.89)**	(0.39)	**(2.90)**	(0.71)	(36.85)
Female	04 or less	58.3	**192.4169**	**-12.09**	**-54.14**	1.12	-4.57	1.86	0.35	-0.69	4.04	4.84	**23.38**	0.71	34.75
			(6.36)	**(-3.60)**	**(-6.29)**	(0.39)	(-0.13)	(0.71)	(0.75)	(-0.09)	(1.55)	(0.83)	**(2.76)**	(0.71)	(34.75)
Male	05_14	9.05	**15.7010**	**-2.00**	**-3.18**	0.67	**11.49**	0.29	0.11	-0.88	**1.03**	-0.21	**7.02**	0.70	5.10
			(3.54)	**(-4.07)**	**(-2.52)**	(1.58)	**(2.27)**	(0.76)	(1.59)	(-0.76)	**(2.69)**	(-0.25)	**(5.64)**	(0.70)	5.10
Female	05_14	8.31	**13.9285**	**-1.72**	**-3.06**	**0.71**	7.86	0.42	0.09	-0.66	**1.23**	0.34	**7.02**	0.70	4.96
			(3.22)	**(-3.60)**	**(-2.49)**	**(1.72)**	(1.60)	(1.12)	(1.37)	(-0.58)	**(3.29)**	(0.41)	**(5.80)**	(0.70)	(4.96)
Female	45_59	30.78	**30.3456**	**-2.70**	**-4.34**	**2.19**	14.14	0.81	0.03	0.71	**1.41**	1.56	**7.94**	0.64	8.68
			(4.02)	**(-3.22)**	**(-2.02)**	**(3.02)**	(1.64)	(1.25)	(0.23)	(0.36)	**(2.16)**	(1.06)	**(3.75)**	(0.64)	(8.68)
Male	45_59	23.95	19.8752	**-3.88**	3.67	**3.45**	**23.70**	1.23	0.22	-2.55	1.20	**4.45**	**14.01**	0.56	11.98
			(1.91)	**(-3.35)**	(1.24)	**(3.46)**	**(2.00)**	(1.36)	(1.39)	(-0.94)	(1.34)	**(2.20)**	**(4.79)**	(0.56)	(11.98)
Female	15_44	25.67	-31.6104	0.25	4.72	**7.42**	**52.48**	1.11	0.00	-4.92	**2.59**	**10.61**	**28.60**	0.53	20.76
			(-1.75)	(0.12)	(0.92)	**(4.29)**	**(2.55)**	(0.71)	(-0.02)	(-1.05)	**(1.66)**	**(3.03)**	**(5.64)**	(0.53)	(20.76)
Male	15_44	26.1	-18.0815	-1.05	4.26	**5.23**	**56.79**	1.07	0.18	**-5.98**	1.85	**6.43**	**19.63**	0.52	15.75
			(-1.32)	(-0.69)	(1.09)	**(3.99)**	**(3.64)**	(0.90)	(0.84)	**(-1.67)**	(1.56)	**(2.42)**	**(5.11)**	(0.52)	(15.75)
Female	60plus	39.75	**42.2153**	**-2.04**	-4.73	1.38	19.26	0.29	**-0.35**	**7.09**	0.72	-0.86	**7.72**	0.45	12.22
			(3.97)	**(-1.73)**	(-1.56)	(1.36)	(1.59)	(0.31)	**(-2.13)**	**(2.56)**	(0.78)	(-0.42)	**(2.59)**	(0.45)	(12.22)
Male	60plus	36.32	**45.9690**	**-3.30**	1.06	**1.60**	8.04	0.49	0.00	3.99	0.13	0.11	**5.63**	0.31	11.02
			(4.79)	**(-3.10)**	(0.39)	**(1.74)**	(0.74)	(0.59)	(0.03)	(1.60)	(0.16)	(0.06)	**(2.09)**	(0.31)	(11.02)

N=177, bolded cells are significant at 0.05 one-tailed level

Table 2: The long-term impact of civil wars: DALYs lost by disease categories

Cause Name	Gender	Age Group	Deaths due to civil war per '00 people (1991-97) Coefficient	Deaths due to civil war per '000 people (1991-97) t-ratio	Adjusted R-square
Malaria	Female	15_44	0.0490	3.29	0.57
Malaria	Male	15_44	0.0703	2.72	0.56
Malaria	Female	05_14	0.3755	2.61	0.54
Malaria	Male	05_14	0.3816	2.55	0.53
Malaria	Male	04orless	1.9640	2.49	0.54
Malaria	Female	04orless	1.7990	2.24	0.54
Malaria	Female	45_59	0.0105	2.23	0.55
Malaria	Male	45_59	0.0047	1.67	0.65
Tuberculosis	Female	05_14	0.0856	2.71	0.59
Tuberculosis	Male	05_14	0.0733	2.27	0.57
Tuberculosis	Female	15_44	0.1077	2.25	0.56
Tuberculosis	Male	15_44	0.1096	1.85	0.61
Tuberculosis	Male	45_59	0.1267	1.69	0.71
Tuberculosis	Female	45_59	0.0991	1.68	0.58
Respiratory diseases, infectious	Female	15_44	0.0941	2.57	0.60
Respiratory diseases, infectious	Female	45_59	0.1027	2.29	0.58
Respiratory diseases, infectious	Male	05_14	0.1115	2.12	0.62
Respiratory diseases, infectious	Female	05_14	0.1109	2.00	0.64
Respiratory diseases, infectious	Male	15_44	0.0931	1.96	0.57
Respiratory diseases, infectious	Male	45_59	0.0918	1.94	0.65
Other infectious	Female	05_14	0.4189	2.76	0.63
Other infectious	Male	05_14	0.3183	2.27	0.66
Other infectious	Female	15_44	0.3672	2.25	0.62
Other infectious	Female	45_59	0.2546	2.22	0.64
Other infectious	Male	45_59	0.1921	1.83	0.69
Other infectious	Male	15_44	0.3369	1.78	0.62
Transportation accidents	Female	05_14	0.0672	3.92	0.28
Transportation accidents	Female	15_44	0.0479	3.70	0.24
Transportation accidents	Female	45_59	0.0652	2.17	0.20
Transportation accidents	Male	15_44	0.1542	2.12	0.33
Transportation accidents	Male	45_59	0.1026	1.93	0.24
Cervix cancer	Female	45_59	0.0347	2.03	0.69
Cervix cancer	Female	60plus	0.0502	1.89	0.71
Cervix cancer	Female	05_14	0.0000	1.76	0.57
Homicide	Female	05_14	0.0245	5.22	0.39
Homicide	Male	15_44	0.1362	2.17	0.43

Table 2

Cause Name	Gender	Age Group	Deaths due to civil war per '00 people (1991-97) Coefficient	Deaths due to civil war per '000 people (1991-97) t-ratio	Adjusted R-square
Cardiovascular disease	Female	05_14	0.0336	2.62	0.54
Other malignant neoplasms	Male	05_14	0.0161	2.57	0.45
Lung cancer	Female	15_44	0.0058	2.27	0.18
Breast cancer	Female	04orless	0.0010	2.27	0.38
Digestive disease	Female	05_14	0.0118	2.14	0.29
Respiratory disease, chronic	Female	05_14	0.0364	1.94	0.05
All other diseases	Female	04orless	1.0348	1.79	0.25
Liver cancer	Female	45_59	0.0166	1.76	0.54
Respiratory disease, chronic	Male	05_14	0.0528	1.70	0.02
Other malignant neoplasms	Female	05_14	0.0093	1.67	0.28
Other unintentional injuries	Female	45_59	0.1038	1.67	0.14

Table 3: The long-term impact of contiguous civil wars: DALYs lost by disease categories

Cause Name	Gender	Age Group	Contiguous civil war Coefficient	Contiguous civil war t-ratio	Adjusted R-square
AIDS	Female	05_14	0.2023	3.84	0.42
AIDS	Male	05_14	0.1826	3.84	0.38
AIDS	Female	04orless	3.6475	3.64	0.42
AIDS	Male	04orless	3.1170	3.61	0.39
AIDS	Female	45_59	2.1487	3.54	0.39
AIDS	Female	60plus	0.1151	3.50	0.40
AIDS	Male	60plus	0.2385	3.43	0.36
AIDS	Female	15_44	9.5552	3.42	0.34
AIDS	Male	45_59	3.3563	3.42	0.35
AIDS	Male	15_44	5.8860	3.01	0.31
Other unintentional injuries	Male	05_14	0.2463	2.37	0.56
Other unintentional injuries	Male	04orless	1.1228	2.35	0.06
Other unintentional injuries	Female	04orless	0.5640	2.31	0.20
Other unintentional injuries	Female	05_14	0.1756	1.74	0.47
Suicide	Male	05_14	0.0902	3.56	0.25
Suicide	Male	45_59	0.2723	2.13	0.37
Suicide	Male	60plus	0.1152	1.72	0.21
Homicide	Male	05_14	0.0186	2.44	0.57
Homicide	Female	05_14	0.0189	1.79	0.39
Lung cancer	Male	15_44	0.0192	2.60	0.30
Lung cancer	Female	04orless	0.0181	1.86	0.00
Lung cancer	Female	05_14	0.0010	1.67	0.10
Digestive disease	Female	05_14	0.0392	3.16	0.29
Digestive disease	Female	15_44	0.1052	2.53	0.28
All other diseases	Female	05_14	0.1872	2.01	0.06
Other malignant neoplasms	Female	05_14	0.0241	1.92	0.28
Cancer of mouth, esophagus, ...	Female	04orless	0.0153	1.77	-0.02
War	Male	04orless	0.0011	1.70	0.06
Cardiovascular disease	Male	45_59	0.6437	1.66	0.24

Appendix: All equations, for civil war and contiguous civil war effects

Cause Name	Gender	Age Group	Deaths due to civil war per '00 people (1991-97) Coefficient	Deaths due to civil war per '00 people (1991-97) t-ratio	Contiguous civil war Coefficient	Contiguous civil war t-ratio	Adjusted R-square
Homicide	Female	05_14	0.0245	5.22	0.0189	1.79	0.39
Transportation accidents	Female	05_14	0.0672	3.92	0.0312	0.81	0.28
Transportation accidents	Female	15_44	0.0479	3.70	0.0246	0.84	0.24
Malaria	Female	15_44	0.0490	3.29	-0.0315	-0.96	0.57
All causes	Female	05_14	1.2266	3.29	0.3432	0.41	0.70
Other infectious	Female	05_14	0.4189	2.76	0.0808	0.24	0.63
Malaria	Male	15_44	0.0703	2.72	-0.0440	-0.77	0.56
Tuberculosis	Female	05_14	0.0856	2.71	-0.0355	-0.50	0.59
All causes	Male	05_14	1.0291	2.69	-0.2111	-0.25	0.70
Cardiovascular disease	Female	05_14	0.0336	2.62	0.0359	1.25	0.54
Malaria	Female	05_14	0.3755	2.61	-0.0808	-0.26	0.54
Other malignant neoplasms	Male	05_14	0.0161	2.57	0.0085	0.60	0.45
Respiratory diseases, infectious	Female	15_44	0.0941	2.57	-0.0780	-0.95	0.60
Malaria	Male	05_14	0.3816	2.55	-0.1324	-0.40	0.53
Malaria	Male	04orless	1.9640	2.49	-0.2265	-0.13	0.54
Respiratory diseases, infectious	Female	45_59	0.1027	2.29	-0.0988	-0.98	0.58
Tuberculosis	Male	05_14	0.0733	2.27	-0.0615	-0.85	0.57
Lung cancer	Female	15_44	0.0058	2.27	0.0054	1.38	0.18
Breast cancer	Female	04orless	0.0010	2.27	0.0004	0.36	0.38
Other infectious	Male	05_14	0.3183	2.27	-0.3062	-0.97	0.66
Other infectious	Female	15_44	0.3672	2.25	-0.4102	-1.12	0.62
Tuberculosis	Female	15_44	0.1077	2.25	-0.1699	-1.58	0.56
Malaria	Female	04orless	1.7990	2.24	0.0679	0.04	0.54
Malaria	Female	45_59	0.0105	2.23	-0.0019	-0.18	0.55
Other infectious	Female	45_59	0.2546	2.22	-0.2857	-1.11	0.64
Transportation accidents	Female	45_59	0.0652	2.17	-0.0134	-0.20	0.20
Homicide	Male	15_44	0.1362	2.17	0.2034	1.44	0.43
All causes	Female	45_59	1.4076	2.16	1.5554	1.06	0.64
Digestive disease	Female	05_14	0.0118	2.14	0.0392	3.16	0.29
Respiratory diseases, infectious	Male	05_14	0.1115	2.12	-0.0120	-0.10	0.62
Transportation accidents	Male	15_44	0.1542	2.12	-0.1617	-0.99	0.33
Cervix cancer	Female	45_59	0.0347	2.03	0.0083	0.22	0.69
Respiratory diseases, infectious	Female	05_14	0.1109	2.00	0.0355	0.28	0.64
Respiratory diseases, infectious	Male	15_44	0.0931	1.96	-0.0895	-0.84	0.57
Respiratory diseases, infectious	Male	45_59	0.0918	1.94	-0.0675	-0.63	0.65
Respiratory disease, chronic	Female	05_14	0.0364	1.94	0.0623	1.48	0.05
Transportation accidents	Male	45_59	0.1026	1.93	0.0000	0.00	0.24
Cervix cancer	Female	60plus	0.0502	1.89	0.0415	0.69	0.71
All causes	Male	04orless	5.2200	1.89	2.4313	0.39	0.71
Tuberculosis	Male	15_44	0.1096	1.85	-0.1331	-1.00	0.61

Appendix

Cause Name	Gender	Age Group	Deaths due to civil war per '00 people (1991-97) Coefficient	Deaths due to civil war per '00 people (1991-97) t-ratio	Contiguous civil war Coefficient	Contiguous civil war t-ratio	Adjusted R-square
Other infectious	Male	45_59	0.1921	1.83	-0.2230	-0.95	0.69
All other diseases	Female	04orless	1.0348	1.79	1.0517	0.92	0.25
Other infectious	Male	15_44	0.3369	1.78	-0.5224	-1.23	0.62
Liver cancer	Female	45_59	0.0166	1.76	-0.0170	-0.80	0.54
Cervix cancer	Female	05_14	0.0000	1.76	0.0001	0.65	0.57
Respiratory disease, chronic	Male	05_14	0.0528	1.70	0.0292	0.42	0.02
Tuberculosis	Male	45_59	0.1267	1.69	-0.2093	-1.24	0.71
Tuberculosis	Female	45_59	0.0991	1.68	-0.1842	-1.39	0.58
Malaria	Male	45_59	0.0047	1.67	-0.0015	-0.24	0.65
Other malignant neoplasms	Female	05_14	0.0093	1.67	0.0241	1.92	0.28
Other unintentional injuries	Female	45_59	0.1038	1.67	0.0522	0.37	0.14
All causes	Female	15_44	2.5861	1.66	10.6079	3.03	0.53
Breast cancer	Female	60plus	0.0340	1.65	0.0073	0.14	0.17
Other infectious	Male	04orless	1.6845	1.61	-1.4604	-0.62	0.70
Liver cancer	Female	60plus	0.0262	1.56	-0.0101	-0.27	0.60
All causes	Male	15_44	1.8464	1.56	6.4254	2.42	0.52
All causes	Female	04orless	4.0447	1.55	4.8424	0.83	0.71
Other unintentional injuries	Male	15_44	0.1629	1.54	0.0751	0.32	0.35
Perinatal conditions	Female	04orless	0.7460	1.48	0.1873	0.55	0.31
All other diseases	Male	04orless	0.7531	1.46	0.3415	0.29	0.30
All other diseases	Female	45_59	0.3993	1.46	-0.6769	-1.24	0.27
Homicide	Female	60plus	0.0341	1.46	0.0142	0.27	0.07
Liver cancer	Male	05_14	0.0007	1.46	-0.0013	-1.22	0.57
Respiratory disease, chronic	Male	04orless	0.1414	1.44	-0.1404	-0.64	0.41
Transportation accidents	Female	60plus	0.0681	1.42	-0.0191	-0.18	0.08
Breast cancer	Female	45_59	0.0367	1.41	-0.0691	-1.06	0.21
Other unintentional injuries	Female	60plus	0.2266	1.40	0.0461	0.13	0.07
Homicide	Male	60plus	0.0634	1.39	0.0135	0.13	0.05
Liver cancer	Male	45_59	0.0445	1.38	-0.0925	-1.28	0.44
Stomach cancer	Female	15_44	0.0051	1.38	0.0018	0.33	0.39
Homicide	Female	04orless	0.0165	1.37	0.0240	0.88	0.13
All causes	Male	45_59	1.2004	1.34	4.4453	2.20	0.56
Other malignant neoplasms	Female	60plus	0.0693	1.29	-0.0960	-0.79	0.04
Homicide	Male	05_14	0.0044	1.29	0.0186	2.44	0.57
Tuberculosis	Male	60plus	0.1024	1.27	-0.0781	-0.43	0.67
Liver cancer	Male	15_44	0.0128	1.26	-0.0302	-1.32	0.55
Malaria	Male	60plus	0.0021	1.24	0.0016	0.43	0.56
Other unintentional injuries	Male	60plus	0.1888	1.24	-0.0050	-0.01	0.04
Transportation accidents	Male	60plus	0.0646	1.23	-0.0289	-0.24	0.12
Malaria	Female	60plus	0.0037	1.20	0.0042	0.63	0.36
Tuberculosis	Female	60plus	0.0567	1.17	-0.0820	-0.75	0.51
Stomach cancer	Male	05_14	0.0003	1.17	0.0001	0.16	0.60
Other infectious	Female	04orless	1.1102	1.17	-0.2197	-0.10	0.71

Appendix

Cause Name	Gender	Age Group	Deaths due to civil war per '00 people (1991-97) Coefficient	Deaths due to civil war per '00 people (1991-97) t-ratio	Contiguous civil war Coefficient	Contiguous civil war t-ratio	Adjusted R-square
Other unintentional injuries	Female	05_14	0.0522	1.16	0.1756	1.74	0.47
All other diseases	Female	60plus	0.5441	1.15	-2.0441	-2.18	0.21
Other malignant neoplasms	Female	45_59	0.0352	1.12	-0.0444	-0.63	0.13
Liver cancer	Male	60plus	0.0365	1.08	-0.0284	-0.37	0.49
Other malignant neoplasms	Male	15_44	0.0146	1.05	-0.0001	0.00	0.08
Cervix cancer	Female	15_44	0.0033	1.04	0.0012	0.16	0.29
Homicide	Male	45_59	0.0308	1.04	0.1024	1.53	0.17
Liver cancer	Female	05_14	0.0002	0.96	0.0008	1.62	0.50
Digestive disease	Female	60plus	0.0698	0.94	-0.0235	-0.14	0.49
All other diseases	Male	45_59	0.2944	0.89	-0.9325	-1.25	0.34
Other malignant neoplasms	Male	60plus	0.0758	0.89	-0.0147	-0.08	0.18
Other unintentional injuries	Male	05_14	0.0406	0.88	0.2463	2.37	0.56
Homicide	Female	15_44	0.0401	0.86	-0.0068	-0.06	0.06
AIDS	Male	60plus	0.0264	0.85	0.2385	3.43	0.36
Cardiovascular disease	Male	05_14	0.0068	0.82	-0.0017	-0.09	0.66
Other malignant neoplasms	Female	04orless	0.0177	0.81	0.0113	0.23	0.29
Homicide	Male	04orless	0.0297	0.80	0.1062	1.26	0.02
AIDS	Male	05_14	0.0167	0.79	0.1826	3.84	0.38
Homicide	Female	45_59	0.0417	0.79	-0.0267	-0.22	-0.01
AIDS	Male	04orless	0.3012	0.78	3.1170	3.61	0.39
All causes	Female	60plus	0.7186	0.78	-0.8610	-0.42	0.45
Other malignant neoplasms	Male	45_59	0.0256	0.76	0.0778	1.02	0.28
Other infectious	Female	60plus	0.1112	0.75	0.0962	0.29	0.47
Digestive disease	Male	04orless	0.1381	0.72	0.5618	1.30	0.07
Liver cancer	Female	15_44	0.0015	0.71	-0.0030	-0.61	0.61
Lung cancer	Female	45_59	0.0147	0.69	-0.0233	-0.71	0.15
Tuberculosis	Male	04orless	0.0348	0.68	0.0442	0.39	0.30
Respiratory diseases, infectious	Female	60plus	0.0463	0.68	-0.0410	-0.27	0.51
Other infectious	Male	60plus	0.0370	0.67	-0.0361	-0.29	0.72
All other diseases	Male	60plus	0.2023	0.65	-1.4834	-2.13	0.36
AIDS	Male	45_59	0.2794	0.64	3.3563	3.42	0.35
AIDS	Female	60plus	0.0088	0.63	0.1151	3.50	0.40
Suicide	Female	60plus	0.0247	0.61	0.0146	0.54	0.04
Digestive disease	Female	04orless	0.0891	0.61	0.4707	1.44	0.05
AIDS	Female	05_14	0.0133	0.60	0.2023	3.84	0.42
AIDS	Male	15_44	0.5025	0.58	5.8860	3.01	0.31
AIDS	Female	04orless	0.2420	0.57	3.6475	3.64	0.42
Maternal conditions	Female	45_59	0.0001	0.56	0.0000	-0.45	0.04
All other diseases	Male	15_44	0.2614	0.54	-1.3917	-1.27	0.24
Other unintentional injuries	Female	04orless	0.0582	0.53	0.5640	2.31	0.20
Cardiovascular disease	Female	15_44	0.0128	0.52	0.0644	1.16	0.47
Perinatal conditions	Female	05_14	0.0021	0.50	-0.0040	-1.42	-0.05
Other malignant neoplasms	Male	04orless	0.0211	0.50	0.1327	1.39	0.05

Appendix

Cause Name	Gender	Age Group	Deaths due to civil war per '00 people (1991-97) Coefficient	Deaths due to civil war per '00 people (1991-97) t-ratio	Contiguous civil war Coefficient	Contiguous civil war t-ratio	Adjusted R-square
Other malignant neoplasms	Female	15_44	0.0048	0.49	0.0291	1.32	0.16
Transportation accidents	Female	04orless	0.0115	0.49	0.0378	0.71	0.12
Respiratory disease, chronic	Female	45_59	0.0181	0.45	0.0314	0.35	0.50
Digestive disease	Male	60plus	0.0406	0.44	0.0584	0.28	0.50
Lung cancer	Male	15_44	0.0015	0.44	0.0192	2.60	0.30
Respiratory diseases, infectious	Male	04orless	0.2077	0.43	0.2498	0.23	0.62
Cancer of mouth, esophagus, ...	Female	04orless	0.0016	0.43	0.0153	1.77	-0.02
Transportation accidents	Male	05_14	0.0121	0.42	-0.0321	-0.50	0.11
Tuberculosis	Female	04orless	0.0168	0.42	0.0418	0.46	0.29
War	Female	45_59	0.0001	0.41	-0.0003	-0.81	0.00
Stomach cancer	Male	60plus	0.0142	0.41	0.0014	0.02	0.20
Other unintentional injuries	Male	45_59	0.0395	0.41	-0.0213	-0.10	0.05
All other diseases	Female	15_44	0.0849	0.40	-0.0439	-0.10	0.24
Cardiovascular disease	Female	45_59	0.0405	0.37	0.0999	0.41	0.62
AIDS	Female	45_59	0.0950	0.37	2.1487	3.54	0.39
Cardiovascular disease	Male	04orless	0.0135	0.34	0.0446	0.50	0.26
Stomach cancer	Female	05_14	0.0001	0.34	-0.0003	-0.67	0.06
Stomach cancer	Male	45_59	0.0062	0.34	0.0101	0.24	0.28
Digestive disease	Male	45_59	0.0345	0.33	0.1081	0.46	0.33
All other diseases	Female	05_14	0.0132	0.28	0.1872	2.01	0.06
Suicide	Male	60plus	0.0276	0.28	0.1152	1.72	0.21
Respiratory disease, chronic	Female	04orless	0.0183	0.25	-0.0163	-0.10	0.29
Stomach cancer	Female	45_59	0.0039	0.21	-0.0186	-0.65	0.36
Respiratory diseases, infectious	Male	60plus	0.0108	0.20	-0.0973	-0.80	0.54
Cancer of mouth, esophagus, ...	Male	60plus	0.0052	0.18	0.0161	0.25	0.39
Lung cancer	Male	45_59	0.0054	0.17	0.0981	1.37	0.40
All causes	Male	60plus	0.1337	0.16	0.1076	0.06	0.31
AIDS	Female	15_44	0.1900	0.16	9.5552	3.42	0.34
Other unintentional injuries	Female	15_44	0.0093	0.16	0.0579	0.44	0.07
Other unintentional injuries	Male	04orless	0.0339	0.16	1.1228	2.35	0.06
Perinatal conditions	Male	45_59	0.0000	0.16	0.0000	-0.59	-0.13
Stomach cancer	Male	15_44	0.0003	0.14	0.0005	0.09	0.37
Cardiovascular disease	Female	04orless	0.0398	0.13	0.9906	1.43	-0.03
Maternal conditions	Female	15_44	0.0124	0.10	-0.1285	-1.59	0.31
Suicide	Female	45_59	0.0067	0.08	0.0107	0.19	0.30
Respiratory diseases, infectious	Female	04orless	0.0355	0.08	0.5320	0.52	0.63
War	Male	04orless	0.0000	0.07	0.0011	1.70	0.06
Lung cancer	Female	05_14	0.0000	0.06	0.0010	1.67	0.10
Cancer of mouth, esophagus, ...	Female	60plus	0.0007	0.05	-0.0150	-0.51	0.55
Cervix cancer	Female	04orless	0.0003	0.02	0.0489	1.45	-0.02
War	Male	45_59	0.0000	0.00	-0.0051	-0.74	0.01
Perinatal conditions	Male	60plus	0.0000	-0.02	0.0000	-0.25	-0.14
Lung cancer	Male	04orless	-0.0002	-0.02	0.0267	1.51	-0.01

Cause Name	Gender	Age Group	Deaths due to civil war per '00 people (1991-97) Coefficient	Deaths due to civil war per '00 people (1991-97) t-ratio	Contiguous civil war Coefficient	Contiguous civil war t-ratio	Adjusted R-square
Stomach cancer	Female	60plus	-0.0015	-0.05	-0.0417	-0.84	0.29
Stomach cancer	Male	04orless	-0.0004	-0.05	0.0276	1.52	0.01
War	Female	15_44	0.0000	-0.06	-0.0008	-0.78	0.03
War	Female	60plus	0.0000	-0.07	0.0001	1.08	-0.03
Liver cancer	Female	04orless	-0.0001	-0.09	0.0025	0.98	0.09
Digestive disease	Female	45_59	-0.0059	-0.09	0.0897	0.64	0.20
Perinatal conditions	Male	04orless	-0.3928	-0.10	0.3715	0.25	0.55
Respiratory disease, chronic	Male	45_59	-0.0061	-0.12	0.0343	0.29	0.37
Suicide	Female	05_14	-0.0016	-0.12	0.0063	0.70	0.11
Perinatal conditions	Female	60plus	0.0000	-0.14	0.0000	0.61	0.12
Respiratory disease, chronic	Male	15_44	-0.0029	-0.14	-0.0602	-1.32	0.36
Stomach cancer	Female	04orless	-0.0004	-0.15	-0.0023	-0.62	0.09
Lung cancer	Male	60plus	-0.0088	-0.18	-0.0261	-0.24	0.35
Cancer of mouth, esophagus, ...	Female	05_14	-0.0003	-0.19	-0.0021	-0.59	-0.01
Digestive disease	Male	05_14	-0.0016	-0.22	0.0165	1.04	0.56
Lung cancer	Female	60plus	-0.0089	-0.23	-0.1227	-2.08	0.05
Cancer of mouth, esophagus, ...	Female	45_59	-0.0030	-0.25	-0.0213	-0.79	0.27
Breast cancer	Female	15_44	-0.0018	-0.28	-0.0230	-1.43	0.16
Respiratory disease, chronic	Female	60plus	-0.0341	-0.29	0.0085	0.03	0.30
Lung cancer	Female	04orless	-0.0018	-0.29	0.0181	1.86	0.00
Respiratory disease, chronic	Female	15_44	-0.0058	-0.29	0.0352	0.79	0.35
Digestive disease	Male	15_44	-0.0095	-0.30	0.0013	0.02	0.38
Cancer of mouth, esophagus, ...	Male	45_59	-0.0064	-0.31	0.0262	0.57	0.18
All other diseases	Male	05_14	-0.0124	-0.32	0.0872	0.99	0.07
War	Male	15_44	-0.0011	-0.34	-0.0056	-0.79	-0.01
Liver cancer	Male	04orless	-0.0005	-0.38	-0.0038	-1.33	0.16
Breast cancer	Female	05_14	0.0000	-0.40	0.0000	-0.10	0.39
Perinatal conditions	Female	15_44	-0.0004	-0.43	-0.0004	-0.64	-0.15
Cardiovascular disease	Male	15_44	-0.0149	-0.43	-0.0233	-0.30	0.34
Cancer of mouth, esophagus, ...	Male	05_14	-0.0001	-0.44	-0.0007	-1.14	0.20
War	Male	60plus	-0.0001	-0.46	0.0004	0.58	0.18
Lung cancer	Male	05_14	-0.0001	-0.46	0.0001	0.18	0.02
Suicide	Male	45_59	-0.0895	-0.47	0.2723	2.13	0.37
War	Female	05_14	0.0000	-0.48	0.0000	0.25	0.18
Cardiovascular disease	Female	60plus	-0.2184	-0.50	0.4708	0.48	0.24
Transportation accidents	Male	04orless	-0.0158	-0.54	-0.0180	-0.27	0.16
Cancer of mouth, esophagus, ...	Male	04orless	-0.0002	-0.56	0.0010	1.09	-0.02
War	Female	04orless	-0.0001	-0.64	0.0006	1.61	0.01
Respiratory disease, chronic	Male	60plus	-0.0819	-0.67	-0.1505	-0.55	0.17
Cancer of mouth, esophagus, ...	Female	15_44	-0.0014	-0.77	-0.0022	-0.52	0.22
Perinatal conditions	Female	45_59	-0.0005	-0.79	0.0005	1.17	0.01
Cancer of mouth, esophagus, ...	Male	15_44	-0.0028	-0.83	0.0007	0.09	0.19
Digestive disease	Female	15_44	-0.0189	-1.02	0.1052	2.53	0.28

Cause Name	Gender	Age Group	Deaths due to civil war per '00 people (1991-97) Coefficient	Deaths due to civil war per '00 people (1991-97) t-ratio	Contiguous civil war Coefficient	Contiguous civil war t-ratio	Adjusted R-square
Perinatal conditions	Male	15_44	-0.0006	-1.05	0.0001	0.43	-0.05
Cardiovascular disease	Male	45_59	-0.1847	-1.07	0.6437	1.66	0.24
Perinatal conditions	Male	05_14	-0.0024	-1.17	-0.0005	-0.58	0.07
Cardiovascular disease	Male	60plus	-0.5114	-1.20	1.1523	1.20	0.12
Suicide	Male	15_44	-0.3465	-1.38	0.2396	1.42	0.32
War	Male	05_14	-0.0005	-1.40	0.0003	0.38	0.15
Suicide	Male	05_14	-0.0935	-2.49	0.0902	3.56	0.25
Suicide	Female	15_44	-0.2720	-3.37	0.0216	0.40	0.60
Breast cancer	Male	04orless	0.0000		0.0000		
Breast cancer	Male	05_14	0.0000		0.0000		
Breast cancer	Male	15_44	0.0000		0.0000		
Breast cancer	Male	45_59	0.0000		0.0000		
Breast cancer	Male	60plus	0.0000		0.0000		
Cervix cancer	Male	04orless	0.0000		0.0000		
Cervix cancer	Male	05_14	0.0000		0.0000		
Cervix cancer	Male	15_44	0.0000		0.0000		
Cervix cancer	Male	45_59	0.0000		0.0000		
Cervix cancer	Male	60plus	0.0000		0.0000		
Maternal conditions	Female	04orless	0.0000		0.0000		
Maternal conditions	Female	05_14	0.0000		0.0000		
Maternal conditions	Female	60plus	0.0000		0.0000		
Maternal conditions	Male	04orless	0.0000		0.0000		
Maternal conditions	Male	05_14	0.0000		0.0000		
Maternal conditions	Male	15_44	0.0000		0.0000		
Maternal conditions	Male	45_59	0.0000		0.0000		
Maternal conditions	Male	60plus	0.0000		0.0000		
Suicide	Female	04orless	0.0000		0.0000		
Suicide	Male	04orless	0.0000		0.0000		