Indirect Health Consequences of War: Cardiovascular Disease

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This is a work in progress; revisions are needed

Abstract

This study examines the impact of armed conflict on male and female adult cardiovascular disease mortality. This is an indirect health consequence of war which has not been given enough attention in social science research. The depletion of resources, access to health care, and general disruption to every day life during times of armed conflict create excess stress and burdens which increase deaths caused by cardiovascular disease. I use a variety of data to measure demographic, developmental, and conflict related outcomes. I find that all types of armed conflict increase the cardiovascular disease mortality rates among both females and males across countries and over time.

Introduction

War is a complicated topic with many disturbing outcomes. The effects of extreme violence such as war can be very far-reaching, often having severe indirect consequences. We typically think of direct health consequences such as soldier and civilian casualties caused by bullets and bombs. There are however, numerous indirect health consequences that create extensive devastation among populations (Ghobarah, Huth and Russett 2003; Murray et al. 2002). Because many of these indirect effects only become evident over time, policy makers and those who have the most control over initiating the violent acts often do not take these factors into consideration. As our world continues to remain stratified and extreme violence is common,

it is extremely important to explore what the real human cost of war is.

In this paper I focus on rates of mortality caused by cardiovascular disease (CVD). Men and women experience mortality differently with women typically enjoying longer life expectancy across the entire life course (Jansen 2006; Mathers et al. 2001). I conduct a gender-stratified analysis of indirect effects of war on CVD mortality rates. Cardiovascular diseases are chronic illnesses that are negatively influenced by stress and other long-term exposure to hazardous social contexts (Fitzpatrick et al. 2004; Head et al. 2008; Kang, Bullman and Taylor 2006). Literature has shown that the stress of violent conflict as well as destruction of infrastructure have a detrimental effect on health outcomes (Pilav et al. 2007; Rose et al. 1987; Siegel, Baron and Epstein 1985; Sullenberger and Gentlesk 2008). Many chronic diseases may not present themselves until years or decades after conflicts have ended. In this paper I use the definition of war developed by the Uppsala Conflict Data Program at the Department of Peace and Conflict Research at Uppsala University (UCDP) (Gleditsch et al. 2002). The UCDP defines war as "a contested incompatibility that concerns government and/or territory where the use of armed forces between two parties, of which at least one is the government or state, results in at least 25 battle-related deaths." (p. 3)

Previous Work

Until fairly recently there have been few studies which explore the indirect health consequences of war. The studies that do exist focus mainly on mental health issues such as post traumatic stress disorder (Levy and Sidel 2009). There is a body of research which looks at the impact of conflicts on infectious diseases (Bunton and Wills 2005; Cliff and Noormahomed 1993; Garfield 1985; Iacopino and Waldman 1999; Murray et al. 2002). In this study I am

exploring the effect that armed conflict has on cardiovascular disease. These indirect health consequences of war have not been researched in great detail although they play a significant role in mortality across the globe. As Murray et al. stated, war related injury and deaths are a large contributor to disease on a global scale (2002). They explain that because information systems are broken down during conflict it is difficult to understand the magnitude of death and disability. Levy and Sidel find that armed conflict creates both direct and indirect health problems for military personnel as well as civilians (2009). They note that most research has focused on short-term direct health effects of armed conflict. They add that the few studies which explore long-term effects focus mainly on issues of mental health such as Post Traumatic Stress Disorder. Another limitation of the literature that I have encountered is that very few studies have conducted longitudinal, cross-national research.

One exception is an article written by Li and Wen which explored the impact of armed conflict on adult mortality across countries and over time (2005). They constructed age-sex-cause specific death rates using national statistical registries and population counts obtained from the World Health Organization. Their final dataset included information from 84 countries spanning 1961 to 1998. The authors used several measures of armed conflict to explore the effects of various types of conflict on adult mortality rates. They found that the effects of civil war were stronger than the effects of interstate armed conflict on mortality rates immediately following the conflict. Interestingly the opposite was found for the lingering effects. As most would expect they did find that the effects of severe conflict were much stronger than the effects of minor conflict. Their results demonstrated that males bear more of the immediate brunt following conflict whereas females suffer increased mortality rates as a lingering effect of conflict. I owe much of my theoretical and methodological framework in this piece to the unique

contributions put forth by Li and Wen (2005). Cause specific mortality is not explored in their article which is a void that this article seeks to address.

Another foundational piece within the literature is a study which explored the impacts of civil war on civilian populations (Ghobarah, Huth and Russett 2003). This study also used World Health Organization data to explore death and disability among populations who had experienced internal armed conflict. The authors focus on the long-term impacts and examine a variety of different debilitating diseases and conditions that emerge as indirect consequences of civil armed conflict. In their conclusions they make the comparison that suggests the amount of death and disability experienced in the year 1999, because of lingering effects of war, is equal to that experienced as a direct result of war during the years 1991-1997. While this study does provide important insight into the effects of civil wars, it does not examine the impact of interstate conflict or the varying levels of intensity associated with various types of conflict. In this article I attempt to address those issues.

Theoretical Perspective

The general theoretical perspective of this study is that the stresses of armed conflict on civilian as well as military populations lead to a depleted state of well-being which results in an increase in diseases such as cardiovascular disease. Armed conflict also damages infrastructure and limits health care access and delivery. Rose and colleagues found an increase in ischemic heart disease mortality associated with combat veterans who experienced traumatic leg amputations (1987). Falger, et al. found that Dutch World War II veterans experienced higher rates of cardiovascular disease (1992). The authors attribute this increased risk for cardiovascular disease to be associated with war experiences and also related to post traumatic

stress disorder. Kang, Bullman, & Taylor also found that World War II prisoners of war hadhigher rates of cardiovascular disease which is related to post traumatic stress disorder (2006). Increased levels of stress are known to weaken the heart and increase the likelihood of cardiovascular ailments. In their 1998 study, Kubzanksy, et al. conclude that chronic heart disease (CHD) may develop as a result of anxiety. They add that the risk for CHD may be increased by chronic anxiety for several reasons. These include risky health behaviors, increased hypertension, and an increased chance of actually triggering deadly coronary failures.

Military personnel are not the only people at risk for increased morbidity and mortality as a result of being exposed to armed conflict (Li and Wen 2005; Murray et al. 2002). Head and colleagues used birth weight data and late life hospital admissions for CVD to examine the effect of undernutrition in infancy on later life CVD (2008). The data measuring birth weight were timed to coincide with the German occupation of the Channel Islands during World War II. A control group of individuals born at the same time and who had been evacuated or otherwise left the area were also used in the study. The authors found that the prevalence of CVD was correlated with exposure to the occupation. The lack of proper nutrition during the occupation was cited as a major factor. The impact of food deprivation during the occupation had a stronger impact on CVD prevalence among all age groups than undernurishment in utero before the war.

Being subjected to armed conflict can also increase the levels of risk behaviors engaged in by populations. People who are exposed to armed conflict may engage in risky behavior in order to cope with the stress experienced both during and after the conflict. In their 2007 study, Aida and colleagues found that in postwar Bosnia and Herzegovina, cardiovascular disease risk factors including smoking, obesity, and hypertension were disproportionately high among both

men and women. The authors argue that this increased risk for cardiovascular disease comes as the result of the stresses of war. Wilkinson also finds that there are high rates of increased risk and unhealthy lifestyles causally associated with cardiovascular disease in Bosnia and Herzegovina (2007).

An important limitation of the literature is that it is sparse and sporadic. As previously mentioned there are few studies which explore the indirect health consequences of armed conflict. There are even fewer that focus on chronic or infectious diseases. Of the studies that do exist, I am aware only of Li and Wen's (2005) work which has a time-series and cross-national design allowing for broad applicability and generalizability. This is a key factor as to why studies such as this one provide an important contribution to the literature and field in general.

Conflict type can play an important role in the health outcomes experienced by populations. It is logical that as the severity of the conflict increases, the mortality and adverse health consequences related to the conflict also increase. The length of time that populations are exposed to armed conflict will obviously also play an important role in the severity of both direct and indirect health consequences. Internal conflict, or civil war, can be especially devastating on populations. Because most if not all of the fighting occurs within a given territory, the local populations bear much of the brunt of the conflict. Ghobarah, Huth, and Russett (2003) find that civil wars produce devastating effects on civilian populations because of exposure to conditions which increase exposure to disease, injury, and death.

In this study I not only compare and contrast the differences between women and men but also pay particular attention to the severity of the war effects on both genders individually and comparatively. Sibai, Fletcher, and Armenian (2001) discovered that women experienced

higher rates of cardiovascular disease mortality after a 16 year civil war in Lebanon. They found that exposure to war time trauma occurring to the women's families or to themselves created a significantly greater risk of cardiovascular disease mortality compared to men. Men experienced greater heart disease mortality rates when they experienced property loss and work-related difficulties. All people who were displaced during war time experienced greater risk for cardiovascular disease mortality. Jansen adds that gender inequality experienced by women is magnified by armed conflict (2006). The author states that women suffer disproportionately in terms of human rights, access to resources, and personal safety.

Research Questions and Hypotheses

This study examines the effects of war on mortality rates associated with cardiovascular diseases and how these associations vary according to gender. The study hypotheses are: 1) War will cause chronic disease mortality rates to increase. 2) The severity, length, and type of conflict will influence mortality rates. 3) Increases in severity and length will increase mortality rates. 4) Interstate conflict will have less influence on mortality rates. 5) Internal conflict will have a greater impact on mortality. 6) Minor conflict will have less impact on mortality. 7) Women will experience more severe impacts on chronic illness mortality as a result of war.

Data

I have compiled data from a variety of sources including the World Health Organization Mortality Database and Population Database, Uppsala Conflict Data Program at the Department of Peace and Conflict Research, Center for the Study of Civil War at the International Peace Research Institute in Oslo, Armed Conflict Database, Ghobarah, Huth & Russet Inequality Data,

Deininger & Squire Income and Inequality Data, Polity IV Database, World Bank World Development Indicators, and Organization for Economic Cooperation and Development. These data sources are linked by a country identifier.

The working sample consists of data from 134 countries over a 40 year period. Country names are presented in the Appendix. Multivariate regression analysis is used. The dependent variables are mortality rates Log transformed to correct for the skewness of the distribution. Key independent variables – measures of conflict - are lagged one year to prevent reverse causality. Using lagged independent variables is helpful for reducing reverse causation given the possibility that conflicts may emerge due to high mortality rates of the adult population which may result in desperate situations. I use STATA version 9 to create the dataset and run regression models. Robust standard errors are used in all of the models.

Dependent Variable

The dependent variable is the cause specific crude mortality rate stratified by sex for the working age population: 15-64 years old. I log transform the variable to correct its skewed distribution. To create this variable, data from the World Health Organization (WHO) Mortality Database (World Health Organization 2008) were used. This database contains a compilation of death counts specified by sex, cause of death, and age. It also contains population counts specified by sex and age. These counts are obtained from national statistic registries of 134 countries spanning the years 1950 to 2001. Mortality rates are calculated using the WHO death and population counts. The rates measure total deaths per 1,000 in each specified category.

Independent Variables

Several measures of armed conflict are used to test the hypotheses. The Armed Conflict Database (Gleditsch et al. 2002) provides several measures of armed conflict ranging from minor to severe, internal and external, as well as variations on some categories. Each variable is measured in dummy form where 1 = yes and 2 = no as well as continuous form measuring the percentage of time that a country has experienced the given type of conflict. Reverse causality is a concern that is alleviated by lagging each of the conflict variables by a year. The concern is that if a country experiences high mortality rates among working age populations, this may result in desperate situations from which conflict emerges. Lagging the key independent variables by a year will prevent reverse causality and is a commonly used approach in time-series cross-national designs (Reference). I will now describe each of the conflict variables. Conflict Dummy is a dichotomous variable expressing whether or not there has been armed conflict involvement in the given country. Conflict Count states the number of armed conflicts within a country during a one year period. Conflict History measures the -percentage of time since 1946 that a country has been involved in an armed conflict.

The Interstate dummy variable expresses whether or not there has been armed conflict between two or more states. Interstate history measures the percentage of time since 1946 that a country has been involved in an armed conflict with at least one other state. The Intrastate Dummy variable expresses whether or not armed conflict has occurred between the government of the state and one or more internal opposition groups with or without intervention from other states. Intrastate History measures the percentage of time since 1946 that a country has been involved in an armed conflict occurring between the government of the state and one or more internal opposition groups with or without intervention from other states. The Minor Conflict Dummy expresses whether or not a country has been involved in a minor conflict defined as resulting in

between 25 and 999 battle-related deaths per year. Minor Conflict History measures the percentage of time since 1946 that a country has been involved in minor conflict defined as causing between 25 and 999 battle-related deaths per year. Severe Conflict Dummy expresses whether or not a country has been involved in a severe conflict defined as causing 1,000 or more battle-related deaths per year. Severe Conflict history measures the percentage of time since 1946 that a country has been involved in severe conflict defined as causing 1,000 or more battle-related deaths per year.

Control Variables

A host of control variables are included in the analysis to account for demographics, political structures, development characteristics, time, location, infrastructure, and other measures of conflict and health outcomes at the country level.

In Western societies democracy is considered to be a superior political system as it theoretically emphasizes and aims to protect human rights. On the other hand, countries that are more democratic can experience greater income equality and per capita income growth (Przeworski et al. 2000). As the level of democracy increases, a nation's level of prosperity and well-being tends to increase as well. Countries that are more democratic, as opposed to autocratic, tend to experience greater equality and access to resources (Przeworski et al. 2000; Reuveny and Li 2003). Although there is debate in the literature, there is some evidence that if there is more equality with regard to access to resources the population may experience better health (Wilkinson 1996). Therefore, it is expected that the level of democracy will decrease the negative health effects experienced as a result of war. To measure the level of democracy I use the Polity IV database (Marshall & Jaggers, 2007). This data project has created an empirical

measurement of democracy on a continuous scale ranging from zero to ten. Autocracy is similarly measured in the opposite direction from 0 to negative 10. Democracy is measured by a continuous variable ranging from –10 to 10. A score of -10 represents complete autocracy. A score of 10 represents a country that is strongly democratic. Tropical regions of the globe tend to contain poorer and less developed countries. In these countries advanced medical facilities and technologies are less available or accessible as compared to more developed nations. A dichotomous indicator is used to distinguish tropical regions from the rest of the world (Ghobarah, Huth and Russett 2003).

Urbanization is another important determinant of population health (Li and Wen 2005). On the one hand, urbanization may create large communities of low income individuals who are drawn to cities in hopes of improving their socioeconomic status. Deprived migrants are often segregated and exposed to harsh environments and living conditions (Massey, Durand and Malone 2002). This can create extra burdens on the medical infrastructure and ultimately, large-scale urbanization and concomitant migration may lead to increased mortality rates on a society level. Alternatively, urbanization likely creates economic prosperity by stimulating economic growth and development which will provide greater access to health-promoting resources such as medical services for more people. This increase in infrastructure and general prosperity is presumed to decrease mortality rates. Technologically advanced medical institutions are found in cities as opposed to rural locations. I use the variable *urban growth* to help control for the mentioned scenarios. This variable also comes from Ghobarah, Huth, and Russett (2003).

Medical infrastructure was tapped by two variables. The first is the numbers of *hospital beds* available per 1,000 persons. The idea is that as the available of medical care increases, mortality will decrease. The second is *per capita health expenditure.* This variable provides a

measure of the amount of money spent on health expenditures per capita. The amount is converted to the current US dollar equivalent.

Time can also play an important role in the advancement of medical technologies. I use the *year* variable to control for the possibility that over time mortality rates have decreased overall. Because medical advancement continues to grow at an exponential rate, the year that a country experiences an armed conflict may have an influence on the intensity of mortality which is experienced. I have data from 134 countries which span half a decade from 1950 to 2001.

Li and Wen also argue that the ratio of dependent individuals within a nation can influence the mortality rate (2005). The authors explain that individuals who are younger than 15 or older than 64 are typically dependent upon at least one working age (15-64) individual. This creates excessive strain and a greater burden for the working population which in turn may increase their rate of mortality. I use the *dependency* variable to capture this effect. This variable is created using data from the World Bank World Development Indicators (2002).

Results

Analytical results are presented in tables I and II. Table I shows the results of the OLS regression of conflicts on mortality for females aged 15-65 whose cause of death was cardiovascular disease. Table II displays the same results for males aged 15-65. Each table displays conflict variables and all of the control variables. The tables include the following models: Model 1 displays the immediate effect of all conflict types. Model 2 displays the lingering effects. Model 3 focuses on the immediate effects of interstate conflicts while Model 4 displays the lingering effects. Model 5 focuses on the immediate effects of intrastate conflicts and Model 6 displays the lingering effects. Model 7 displays the immediate effects of minor

conflicts and Model 8 displays the lingering effects. Model 9 focuses on the immediate effects of severe conflicts and Model 10 displays the lingering effects.

In discussing the results I first describe the effect of each type of conflict associated with each gender followed by the effects of the control variables. I start with the first model and proceed through to the tenth model. I begin now with the effects of each type of conflict and the effects which they have on adult cardiovascular disease mortality. In model 1 we find similar results for males and females. The coefficient of the conflict dummy is 0.1316 in Model 1.1. The dependent variable is log transformed so the effect size of the conflict variable corresponds to exp(0.1316) = 1.1407 for women. Therefore the conflict dummy is associated with an increase of about 14% in the female CVD mortality rate. In a given year, the occurrence of an armed conflict, defined as conflicts resulting in 1,000 or more deaths, corresponds to about a 14% increase in the adult female and about a 12% increase in the male CVD mortality rate in the subsequent year.

The armed conflict history variable, capturing cumulative conflict exposure in a country, produces similar results. The effects of the two conflict variables are both slightly stronger for women. A one standard deviation increase in the percentage of time that a nation has been involved in any armed conflict is associated with a 7.1% and 6.5% increase in the adult CVD mortality rate for females and males respectively. The interstate dummy variable did not produce statistically significant results for either gender. The interstate history variable on the other produced significant results for females but not males. A one standard deviation increase in the history of interstate conflict increases female CVD mortality by 6.3%.

Intrastate armed conflict, or civil war, produced statistically significant and relatively strong results across the board. The intrastate dummy variable is associated with an increase of

about 18.3% and 16.1% in the adult CVD mortality rate for females and males respectively. A one standard deviation increase in the history of intrastate conflict increases female CVD mortality by 12% and that of males by 9.6%. Once again the negative health impacts experienced by women as a result of armed conflict is greater than that experienced by men.

I have hypothesized that the level of conflict intensity would impact the indirect health outcomes of war. It seems logical that minor conflict would result in less devastation than severe conflict. The results of minor and severe conflict are somewhat surprising. The minor dummy variable is only statistically significant for females and is associated with an 18.3% increase in CVD mortality rates. The minor conflict variable is statistically significant for both sexes but produced drastically different results. A one standard deviation increase in the history of minor conflict increases female CVD mortality by 170.1% and that of males by only 5.9%. This extreme result demonstrates the impact that armed conflict can have on populations. Severe conflict surprisingly did not produce any statistically significant results. This may be explain by the fact that extreme armed conflict disrupts every aspect of society and it is likely that record keeping during these types of conflicts was severely disrupted. Another explanation may be that with increased mortality rates during times of severe conflict hospitals and clinics may experience excessive burdens which disrupt not only record keeping but also their ability to treat chronic conditions. Doctors and medical personnel often flee areas of extreme conflict (Docquier, Lohest and Marfouk 2007). The burden created by depleted resources, infrastructure, and personnel may reduce record keeping and treatment abilities. At the same time mortality is greatly increased as a result of the direct health consequences of war.

I will now discuss the control variables. Interestingly the level of democracy appears to have a statistically significant positive impact on both male and female adult mortality. The

coefficients are not very large in any of the models but the positive impact is surprising. This may be due in part to a selection bias. I suspect that countries which are more democratic may have better information systems which allow for better record keeping. In other words, more democratic countries may more accurately report armed conflict while non-democratic nations may under-report it. Being located in a tropical region produced fairly strong results indicating a negative relationship. The effect is stronger for males than females. This can likely be explained by the fact that in tropical regions there are great risks created by infectious diseases that may remove an individual from the population before they have the chance to experience death from chronic illnesses such as cardiovascular disease. Males may also engage in more risk behaviors than females which could account for the gender differences. Infectious diseases may account for many deaths which prevent a person from living long enough to become terminally ill with a chronic disease. The annual percentage growth rate of the urban population produced similar results as to that of tropical region location. The results were statistically significant and negative across the board for both genders. It appears that urban growth does have a protective effect on mortality. With more resources, technological advancement, medical facilities, and an arguably better standard of living associated with increased urban development, cardiovascular disease appears to decrease. Hospital beds also produced interesting results. The relationship is positive and statistically significant across all types of conflicts for both genders. The coefficients are not very strong. This may also be due to the fact that where there are more hospital beds there is also a better ability to diagnose chronic illnesses such as cardiovascular disease and therefore improve the record keeping abilities of that particular nation. The age dependency ratio does not appear to have a statistically significant impact on mortality rates for either gender. The per capita health expenditure had the anticipated effect of a statistically

significant negative relationship. The coefficients were very small, however, which would once again support the idea that more developed nations may be able to better prevent chronic illness deaths but at the same time experience higher rates of these diseases simply due to selection. People may not live long enough to die from cardiovascular disease in less developed nations. The year also produced results which were not statistically significant. GDP per capita was also not statistically significant.

In general the results are consistent with the literature which concludes that females experience more severe impacts as a results of armed conflict (Jansen 2006). In this case the adult CVD mortality rate was increased more dramatically for females than for males as a result of war. It seems that conflict in general increases chronic illness mortality such as CVD. Of note is the idea that conflict history may exert a much stronger effect on mortality over time because chronic diseases often take years or decades to be manifest. There are studies which have found that the long-term consequences of armed conflict meet or exceed the negative health impacts directly caused by conflict (Ghobarah, Huth and Russett 2003).

Limitations

There are several important limitations that should be mentioned regarding this study. First, the quality of available data is questionable. War disrupts every aspect of society and we can not assume that data are as reliable or conclusive as those gathered during times of peace. However, of data currently available these are the most reliable. The bias caused by data quality is arguably a conservative one with the significance levels of hypothesis testing likely underestimated (Li & Wen 2005). Second, data are only available from the post World War II period up to but not including the current age of warfare i.e. post September 11, 2001. While

this time frame does capture a great deal of armed conflict which has country data available, it would be interesting to explore historical as well as contemporary examples. I must also acknowledge the fact that while international standards have greatly improved as time goes on, record keeping and data coding may not be as consistent across country and over time as we may like. This is not a major concern as the results still demonstrate the destructive impact that armed conflict has on human mortality. Given the fact that these data limitations exist and the results are still as strong as they are speaks to the confidence that can realized in concluding that armed conflict has deteriorating effects on CVD mortality and health in general. Perhaps if more countries were better able to diagnose and record cause specific mortality we would find that the impact of armed conflict on mortality would increase dramatically. This particular study captures the effects of armed conflict on CVD mortality but is not able to clearly define the causal mechanisms through which conflict increases CVD and chronic disease mortality in general.

Conclusion

Armed conflicts have negative impacts on population health measured by cardiovascular disease mortality in this study of 134 countries across a span of forty years. All forms of armed conflict have negative health impacts on populations. I have explored four different kinds of armed conflict in this paper: interstate, intrastate, minor, and severe. The adult cardiovascular disease mortality rate is increased by each type of conflict for males and females. The mortality rate increases as the amount of time each of the types of conflicts is experienced increases. Intrastate conflict, such as civil wars, increases adult mortality at a much greater rate than interstate conflict. It makes sense that when all of the violence is experienced within a country there are greater impacts to the health of the population. An interesting finding of this study is

that minor conflict appears to produce greater mortality than that of severe conflict. Females bear more of the brunt than males.

Armed conflict has been a part of human history for as long as we have record. It is more likely than not that this will continue to be the case for as long as inequality exists in the world. While it is unreasonable to say that we should end armed conflict all together, it is worth exploring ways in which we can prevent and minimize the impact once conflict arises. There are many indirect health consequences that emerge as a result of extreme violence. I have only looked at one small aspect of these consequences in this paper. Further research is needed in order to better understand each of the mechanisms which were discussed but not specifically measured or tested in this paper. Further research should also investigate the effects of various other chronic as well as infectious diseases. Murray et al. explain, "Improved collaboration between political scientists and experts in public health would benefit measurement, prediction, and prevention of conflict related death" (2002). Further research should explore specific ways in which armed conflict impacts chronic disease. If we are able to better understand the mechanisms such as depleted resources and damaged infrastructure that cause increases in mortality many lives could be improved and saved. Policy makers and leaders who make the critical decisions of when to engage in armed conflict need to be as informed and educated as possible regarding the potential outcomes and human costs of war.

Table I Effects of Armed Conflict on Adult Female Cardiovascular Disease Mortality, 1960-2000

	1.1 *aggregate conflict*	1.2 *aggregate history*	1.3 *Interstate conflict*	1.4 *interstate history*	1.5 *intrastate conflict*	1.6 *intrastate history*	1.7 *minor conflict*	1.8 *minor history*	1.9 *severe conflict*	1.10 *severe history*
Conflict dummy (t-1)	0.1316*									
Conflict history (t-1)		0.1308**								
Interstate dummy (t-1)			-0.0510							
Interstate history (t-1)				0.0050*						
Intrastate dummy (t-1)					0.1647**					
Intrastate history (t-1)						0.0059***				
Minor conflict dummy (t-1)							0.1679*			
Minor conflict history (t-1)								0.0065***		
Severe dummy (t-1)									0.0669	
Severe history (t-1)										0.0025
Control Variables										
Democracy	0.0146**	0.0149**	0.0133**	0.0137**	0.0151**	0.0149**	0.0138**	0.0113*	0.0137**	0.0145**
Tropical Region	-0.1717*	-0.1688*	-0.1784**	-0.1431*	-0.1736*	-0.1059	-0.1771**	-0.0955	-0.1753**	-0.1532*
Urban Growth	-0.0994*	-0.1005***	-0.0987***	-0.1061***	-0.0996***	-0.1116***	-0.0978***	-0.1116***	-0.0992***	-0.1038***
Hospital Beds	0.0153*	0.0152*	0.0142	0.0200**	0.0150*	0.0199**	0.0152*	0.0189**	0.0146*	0.0171**
Age Dependency Ratio	-0.2329	-0.2192	-0.1166	-0.0387	-0.2789	-0.3749	-0.2169	-0.3545	-0.1314	-0.1163
Health Expenditure	-0.0002**	-0.0001**	-0.0002**	-0.0002	-0.0001**	-0.0002	-0.0001**	-0.0001**	-0.0002**	-0.0002***
Year	-0.0065	-0.0063	-0.0102	-0.0077	-0.0078	-0.0093***	-0.0091	-0.0089	-0.0081	-0.0090
Constant	-0.2117***	-0.2102**	-0.2100***	-0.2089**	-0.2145***	-0.1656**	-0.2209***	-0.2336***	-0.2061**	-0.1951**
GDP Per Cap	14.3275	13.7630	21.5727	16.3773	16.9193	19.3733	19.5675	19.2668	17.3635	19.0913
R2	0.34	0.34	0.33	0.34	0.34	0.38	0.34	0.36	0.33	0.34
N	421	421	421	421	421	421	421	421	421	421

* significant at 10%; ** significant at 5%; *** significant at 1%

Table II Effects of Armed Conflict on Adult Male Cardiovascular Disease Mortality, 1960-2000

	1.1 *aggregate conflict*	1.2 *aggregate history*	1.3 *Interstate conflict*	1.4 *interstate history*	1.5 *intrastate conflict*	1.6 *intrastate history*	1.7 *minor conflict*	1.8 *minor history*	1.9 *severe conflict*	1.10 *severe history*
Conflict dummy (t-1)	0.1164*									
Conflict history (t-1)		0.1199**								
Interstate dummy (t-1)			-0.0738							
Interstate history (t-1)				0.0029						
Intrastate dummy (t-1)					0.1495*					
Intrastate history (t-1)						0.0048***				
Minor conflict dummy (t-1)							0.1240			
Minor conflict history (t-1)								0.0038***		
Severe dummy (t-1)									0.0773	
Severe history (t-1)										0.0021
Control Variables										
Democracy	0.0158**	0.0163**	0.0145**	0.0148**	0.0164**	0.0161**	0.0151**	0.0133*	0.0150**	0.0157**
Tropical Region	-0.4404***	-0.4382***	-0.4456***	-0.4253***	-0.4423***	-0.3884***	-0.4455***	-0.3966***	-0.4419***	-0.4242***
Urban Growth	-0.1195***	-0.1203***	-0.1194***	-0.1233***	-0.1196***	-0.1291***	-0.1182***	-0.1267***	-0.1200***	-0.1234***
Hospital Beds	0.0312***	0.0310***	0.0303***	0.0338***	0.0309***	0.0347***	0.0310***	0.0332***	0.0308***	0.0328***
Age Dependency Ratio	-0.3285	-0.3214	-0.2239	-0.1788	-0.3730	-0.4367	-0.2986	-0.3627	-0.2406	-0.2259
Health Expenditure	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***	-0.0002***
Year	-0.0088	-0.0083	-0.0126	-0.0105	-0.0098	-0.0111	-0.0111	-0.0112	-0.0100	-0.0111
Constant	-0.0189	-0.0197	-0.0145	-0.0152	-0.0223	0.0162	-0.0258	-0.0296	-0.0097	-0.0041
GDP Per Cap	17.9968	17.0616	25.4731	21.2285	20.0566	22.2699	22.5810	22.8790	20.2874	22.3334
R2	0.39	0.39	0.39	0.39	0.39	0.41	0.39	0.39	0.39	0.39
N	423	423	423	423	423	423	423	423	423	423

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix

Descriptive Statistics

Female Cardiovascular Disease Age 15-64

Variable	N	Mean	Std. Dev.	Min.	Max.
Female Mortality	4138	0.5563	0.4714	0	16.03
War Dummy	3143	0.1667	0.3728	0	1
War Count	3143	0.2119	0.5234	0	4
Interstate Dummy	3143	0.0372	0.1893	0	1
Interstate History	3143	6.3144	12.166	0	57.14
Intrastate Dummy	3143	0.1298	0.3362	0	1
Intrastate History	3143	9.1356	19.218	0	100
Minor Dummy	3143	0.0869	0.2817	0	1
Minor History	3143	6.7671	15.287	0	100
Severe Dummy	3143	0.0799	0.2711	0	1
Severe History	3143	9.8990	17.519	0	100
Democracy	2702	3.4811	7.3424	-10	10
Tropical	4235	0.3530	0.4780	0	1
Urban Growth	4175	2.2030	1.9411	-44.16	19.29
Hospital Beds	1009	7.8340	7.1558	0.33	89.55
Age Dependency Ratio	3860	0.6482	0.1738	0.36	1.14
Health Expenditure	789	681.06	925.76	0	4271
Year	4235	1981	12.4254	1960	2000
GDP	2321	8.827	0.8804	6.46	10.82

Male Cardiovascular Disease Age 15-64

Variable	N	Mean	Std. Dev.	Min.	Max.
Female Mortality	4143	1.1989	0.8671	0	17.78
War Dummy	3196	0.1696	0.3753	0	1
War Count	3196	0.2150	0.5252	0	4
Interstate Dummy	3196	0.0369	0.1886	0	1
Interstate History	3196	6.4133	12.169	0	57.14
Intrastate Dummy	3196	0.1330	0.3396	0	1
Intrastate History	3196	9.2520	19.142	0	100
Minor Dummy	3196	0.0864	0.2809	0	1
Minor History	3196	6.7147	15.170	0	100
Severe Dummy	3196	0.0832	0.2763	0	1
Severe History	3196	10.1100	17.587	0	100
Democracy	2676	3.5277	7.3239	-10	10
Tropical	4241	0.3525	0.4778	0	1
Urban Growth	4175	2.2030	1.9411	-44.16	19.29
Hospital Beds	1009	7.8340	7.1558	0.33	89.55
Age Dependency Ratio	3860	0.6482	0.1738	0.36	1.14
Health Expenditure	789	681.06	925.76	0	4271
Year	4235	1981	12.42	1960	2000
GDP	2321	8.83	0.88	6.47	10.82

List of Countries

Albania
Antigua and Barbuda
Argentina
Armenia
Australia
Austria
Azerbaijan
Bahamas, The
Bahrain
Barbados
Belarus
Belgium
Belize
Bosnia and Herzegovina
Brazil
Bulgaria
Canada
Chile
Colombia
Costa Rica
Croatia
Cuba
Czech Republic
Denmark
Dominica
Dominican Republic
Ecuador
Egypt, Arab Rep.
El Salvador
Estonia
Fiji
Finland
France
Georgia
Greece
Grenada
Guatemala
Guyana
Honduras
Hungary
Iceland
Ireland
Israel
Italy
Jamaica
Japan
Kazakhstan
Korea, Rep.
Kuwait
Kyrgyz Republic
Latvia
Lithuania
Luxembourg
Macedonia, FYR
Malta
Mauritius
Mexico
Moldova
Netherlands
New Zealand
Nicaragua
Norway
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Romania
Russian Federation
Sao Tome and Principe
Seychelles
Singapore
Slovak Republic
Slovenia
Spain
Sri Lanka
St. Kitts and Nevis
St. Lucia
St. Vincent and the Grenad
Suriname
Sweden
Switzerland
Syrian Arab Republic
Tajikistan
Thailand
Trinidad and Tobago
Turkmenistan
Ukraine
United Kingdom
United States
Uruguay
Uzbekistan
Venezuela, RB
Yugoslavia, Fed. Rep.

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