The Echoes of War: Persistent Effects of War on Health Outcomes

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Abstract

Armed conflicts have long-lasting negative impacts on people's health and well-being. Although these negative impacts are well documented, the magnitude of this effect, and how it varies over time and by violence type, remains poorly understood. This study provides the first global, comprehensive estimate of the impacts of armed conflict on the overall burden of disease, and how they vary across age and gender groups, over time, and by type of violence. We use panel data on disability-adjusted life years for 2000-2019, in combination with the geo-referenced version of the Uppsala Conflict Data Program Dataset (UCDP GED). We find that, on average, a single year of war leads to 2.1 months lost to disability for every person. Beyond an immediate but short-lived increase in injuries, armed conflicts have a delayed but long-lasting effect on communicable, maternal, perinatal and nutritional diseases. These diseases are the primary driver of years lost, relative to non-communicable conditions or injuries. The study also illuminates that one-sided violence has the strongest detrimental effect on health compared to non-state and state-based conflicts. These results contribute an important insight on the shadow cast by war, and may help improve the efficiency of prevention policies and health interventions in conflict and post-conflict settings.

1 Introduction

Not only do armed conflicts kill and injure, they also spoil people's health for years to come. The exact magnitude of these effects, however, is less clear. We also know little about the timing of the effects, and how violence intensity and type shape them. Previous studies have provided piece-meal evidence, but further research is needed to better understand the overall impacts of conflicts on the health and well-being of exposed people and future generations (Garry and Checchi, 2019). The advent of more detailed and higher-resolution data has made this task feasible. We leverage longitudinal data on health and well-being to provide a comprehensive, global estimate of the magnitudes of the effects of armed conflict on three major categories of disease. Our approach enables us to trace out the timing of the impacts, and to estimate how the health consequences of conflict vary across age groups and by conflict type. We focus especially on one-sided violence, i.e., violence perpetrated by the state and directed towards civilians.

The profound negative impact of war on health is well understood and documented. Short and long-term negative consequences have been observed in many populations of various ages and genders. This includes civilians (Bendavid et al., 2021; Dimitry, 2012; Jawad et al., 2019; Saulnier and Brolin, 2015), refugees (Abu Suhaiban et al., 2019; Amiri et al., 2020), internally-displaced people (Amodu et al., 2020; Salami et al., 2020) and soldiers (Betancourt et al., 2013; Conard and Sauls, 2014; Kelsall et al., 2015). Previous studies have adopted one of two major approaches: single-setting focused or cross-national. Studies in the former category included single-country surveys (Ajefu and Casale, 2021; Başoğlu et al., 2005; Gade and Wenger, 2011) and limited sample or cohort studies (Kuittinen et al., 2017; Dent, 1999). These studies were instrumental in uncovering the full plethora and diversity of suffering caused by war: PTSD and depression exacerbated by a sense of wartime injustice (Başoğlu et al., 2005), reduced women's decision-making in the household following early-life exposure to conflict (Ajefu and Casale, 2021), and increased adverse mental health outcomes depending on combat exposure type (Gade and Wenger, 2011). Although able to delve deeply into the interaction of conflict and health, the single-country focus of these studies limit their external validity.

Studies in the latter, cross-country, category were better able to tackle some of these issues and provide generalizable results (Jawad et al., 2020a; Al Gasseer et al., 2004; Ghobarah et al., 2003b). The majority of these studies focus on mortality outcomes, such as the indirect increase in all-cause mortality in civilian populations following conflict (Jawad et al., 2020a). However, mortality alone does not capture the full magnitude of human suffering experiences beyond life and death situations. The use of disability-adjusted life year data can provide a more comprehensive picture of the impact of conflict on health and well-being, and measure any delayed health outcomes following conflict (see e.g., Ghobarah et al., 2003b). We build on and expand the cross-sectional approach of Ghobarah et al. (2003b) using a panel-data study of disability-adjusted life years from 2000–2019, together with the Uppsala Conflict Data Program Dataset (Uppsala Conflict Data Program [UCDP], 2019; Davies et al., 2023). Our approach allows us to use country-specific fixed effects and thus does not rely on cross-country comparisons. To the best of our knowledge, this is the first comprehensive analysis of global, time-varying impacts of different conflict types on disability-adjusted life years. We hereby distinguish between three main causes of death: communicable, maternal, perinatal, and nutritional (group I); noncommunicable (group II), and injuries (group III).

Our study uncovers important variations in the impacts of conflict over time and by conflict type: while violence has a strong short-lived, immediate effect on injuries, the effects on communicable, maternal, perinatal and nutritional diseases as well as noncommunicable diseases are only visible about 2-3 years after the conflict. We also find that type I diseases are the biggest drivers of war-related years of life lost. Furthermore, one-sided violence has the strongest detrimental effects on health in comparison to the more contained impacts of state-based and non-state violence.

By showing how the effect of war on health and well-being changes over time, as well as across violence types and demographic groups, our results contribute an important insight on the shadow cast by war. Overall, our results can inform prevention policies and health intervention in conflict and post-conflict settings, through an improved understanding of the biggest drivers of death and disability in conflict-exposed populations. For example, our findings point towards the health sectors that are expected to require most resources and attention at each time period after the conflict erupted, as well as indicate which types of conflicts have the strongest impacts.

2 Methods

Data As our main outcome variable, we employ global, country-year level data from the Disability-Adjusted Life Years (DALY) Database for 2000–2019 (WHO, 2020; Murray et al., 1996). DALYs measure the years lost due to premature deaths and quality years lost due to disability, thus reflecting the overall 'burden of disease.' Our outcome variables are expressed in relative terms, per 100,000 of the relevant population, using population estimates for country, sex, and age groups provided by the World Health Organization (WHO, 2020). We aggregate the original estimates to 6 age groups: under 1, 1–4, 5–14, 15–49, 50–69, and over 70 years old. We focus on three categories of diseases (corresponding to the level 1 disease groups in the WHO classification): communicable, maternal, perinatal, and nutritional diseases (type I); noncommunicable diseases (type II); and injuries (type III) (WHO, 2020, pp. 16-17). In what follows, we refer to type I as 'communicable', type II as 'noncommunicable', and type III as 'injuries.'

Our main independent variable is the incidence of and fatalities from armed conflict. The latter is an incompatibility where the use of armed force led to at least 25 battle-related deaths at the country level in one calendar year (Uppsala Conflict Data Program [UCDP], 2019; Davies et al., 2023). Armed conflict data are drawn from the geo-referenced version of the UCDP GED dataset (Davies et al., 2023; Sundberg and Melander, 2013). We include all types of violence coded by UCDP: state-based conflict, involving at least one governmental actor, non-state conflict where two or more organized groups, such as rebel groups, fight each other, and one-sided violence, or the indiscriminate use of armed force by the government against civilians. The data cover the years 1989–2021, allowing us to study the impact of conflict on health over time, up to a 10-year delay.

We chose UCDP data for two main reasons. First, the application of an immutable and rigorous definition of conflict, and the strict reliance on a set of transparent coding rules make UCDP data comparable across countries and over time. Second, the UCDP data collection is highly standardized and relies on information from news sources, nongovernmental organisation reports, case studies, truth commission reports, historical archives, and other sources of information, thus reducing the risk of media bias (Dietrich and Eck, 2020).

Estimation Framework Our empirical strategy exploits within-country variation in armed conflict and DALY loss over time. We model the relationship between the two using the following linear models:

$$DALY_{it} = \alpha\ Fatalities_{it} + \beta \sum_{\tau=t-10}^{t-1} (1-\delta)^{\tau} Fatalities_{i\tau}/10 + \pi X_{it} + \gamma_i + \eta_t + \epsilon_{it}, \tag{1}$$

$$DALY_{it} = \sum_{\tau=t-10}^{t+10} \beta_{\tau} C_{i\tau} + X_{it}\pi + \gamma_i + \eta_t + \epsilon_{it}, \tag{2}$$

where $DALY_{it}$ are the disability-adjusted life years for country i in year t. In equation (1), our two main predictors are current fatalities in year t as well as the sum of all fatalities in the past 10 years, geometrically discounted by δ, and then normalized to obtain a general per year-rate.

In equation (2), the armed conflict predictors are a vector of 21 indicators C_{it}, equal to 1 if a country i experienced more that 1,000 battle deaths (the common definition for a war) in a given year t and 0 otherwise. To trace out effects over time we include 10 time leads and 10 time lags. Unfortunately, because of the very demanding specification (21 coefficients need to be estimated) we cannot identify effects with our original continuous fatality measures from equation (1) but rather use indicator variables.

We use a series of fixed effects and various control variables to avoid cross-country comparisons and minimize omitted variable bias. Most importantly, country fixed effects (γ_i) control for any time-invariant factor at the country-level. This guarantees that general geographic conditions such as altitude, distance from the equator, or mountainous terrain, which could affect both health conditions and armed conflict risk, are controlled for. Other time-invariant characteristics, such as a country's colonial history, or its general ethnic composition are also controlled for by the fixed effects. Next, we include a set of year fixed effects (η_t) to control for overall general trends in armed conflict and global health. We cluster our standard errors

Table 1. Descriptive statistics

Variable	Mean	SD	N	NA
DALY lost due to communicable plus conditions, all ages, male and female	16072.75	20933.65	3635	244
DALY lost due to noncommunicable diseases, all ages, male and female	20410.12	5611.47	3635	244
DALY lost due to injuries, all ages, male and female	4294.3	3134.04	3635	244
Fatalities, state-based, at current time	258.56	2522.61	3799	80
Fatalities, non-state, at current time	49.32	457.8	3799	80
Fatalities, one-sided, at current time	42.48	264.52	3799	80
Fatalities, all, at current time	350.36	2879.86	3799	80
Fatalities, state-based, cumulative	146.95	944.02	3789	90
Fatalities, non-state, cumulative	21.03	130.82	3789	90
Fatalities, one-sided, cumulative	69.27	997.11	3789	90
Fatalities, all, cumulative	237.25	1486.46	3789	90
Dummy variable for neighbor fatalities ≥ 1000	0.25	0.43	3799	80
GDP per capita (constant 2015 USD), log-transformed	8.51	1.45	3730	149
Health expenditure as percent of GDP	3.22	2.29	3728	151
Urban population growth (annual percent)	2.1	2.0	3835	44
Electoral democracy index	0.53	0.26	3435	444

DALY are disability-adjusted life years, per 100,000 per year. DALY presented in the current table are for all ages and both sexes. Communicable plus variable are communicable, maternal, perinatal and nutritional conditions. Violence variables are coded by UCDP (Davies et al., 2022). Cumulative and discounted fatality values are presented for a discount factor equal to 0.1. Data on GDP are obtained from the World Development Indicators (WorldBank, 2019). The electoral democracy index is drawn from Varieties of Democracy (V-Dem institute, 2022). All variables are presented at per country per year resolution.

at the country level to allow for arbitrary correlation within countries over time.

X_{it} is a vector of time-varying country-level control variables that could affect both DALYs and armed conflict. These include the presence or absence of over 1000 fatalities in all neighbouring countries, (GDP) (in constant 2015 US$) (World Bank, 2023a), urban population growth (World Bank, 2023b), electoral democracy index (Coppedge et al., 2022; Pemstein et al., 2022), and health expenditure as percent of GDP (Global Health Observatory, World Health Organization, 2023).

The robustness of our findings to various alternative specifications and transformations of our dependent and independent variables, in particular taking the natural logarithm of both our dependent and independent variables, is shown in the appendix. We also show that the results are robust to dropping one country (or year) at a time.

3 Results

3.1 Data description

Our dataset spans 201 countries from 2000 to 2019, for a total of 3,879 observations. Summary statistics for each dependent and independent variable are presented in Table 1. In a given year, a country lost on average 16,073 years per 100,000 people due to communicable, maternal, perinatal and nutritional conditions; 20,410 years per 100,000 people due to noncommunicable diseases, and 4,294 years per 100,000 people due to injuries. A country experienced on average 259 fatalities in a year due to state-based violence, 49 fatalities due to non-state violence, and 42 due to one-sided violence. From 2000 to 2019, 40 of 201 countries experienced at least one year of major war, i.e., at least 1000 fatalities per year. When estimating equation 2 above, we use conflict data from 1990 to 2018 (time-adjusted from 1 to 10 years into the past and future).

3.2 Findings

Table 2 presents our first set of results based on equation 1, using 0.1 as discount factor. The models pool all age groups and both sexes. We focus on one-sided violence (Models 1, 3, and 5). However, the results are robust to adding non-state, and state-based violence, separately to the regression (Models 2, 4, and 6). Additional results for the other two violence types are presented in the appendix and generally much weaker than the ones for one-sided violence.

We find large and significant effects of one-sided conflict on all three categories of DALYs, although the effects exhibit some important time variations: conflicts have strong immediate effects on injuries, while the effects on communicable and noncommunicable diseases are delayed. Model 1 suggests that one additional conflict fatality per year in the past ten years (cumulative but discounted) increases DALYs lost due to communicable diseases by 1.416 per 100,000 person and year, but concurrent fatalities have no significant effect. For noncommunicable diseases, the point estimate on past conflict drops to 0.259 but is still significant (Model 2). Again, we find no effects of concurrent fatalities. By contrast, concurrent fatalities are most important for injuries in Model 5: an additional fatality increases DALYs

Table 2. The effects of fatalities on DALYs

	DALY lost due to communicable plus conditions, all ages, male and female		DALY lost due to noncommunicable diseases, all ages, male and female		DALY lost due to injuries, all ages, male and female	
	(1)	(2)	(3)	(4)	(5)	(6)
Sum of past fatalities, one-sided	1.416	1.384	0.259	0.256	0.128	0.123
	(0.126)***	(0.095)***	(0.010)***	(0.011)***	(0.015)***	(0.014)***
Sum of past fatalities, non-state		9.353		1.236		0.973
		(4.566)**		(0.478)**		(0.569)*
Sum of past fatalities, state-based		1.861		0.107		-0.235
		(1.446)		(0.196)		(0.233)
Current fatalities, one-sided	0.406	0.599	-0.042	-0.025	1.125	0.698
	(0.811)	(0.853)	(0.055)	(0.069)	(0.448)**	(0.288)**
Current fatalities, non-state		-0.325		0.106		-0.016
		(0.502)		(0.056)*		(0.050)
Current fatalities, state-based		-0.285		-0.034		0.290
		(0.329)		(0.041)		(0.074)***
Dummy variable for neighbor fatalities $\geq$ 1000	172.488	288.433	-69.341	-51.201	100.528	85.712
	(581.922)	(568.220)	(131.629)	(130.508)	(85.919)	(84.255)
Log GDP per capita (constant 2015 USD)	2212.708	2878.646	1034.564	1115.311	-470.977	-387.850
	(2665.838)	(2612.329)	(475.243)**	(479.262)**	(470.887)	(479.801)
Health expenditure as percent of GDP	2608.341	2576.910	359.022	357.027	65.910	94.164
	(574.263)***	(567.188)***	(123.515)***	(123.558)***	(49.239)	(49.351)*
Urban population growth (annual percent)	-4.599	-18.959	-103.047	-105.382	-125.612	-93.833
	(215.437)	(213.819)	(36.846)***	(36.976)***	(69.505)*	(55.976)*
Electoral democracy index	-6922.303	-6666.775	-73.465	-8.486	-61.241	62.123
	(4272.835)	(4208.233)	(855.157)	(855.832)	(568.838)	(556.138)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.93	0.93	0.96	0.97	0.36	0.37
Obs	3178	3178	3178	3178	3178	3178

due to injuries by 1.125.

In Figure 1 we plot the point estimates on our conflict indicator variables from equation (2), for all three disease types across all age groups and both sexes.[1] As expected, the point estimates up to the time of the conflict (from $t = -10$ to $t = -1$) are insignificant and oscillate around zero. This is an important placebo check and supports our claim that conflict is causing changes in DALYs. Once a major conflict starts, we observe a strong increase in

[1]The findings are best summarized using a graph but for completeness sake we report the corresponding regressions in the appendix.

communicable diseases which linger at a constant level of 2,000[2] for about seven years and then disappear (Subfigure (a)). For noncommunicable diseases, we observe effects for two to four years after the conflict which then quickly disappear (Subfigure (b)). Finally, we observe an immediate spike in injuries (Subfigure (c)) which lasts for three years and then dies off.

[2]Recall that, unlike the results in Table 2, in this case our independent variable is *war* and thus fatalities above 1,000, which explains the increase in effect size.

Figure 1. The effects of conflict on DALYS over time

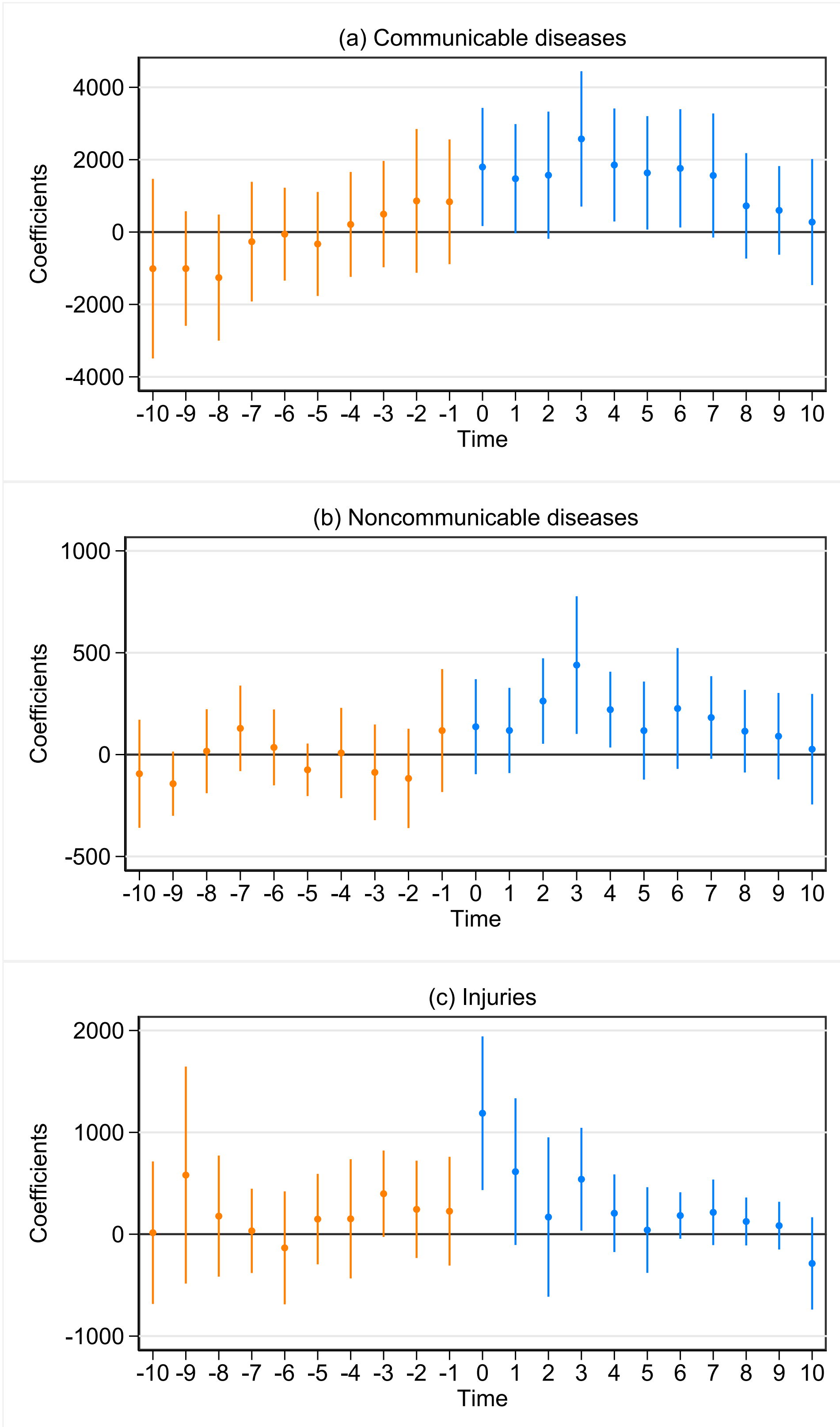
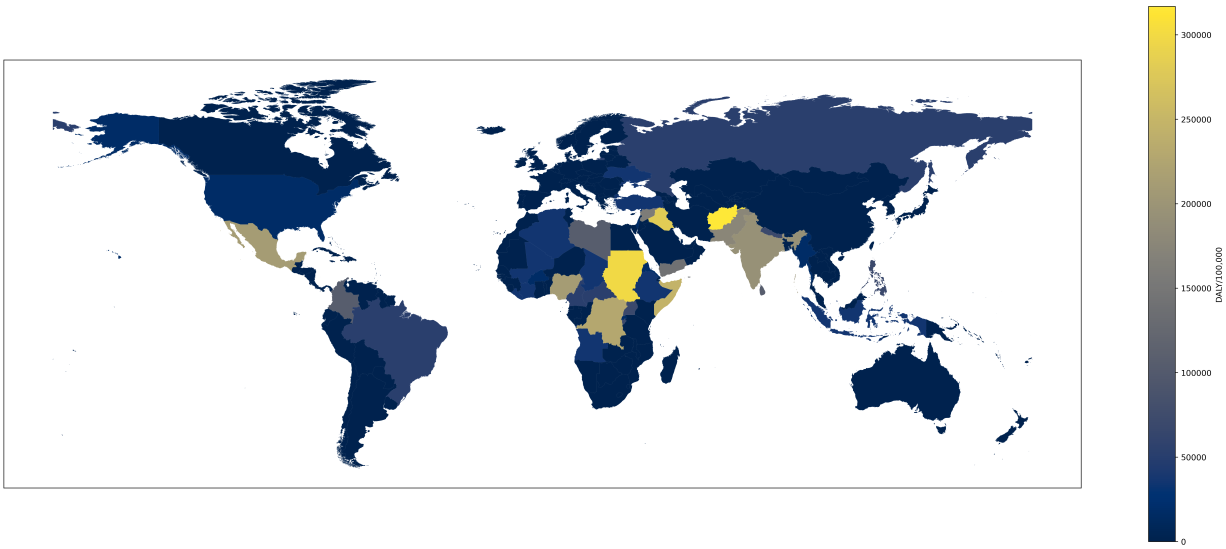


Figure 2. Total DALY lost per 100,000 people due to war in 2000-2019



In terms of magnitudes, if we add all the impact point estimates,[3] a person loses an average of 2.1 months of life (or 0.177 DALYs) due to the occurrence of one year of major conflict. We can use that number to calculate the expected DALYs lost for individual countries in our sample period. Figure 2 visualizes the findings.[4] For example, Afghanistan's 18 years of war lead to a total loss of DALY of 3.2 years per person (or 320,000 per 100,000 people).[5] In 2000-2019, Sudan suffered from a loss of 3 years per person, closely followed by Iraq (2.8), Somalia (2.5), the DRC (2.3) and Mexico (2.1). The Syrian war led to 1.6 lost years. Conflicts in India, Sri Lanka, Colombia, South Sudan and Yemen are associated to a loss of between 1 and 2 years. At the time of writing, the 2 year war in Ukraine has already caused a loss of about 4 months (or 0.352 DALY) due to disability and diseases, as much as more long-lasting violence in Angola, Mali, Ethiopia, Algeria, or Chad.

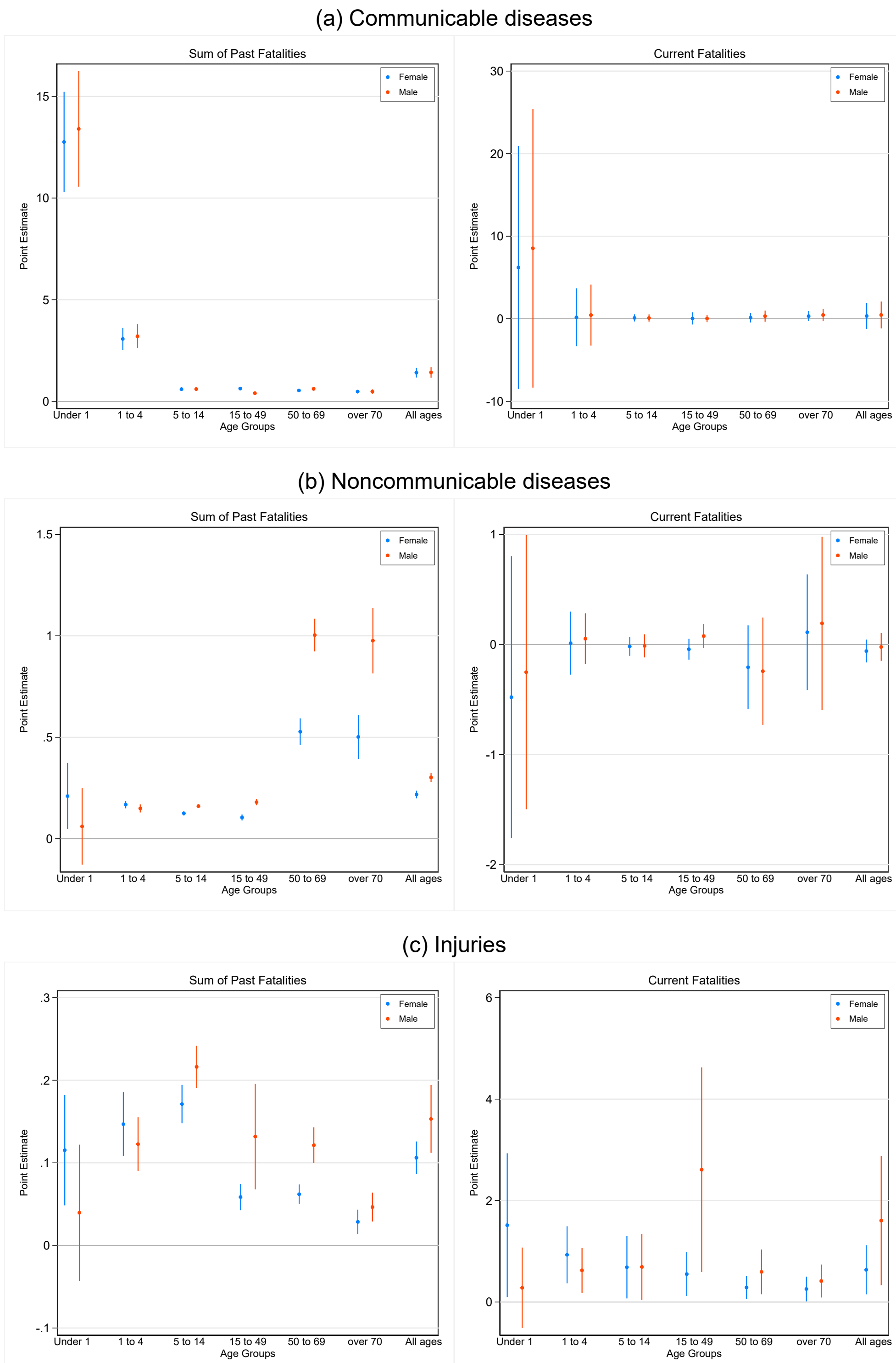
We next investigate the impacts of one-sided conflict for various age and gender groups. The results for equation (1) are shown in Figure 3. We show the point estimates for both

[3]To be precise, we add all the significant point estimates from the three regressions (17,679) and divide that number by 100,000 to get a per person loss of 0.177 (Table A.6). Recall that the point estimates are expressed in DALYs lost per 100,000 people.

[4]The exact numbers are shown in Figure A.4 in the appendix.

[5]Each year of war costs 0.022 DALYS per person, its impacts last 8 years and the war lasted 18, thus 0.022x8x18=3.2.

Figure 3. Effects by age and sex



concurrent fatalities (right) and discounted past fatalities (left). Overall, we do not find strong significant differences between men and women, except for men above 50 years who lose significantly more DALYS than women from noncommunicable diseases (Subfigure (b)), and men between 15 and 49 who are more likely to suffer from injuries (Subfigure (c)).

Children under 5 years, both boys and girls, strongly lose DALYs from communicable diseases: Each additional fatality experienced in the past ten years leads to approximately 13 point increase in DALYs (left Subfigure (a)). For noncommunicable diseases, people above 50 years old, and men especially, are the most affected group (left Subfigure (b)). In contrast to communicable and noncommunicable diseases, all age groups immediately lose DALYs from injuries (right Subfigure (c)), with men between 15 and 49 years old being the most affected. The long-term effects (left Subfigure (c)) are similarly visible for all age groups and both sexes. Generally, the point estimates for men are larger but not significantly different from the effects for females.

As noted, Table 2 and Figure 3 report the effects for one-sided violence, which clearly drives the overall effects. Figure A.5 in the appendix shows that the effects for total violence strongly mirror the ones for one-sided violence. Figures A.6 and A.7 show results for state-based and non-state violence which are again generally insignificant.

Multiple robustness test are provided in the appendix. The effects are stable when dropping one country (or year) at a time and robust to using a logarithm specification. The effects do not depend on the exact choice of discount factor in equation 1 but are generally visible for discount factors between 0.1 and 0.5.

4 Discussion

Our estimates show that between 2000-2019 and across 201 countries, a person lost a total of 2.1 months of life (0.177 DALYs) due to the occurrence of a single year of major conflict. Given that the impacts last 8 years, this amounts to 0.022 DALYS per year. In comparison, an average person in the same countries and for the same period of time lost 0.41 DALYs per year due to all causes, 0.03 DALYs per year due to malignant neoplasms, 0.02 DALYs per year due to mental and substance use disorders, 0.01 DALYs per year due to diabetes mellitus, and 0.02 DALYs per year due to HIV/AIDS.

A single year of war is therefore responsible for approximately 5.4% of overall annual

DALYs lost, which is comparable to the impacts of the major causes of death such as cancer and mental health disorders, and equivalent to the effect of smoking, one of the leading health risk factors, responsible for 6.0% of global DALYs in 2015 (Collaborators, 2017, p. 1899).

As civil wars last on average 6 years, the total per-person loss in DALYs for the 14 years (during and post-conflict) sums up to 1.1 years or 0.079 per year.[6] The closest comparable impact is the one of infectious and parasitic diseases which cause a similar loss of DALYs per year (ghe20, 0.083525). The conflict value is also greater than the average annual loss of DALYs due to injuries (0.042943), which reiterates that conflict affects health through more than physical injuries.

Recent years have witnessed an increase in fatalities, driven by highly violent conflicts in Ukraine and Ethiopia (Davies et al., 2023). Our estimates allow us to predict the total loss in DALYs per person until, say, 2050 for various different scenarios. In the past five years the world experienced on average 15 civil wars, with a maximum of 22 and a minimum of 9 wars. Given an average country population of 40 million, a worst case scenario of 22 wars each year until 2050 would result in 4.6 years per person for an affected total population of 880 million (22x40 million).[7] Given a world population of about 8 billion, this is equivalent to every single individual losing about 0.5 years of life (4.6x0.11). If the number of wars were to stay at around the current level, the world loss would sum up to 0.35 DALYs for every individual and if the number of wars declined to 9 wars per year, the DALY loss would amount to 0.21 for every individual.

In addition to the overall loss of DALY across all ages group and sexes, we find strong evidence of a difference in the effect of conflicts on the health of different age groups, i.e., at the two extremes of the age distribution. Infants and small children are particularly affected by communicable diseases, but also by injuries, while the years lost to disability for adults above 50 years old are mostly due to the incidence of non-communicable conditions. This is consistent with some previous studies that have noted a significant effect on child and maternal mortality in regions of conflict (Wagner, 2019).

[6] An average civil war lasts 6 years, continues to have impacts for 8 years after its end, and is associated with a per person per year DALY cost of 0.022 (6x8x0.022=1.1). The impacts last for 14 years, thus the per year loss is 1.1/14.

[7] Each year of civil war has impacts for 8 following years, there are 26 years until 2050 and each year leads to a 0.022 per person loss of DALY. In total this amounts to 4.6 years (26x8x0.022).

Next, we find that the negative impacts of conflict on the burden of disease are largely driven by one-sided violence, i.e., attacks against civilians. This might be due to the intentional impact of this type of conflict on civilians, but also to the high intensity of many events in this category. Governments involved in a state-based conflict against a rebel group or another state actor may also have more interest in protecting the health and well-being of their citizens, which may reduce the incidence of diseases among the general population.

Finally, a whole plethora of empirical studies are often based on case studies or single out a particular outcome or subgroup and thus only provide piece-meal evidence, without being able to paint the whole picture. One exception is Jawad et al., 2020b that uses global data from 1990–2017 to estimate the effects of conflict on mortality. Using DALYs allows us to measure individuals' suffering from war beyond crude deaths. For example, in contrast to Jawad et al., 2020b, we show that women are equally negatively affected by war. Besides, we are able to trace out the timing of the effects. Another closely related paper is Ghobarah et al., 2003a which uses the same dependent variable but given worse data availability in 2003, only considers a single cross-section.

5 Conclusion

We provide the first comprehensive estimate of the burden of disease caused by war using global panel data on disability adjusted life years and geo-referenced information on political violence for 2000-2019. To the best of our knowledge, our study is the first to systematically investigate the impacts of different types of armed conflict on the years lost to communicable, non-communicable, perinatal, maternal and nutritional diseases and how they vary over time and demographic groups.

We find that, on average, one year of war leads to the loss of over 2 months of life per person. Conflicts lead to an immediate increase in injuries, while their effect on non-communicable, communicable and other diseases are delayed and last up to 8 years after the conflict. Men in working age are most impacted by injuries; infants greatly suffer from communicable conditions, while men above 50 years old are mostly affected by non-communicable diseases.

By providing a comprehensive estimate of the magnitude of the effect of conflict on health, and how it varies, this study contributes to advance the existing knowledge of war impacts on societal well-being. In turn, these findings can help inform more efficient and timely health interventions in conflict and post-conflict settings, for example by suggesting when and how specific health sectors are likely to be mostly affected and what kind of conflict has the strongest impacts.

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A Robustness

A.1 Robust to dropping one country at a time

One concern is that our effects are driven by a particular large or violent country and thus not generalizable. Below, we report the point estimates on concurrent (blue) and the sum of past conflict (orange) from equation (1) in the main text when dropping one country at a time. Figure A.2 demonstrates that our results are stable and not driven by a particular country. It is worth noting that when we drop Afghanistan the point estimate on past conflict for injuries increases and turns significant. Similarly, when dropping Rwanda we observe a stronger positive effect of past conflict on communicable diseases. However, in no case do we observe a drop in significance.

A.2 Robust to dropping one year at a time

The results are further not driven by a particular year in our data. In Figure A.3 we repeat the exercise from above but drop one year at a time in equation (1). The resulting distributions of point estimates are all closely centered around our full sample coefficient.

A.3 Alternative specification

In our baseline specification both our dependent and independent variable enter linearly. In Table A.1 we show that our results from Table 2 are robust to using a log-log specification.

B Extension to main analysis

B.1 Magnitudes for countries in conflict

Given our estimates a person loses an average of 0.025 DALYs per year for 8 years due to the occurrence of a single year of major conflict. We can use that number to calculate the expected DALYs lost for individual countries. Figure A.4 plots the magnitudes for all the countries with at least one major conflict in our sample period.

B.2 Effects for state-based, non-state, and total conflict

In the main paper we show results for one-sided violence against civilians. For completeness sake, we also report the disaggregated findings by age and sex for state-based and non-state violence in Figures A.6 and A.7. Except for a few exceptions, the point estimates are generally insignificant throughout. Figure A.5 repeats the exercise for total violence. The results strongly mirror the ones from the main paper for one-sided violence. In Table A.2 we show xxx

B.3 Varying the discount factor

In the main text we report results for a discount factor of 10%. In Figure A.1 we report the point estimates on the sum of past discounted fatalities from one-sided violence from equation 1 for discount factors ranging from 0 to 1. The positive effects are generally visible for discount factors between 0.1 and 0.5. While communicable and non-communicable diseases exhibit the same hump-shaped pattern, for injuries the effect monotonically increases with higher discount factors. This confirms the overall findings from the main paper that current conflict has the strongest effect on injuries while communicable and non-communicable diseases react to past conflict.

C Additional tables for completeness

In Tables A.3 to A.6 we report the point estimates from Figures 3 and 1 in the main paper.

Table A.1. Robustness: The effects of log fatalities on DALYs

	Log DALY lost due to communicable plus conditions, all ages, male and female		Log DALY lost due to noncommunicable diseases, all ages, male and female		Log DALY lost due to injuries, all ages, male and female	
Sum of past log fatalities, one-sided	0.0315	0.0204	0.0388	0.0601	0.0401	0.0381
	(0.015)**	(0.011)*	(0.031)	(0.022)***	(0.022)*	(0.018)**
Sum of past log fatalities, non-state	-0.0011		-0.0020		0.0218	
	(0.010)		(0.019)		(0.012)*	
Sum of past log fatalities, state-based	-0.0132		0.0285		-0.0252	
	(0.009)		(0.021)		(0.016)	
Current log fatalities, one-sided	-0.0024	-0.0027	-0.0071	-0.0083	0.0148	0.0292
	(0.002)	(0.002)	(0.005)	(0.005)	(0.005)***	(0.008)***
Current log fatalities, non-state	0.0015		-0.0008		0.0114	
	(0.002)		(0.004)		(0.005)**	
Current log fatalities, state-based	-0.0006		-0.0029		0.0204	
	(0.002)		(0.004)		(0.007)***	
Dummy variable for neighbor fatalities $\geq$ 1000	-0.0082	-0.0078	0.0062	0.0052	0.0011	0.0013
	(0.007)	(0.007)	(0.016)	(0.016)	(0.011)	(0.011)
Log GDP per capita (constant 2015 USD)	0.0518	0.0524	-0.2089	-0.2108	-0.0580	-0.0700
	(0.025)**	(0.025)**	(0.072)***	(0.071)***	(0.047)	(0.048)
Health expenditure as percent of GDP	0.0163	0.0161	0.0325	0.0331	-0.0036	-0.0051
	(0.006)***	(0.006)***	(0.015)**	(0.014)**	(0.009)	(0.009)
Urban population growth (annual percent)	-0.0043	-0.0042	0.0081	0.0079	-0.0079	-0.0083
	(0.002)**	(0.002)**	(0.006)	(0.006)	(0.008)	(0.008)
Electoral democracy index	-0.0180	-0.0220	-0.0450	-0.0376	0.0011	0.0024
	(0.047)	(0.045)	(0.112)	(0.112)	(0.063)	(0.064)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.96	0.96	0.99	0.99	0.92	0.91
Obs	3178	3178	3178	3178	3178	3178

Figure A.1. Robustness: Varying the discount factor

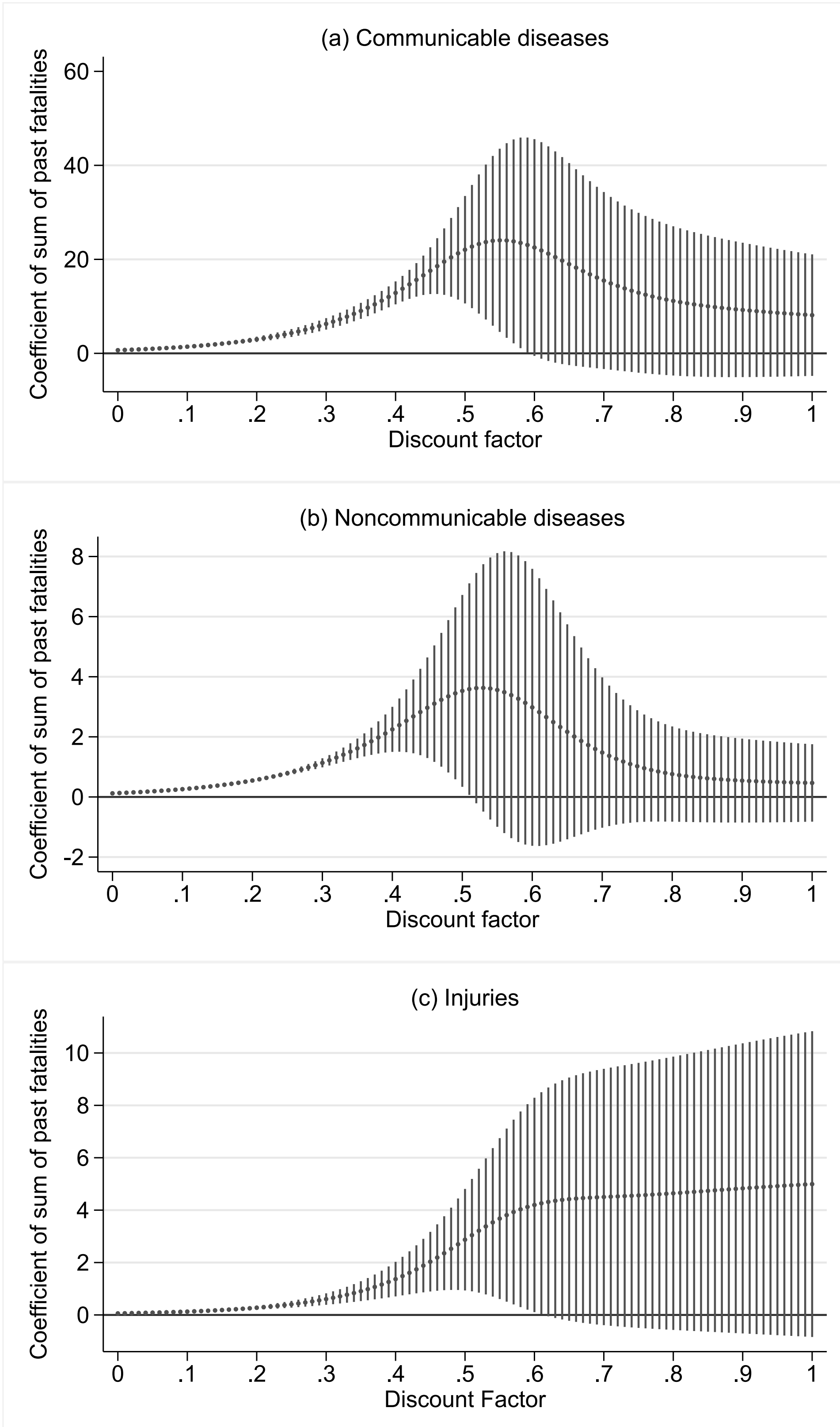


Figure A.2. Robustness: Dropping one country at a time

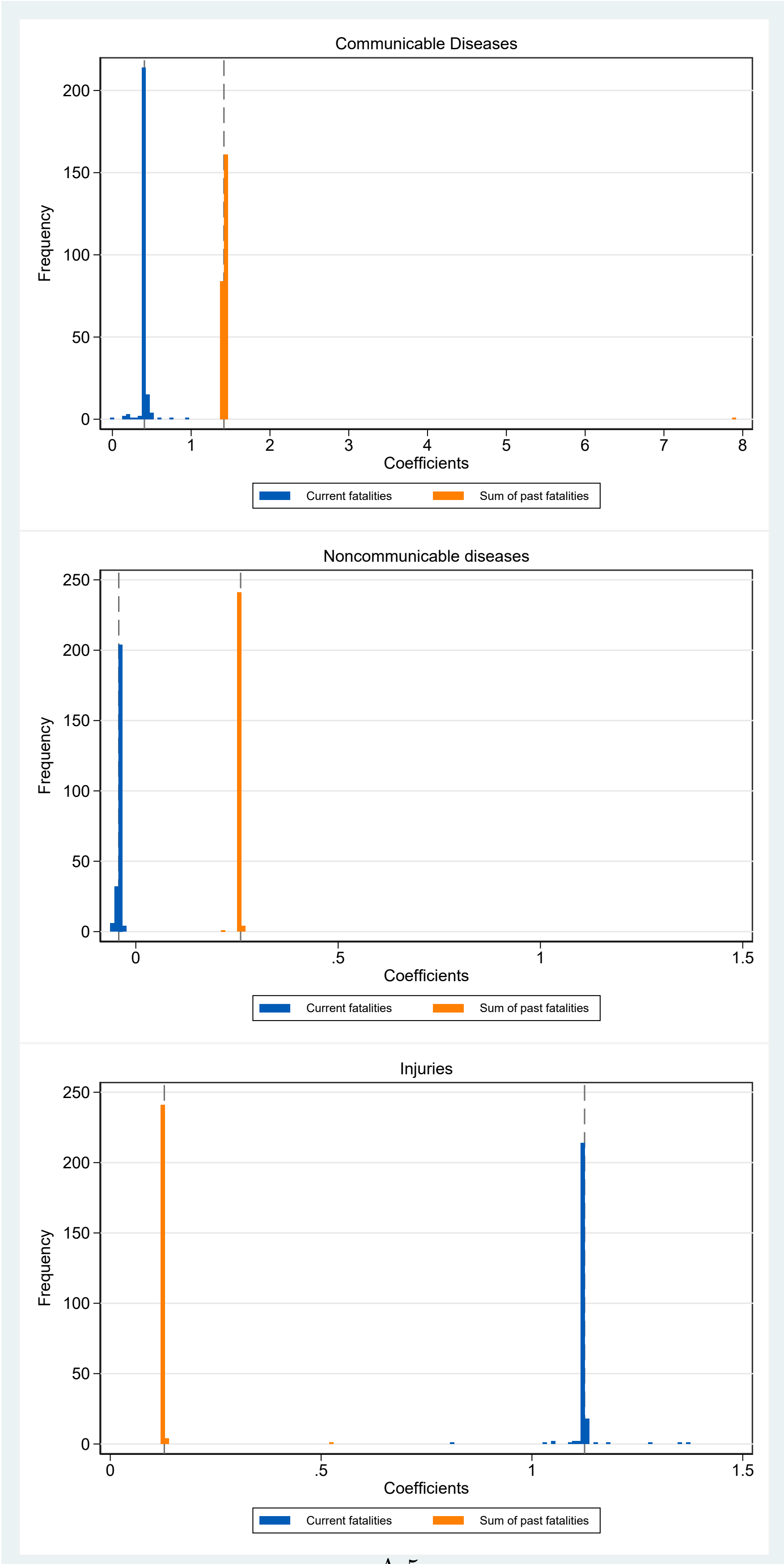
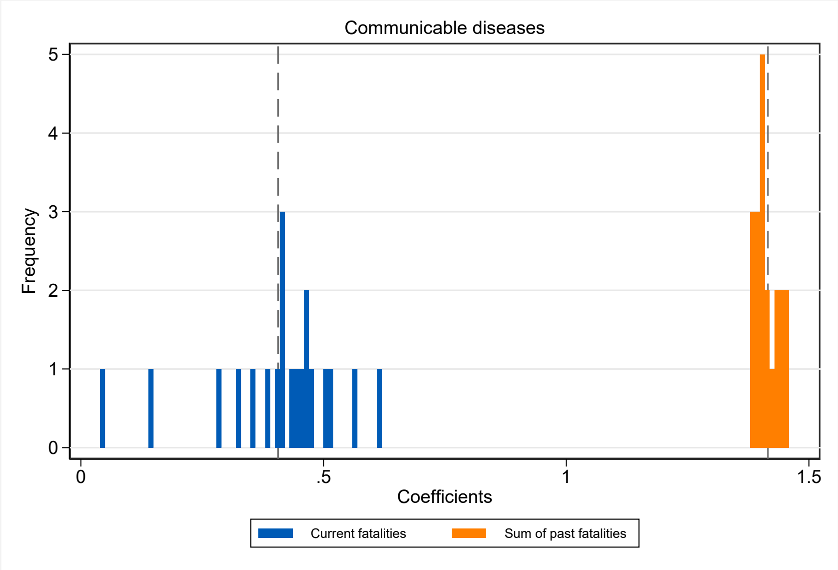
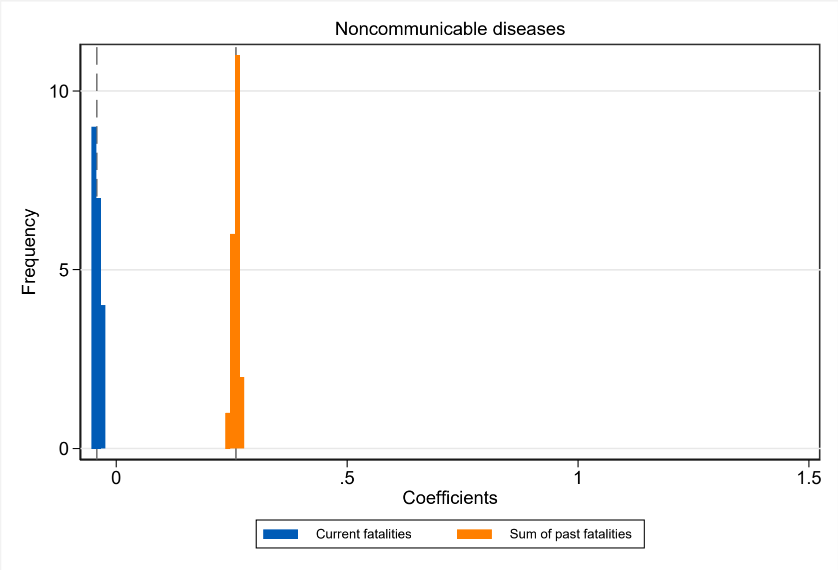


Figure A.3. Robustness: Dropping one year at a time





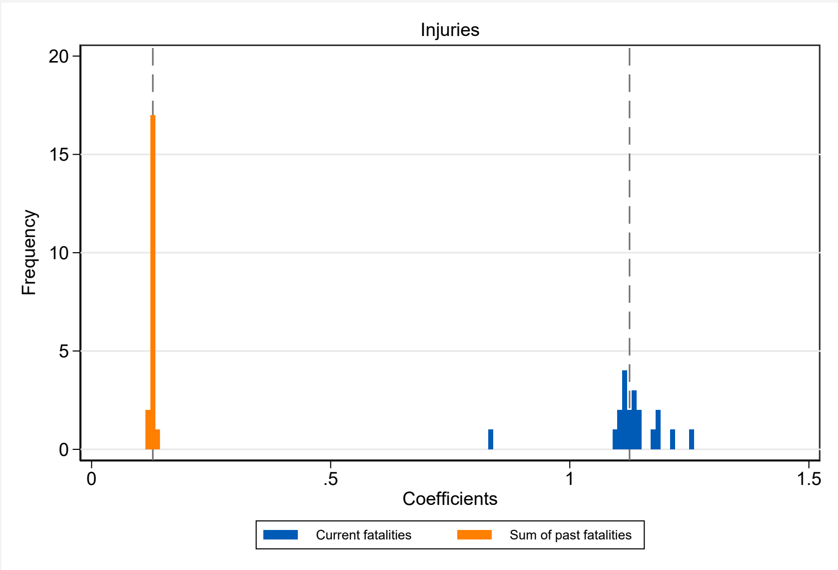


Table A.2. Robustness: The effects of fatalities on DALYs (non-state and state-based)

	DALY lost due to communicable plus conditions, all ages, male and female		DALY lost due to noncommunicable diseases, all ages, male and female		DALY lost due to injuries, all ages, male and female	
Sum of past fatalities, non-state	1.443		11.294		0.878	
	(0.348)***		(5.875)*		(0.580)	
Sum of past fatalities, state-based		0.176		2.276		-0.200
		(0.193)		(1.475)		(0.264)
Current fatalities, non-state	0.087		-0.415		0.085	
	(0.046)*		(0.487)		(0.099)	
Current fatalities, state-based		-0.034		-0.248		0.332
		(0.042)		(0.337)		(0.077)***
Dummy variable for neighbor fatalities$\geq$ 1000	-47.718	-56.334	312.338	287.323	152.605	101.190
	(131.223)	(132.151)	(585.192)	(577.181)	(82.666)*	(82.356)
Log GDP per capita (constant 2015 USD)	949.876	897.807	1757.065	1708.718	-537.416	-506.863
	(510.976)*	(508.425)*	(2858.634)	(2809.444)	(514.738)	(496.019)
Health expenditure as percent of GDP	346.011	337.962	2520.602	2461.760	31.014	72.275
	(124.769)***	(124.698)***	(578.691)***	(571.040)***	(55.235)	(50.188)
Urban population growth (annual percent)	-71.421	-75.968	159.698	132.386	-128.018	-85.572
	(46.506)	(47.158)	(276.086)	(274.245)	(78.900)	(56.352)
Electoral democracy index	-138.530	-263.572	-7190.684	-8167.038	-151.189	-111.994
	(877.052)	(875.336)	(4364.804)	(4484.558)*	(569.827)	(581.029)
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Country Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.96	0.96	0.92	0.92	0.35	0.37
Obs	3178	3178	3178	3178	3178	3178

Figure A.4. Predicted DALYs lost per country

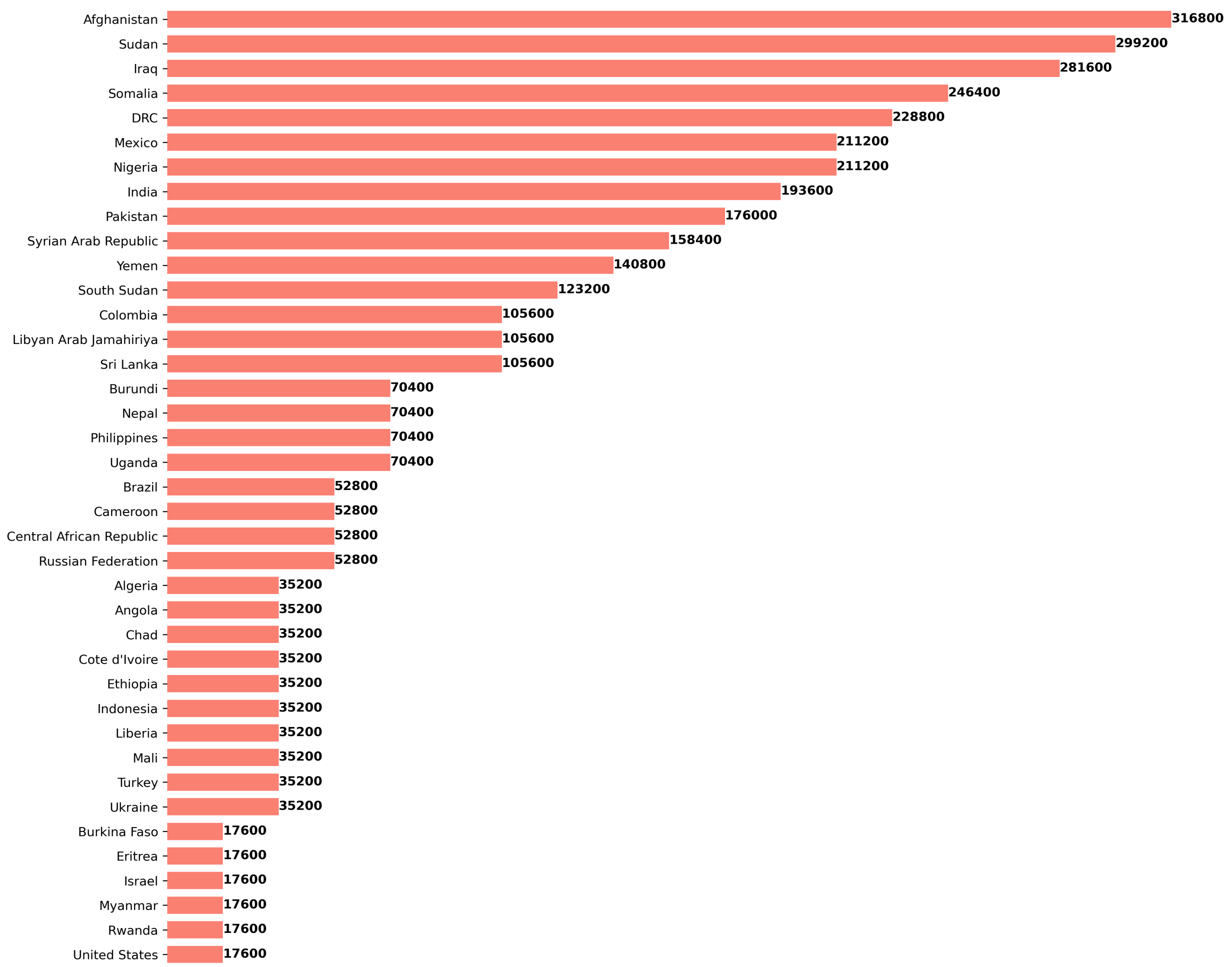
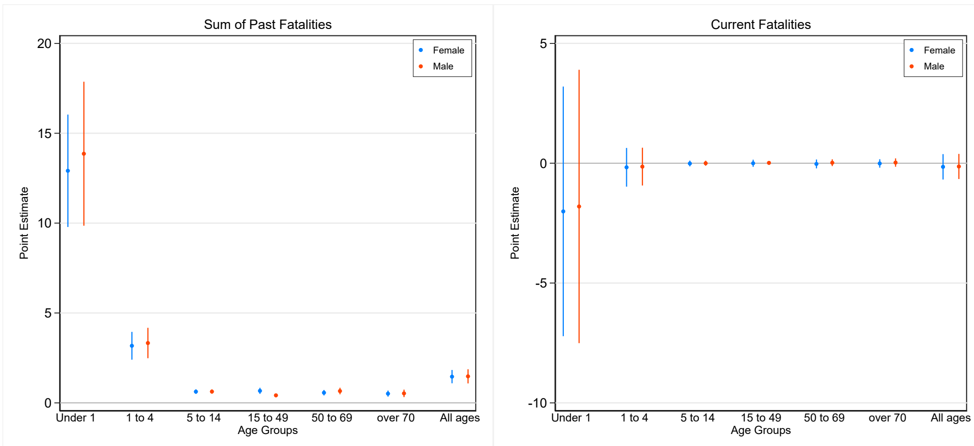
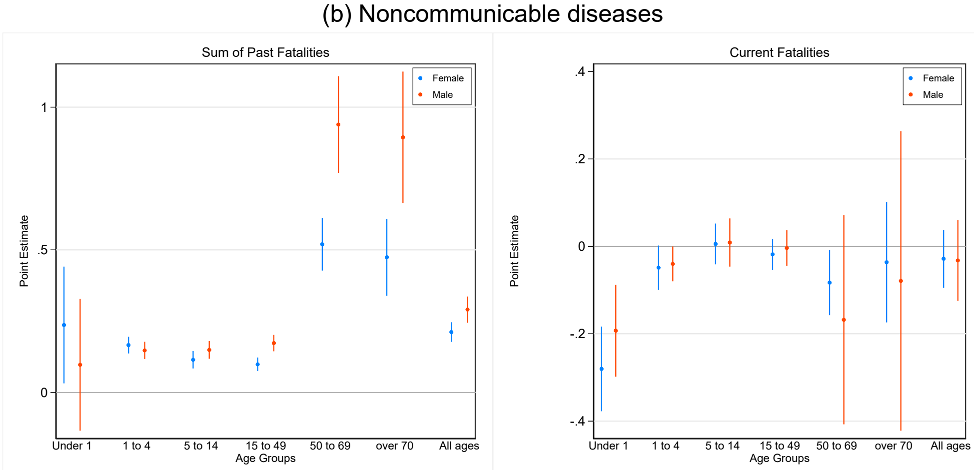


Figure A.5. Effects by age and sex (All violence)

(a) Communicable diseases



(b) Noncommunicable diseases



(c) Injuries

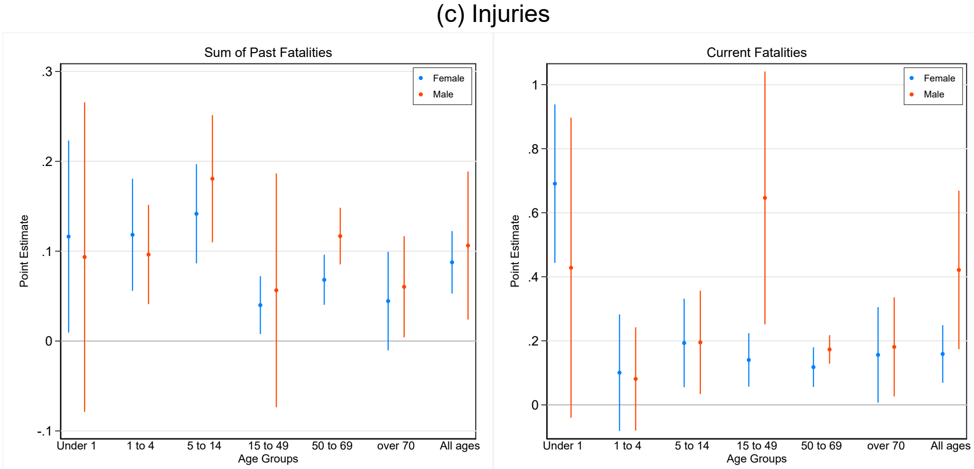
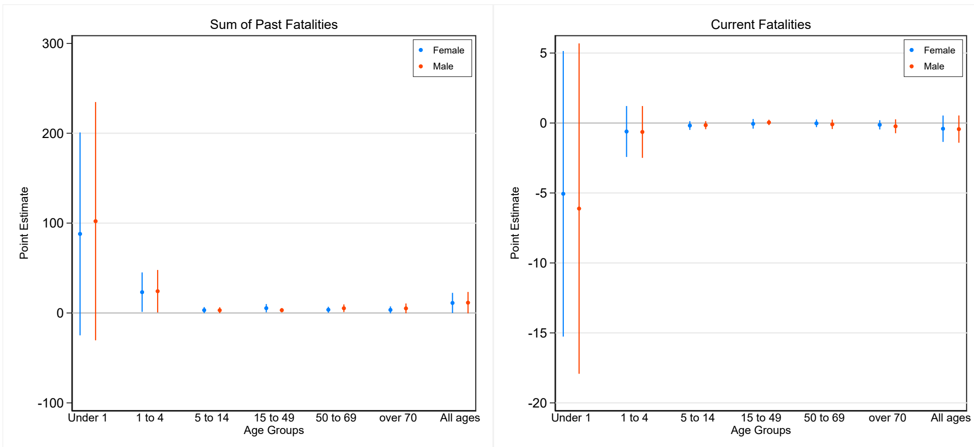
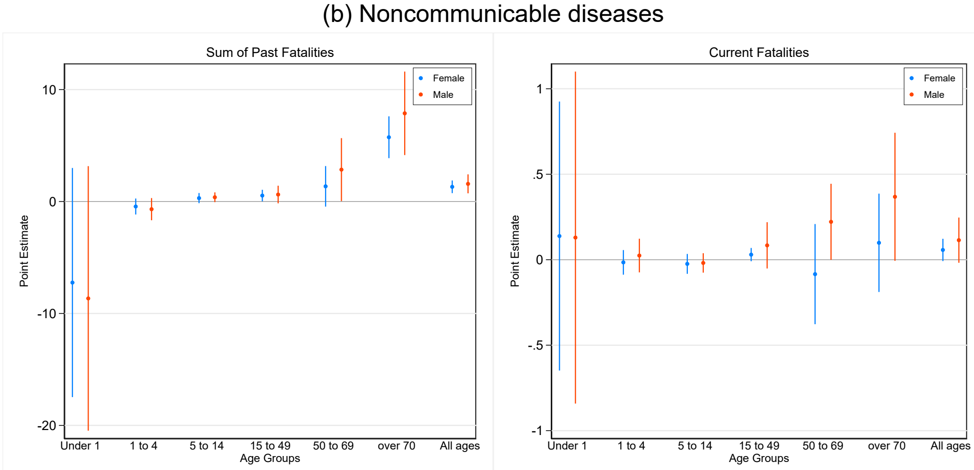


Figure A.6. Effects by age and sex (Non-state violence)

(a) Communicable diseases



(b) Noncommunicable diseases



(c) Injuries

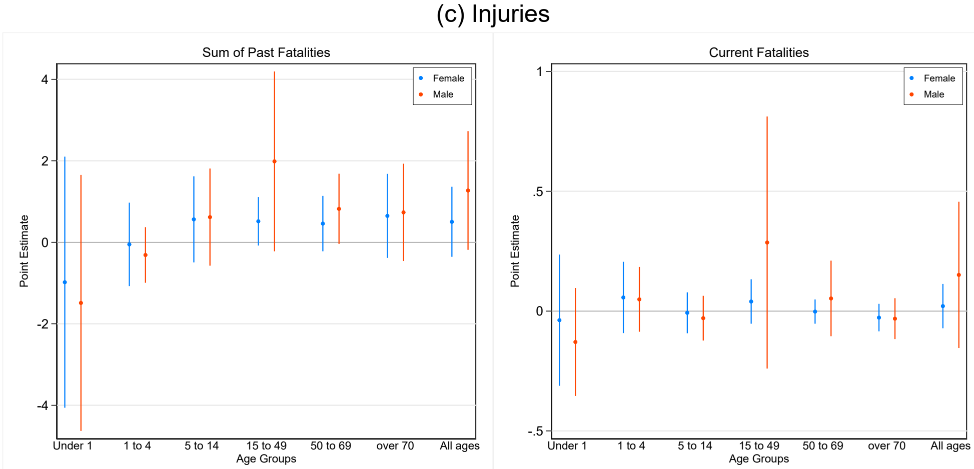
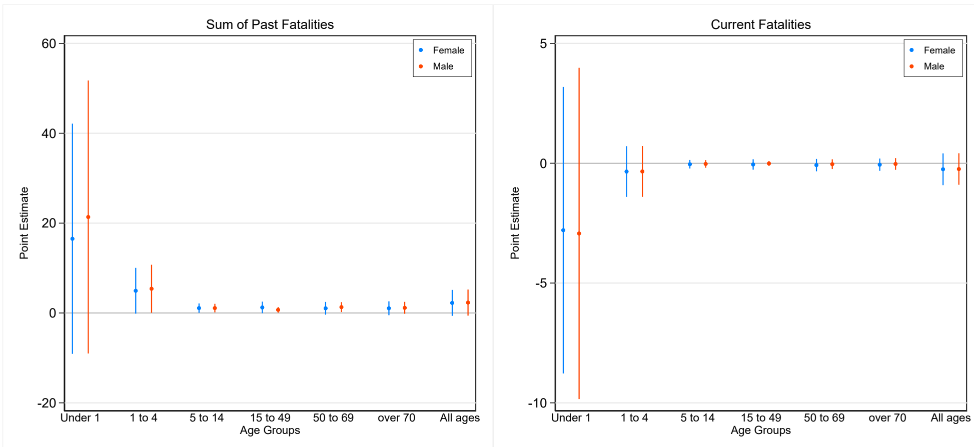
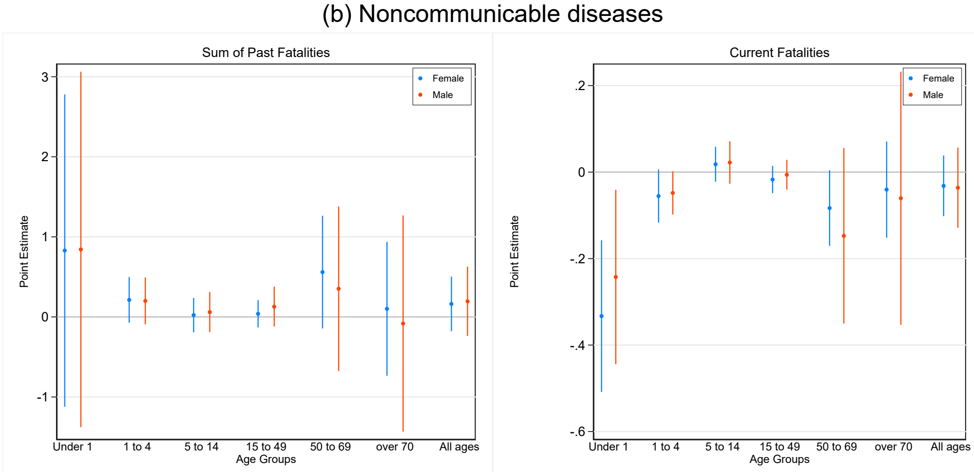


Figure A.7. Effects by age and sex (state-based violence)

(a) Communicable diseases



(b) Noncommunicable diseases



(c) Injuries

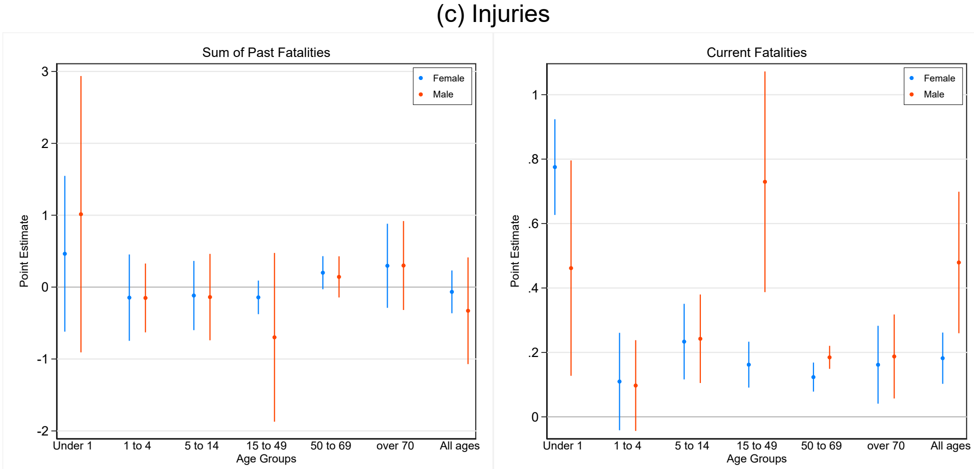


Table A.3. Results from Figure 3 (a): The effects of fatalities on DALYs (communicable diseases)

Outcome	Sum of fatalities, one-sided, discounted by 0.1 per year	Current fatalities, one-sided
DALY lost, all ages, male and female	1.4157	0.4064
	(0.126)***	(0.811)
DALY lost, under 1, male and female	13.0908	7.4114
	(1.358)***	(8.076)
DALY lost, 1 to 4, male and female	3.1366	0.3179
	(0.289)***	(1.832)
DALY lost, 5 to 14, male and female	0.6023	0.1004
	(0.028)***	(0.221)
DALY lost, 15 to 49, male and female	0.5184	0.0377
	(0.031)***	(0.303)
DALY lost, 50 to 69, male and female	0.5647	0.2142
	(0.035)***	(0.312)
DALY lost, over 70, male and female	0.4902	0.3651
	(0.038)***	(0.332)
DALY lost, all ages, female	1.4100	0.3376
	(0.121)***	(0.796)
DALY lost, under 1, female	12.7626	6.2093
	(1.259)***	(7.505)
DALY lost, 1 to 4, female	3.0694	0.1855
	(0.278)***	(1.788)
DALY lost, 5 to 14, female	0.6002	0.1061
	(0.028)***	(0.219)
DALY lost, 15 to 49, female	0.6306	0.0444
	(0.038)***	(0.377)
DALY lost, 50 to 69, female	0.5354	0.1282
	(0.028)***	(0.294)
DALY lost, over 70, female	0.4780	0.3244
	(0.029)***	(0.311)
DALY lost, all ages, male	1.4231	0.4614
	(0.132)***	(0.829)
DALY lost, under 1, male	13.4026	8.5345
	(1.452)***	(8.608)
DALY lost, 1 to 4, male	3.2033	0.4414
	(0.300)***	(1.886)
DALY lost, 5 to 14, male	0.6042	0.0930
	(0.029)***	(0.224)
DALY lost, 15 to 49, male	0.4007	0.0340
	(0.024)***	(0.227)
DALY lost, 50 to 69, male	0.6142	0.3151
	(0.045)***	(0.345)
DALY lost, over 70, male	0.4821	0.4541
	(0.056)***	(0.375)

Table A.4. Results from Figure 3 (b): The effects of fatalities on DALYs (noncommunicable diseases)

Outcome	Sum of fatalities, one-sided, discounted by 0.1 per year	Current fatalities, one-sided
DALY lost, all ages, male and female	0.2591	-0.0421
	(0.010)***	(0.055)
DALY lost, under 1, male and female	0.1346	-0.3645
	(0.090)	(0.641)
DALY lost, 1 to 4, male and female	0.1588	0.0319
	(0.010)***	(0.130)
DALY lost, 5 to 14, male and female	0.1428	-0.0147
	(0.005)***	(0.048)
DALY lost, 15 to 49, male and female	0.1417	0.0157
	(0.007)***	(0.040)
DALY lost, 50 to 69, male and female	0.7323	-0.2448
	(0.036)***	(0.208)
DALY lost, over 70, male and female	0.7454	0.1361
	(0.064)***	(0.300)
DALY lost, all ages, female	0.2181	-0.0596
	(0.010)***	(0.053)
DALY lost, under 1, female	0.2101	-0.4786
	(0.083)**	(0.653)
DALY lost, 1 to 4, female	0.1682	0.0118
	(0.009)***	(0.146)
DALY lost, 5 to 14, female	0.1252	-0.0177
	(0.006)***	(0.044)
DALY lost, 15 to 49, female	0.1048	-0.0433
	(0.008)***	(0.048)
DALY lost, 50 to 69, female	0.5275	-0.2074
	(0.034)***	(0.194)
DALY lost, over 70, female	0.5018	0.1113
	(0.056)***	(0.268)
DALY lost, all ages, male	0.3023	-0.0223
	(0.011)***	(0.064)
DALY lost, under 1, male	0.0605	-0.2519
	(0.096)	(0.635)
DALY lost, 1 to 4, male	0.1493	0.0520
	(0.010)***	(0.117)
DALY lost, 5 to 14, male	0.1607	-0.0131
	(0.005)***	(0.053)
DALY lost, 15 to 49, male	0.1805	0.0765
	(0.008)***	(0.056)
DALY lost, 50 to 69, male	1.0038	-0.2430
	(0.041)***	(0.249)
DALY lost, over 70, male	0.9763	0.1920
	(0.082)***	(0.401)

Table A.5. Results from Figure 3 (c): The effects of fatalities on DALYs (injuries)

Outcome	Sum of fatalities, one-sided, discounted by 0.1 per year	Current fatalities, one-sided
DALY lost, all ages, male and female	0.1281	1.1250
	(0.015)***	(0.448)**
DALY lost, under 1, male and female	0.0770	0.8869
	(0.037)**	(0.528)*
DALY lost, 1 to 4, male and female	0.1347	0.7760
	(0.018)***	(0.253)***
DALY lost, 5 to 14, male and female	0.1933	0.6895
	(0.012)***	(0.322)**
DALY lost, 15 to 49, male and female	0.0937	1.5831
	(0.020)***	(0.625)**
DALY lost, 50 to 69, male and female	0.0827	0.4301
	(0.008)***	(0.166)**
DALY lost, over 70, male and female	0.0434	0.3234
	(0.008)***	(0.141)**
DALY lost, all ages, female	0.1061	0.6370
	(0.010)***	(0.247)**
DALY lost, under 1, female	0.1153	1.5155
	(0.034)***	(0.723)**
DALY lost, 1 to 4, female	0.1468	0.9320
	(0.020)***	(0.287)***
DALY lost, 5 to 14, female	0.1711	0.6855
	(0.012)***	(0.313)**
DALY lost, 15 to 49, female	0.0586	0.5523
	(0.008)***	(0.221)**
DALY lost, 50 to 69, female	0.0620	0.2884
	(0.006)***	(0.116)**
DALY lost, over 70, female	0.0285	0.2576
	(0.008)***	(0.124)**
DALY lost, all ages, male	0.1532	1.6065
	(0.021)***	(0.650)**
DALY lost, under 1, male	0.0396	0.2817
	(0.042)	(0.404)
DALY lost, 1 to 4, male	0.1227	0.6250
	(0.017)***	(0.227)***
DALY lost, 5 to 14, male	0.2162	0.6923
	(0.013)***	(0.332)**
DALY lost, 15 to 49, male	0.1318	2.6089
	(0.033)***	(1.029)**
DALY lost, 50 to 69, male	0.1213	0.5951
	(0.011)***	(0.225)***
DALY lost, over 70, male	0.0465	0.4147
	(0.009)***	(0.166)**

Table A.6. Regression summary, civil war binary

	index	DALY lost due to communicable plus conditions, all ages, male and female	DALY lost due to non-communicable diseases, all ages, male and female	DALY lost due to injuries, all ages, male and female
1	Fatalities, dummy 1000, at current time	1798.255** (832.587)	136.941 (119.014)	1187.834*** (384.881)
2	Fatalities, dummy 1000, t-lag 1 year	1474.629* (770.165)	118.489 (106.724)	614.346* (367.343)
3	Fatalities, dummy 1000, t-lag 2 year	1571.224* (896.726)	262.92** (107.037)	168.742 (399.262)
4	Fatalities, dummy 1000, t-lag 3 year	2574.144*** (953.892)	439.391** (172.393)	539.977** (257.565)
5	Fatalities, dummy 1000, t-lag 4 year	1854.15** (796.488)	220.824** (94.966)	206.355 (194.409)
6	Fatalities, dummy 1000, t-lag 5 year	1635.865** (800.057)	117.789 (122.767)	41.243 (214.56)
7	Fatalities, dummy 1000, t-lag 6 year	1760.701** (833.475)	226.42 (151.216)	183.644 (116.323)
8	Fatalities, dummy 1000, t-lag 7 year	1562.677* (874.589)	182.045* (103.403)	214.988 (164.156)
9	Fatalities, dummy 1000, t-lag 8 year	724.881 (743.119)	114.847 (103.455)	125.227 (120.151)
10	Fatalities, dummy 1000, t-lag 9 year	598.989 (624.931)	90.458 (108.246)	84.334 (119.525)
11	Fatalities, dummy 1000, t-lag 10 year	276.411 (888.622)	26.379 (138.382)	-286.472 (231.216)
12	Fatalities, dummy 1000, t-lead 1 year	837.006 (879.125)	117.961 (153.92)	226.345 (272.38)
13	Fatalities, dummy 1000, t-lead 2 year	861.387 (1013.629)	-116.838 (124.436)	244.251 (243.771)
14	Fatalities, dummy 1000, t-lead 3 year	496.534 (749.418)	-87.124 (119.911)	397.478* (216.384)
15	Fatalities, dummy 1000, t-lead 4 year	211.138 (739.669)	8.028 (112.98)	151.425 (298.581)
16	Fatalities, dummy 1000, t-lead 5 year	-328.841 (732.923)	-74.691 (65.769)	148.546 (226.655)
17	Fatalities, dummy 1000, t-lead 6 year	-57.318 (654.694)	35.372 (95.09)	-133.663 (282.934)
18	Fatalities, dummy 1000, t-lead 7 year	-264.474 (843.28)	128.932 (107.048)	32.96 (211.177)
19	Fatalities, dummy 1000, t-lead 8 year	-1258.066 (888.969)	16.633 (105.175)	177.69 (303.241)
20	Fatalities, dummy 1000, t-lead 9 year	-1008.167 (807.379)	-142.778* (80.44)	580.686 (543.403)
21	Fatalities, dummy 1000, t-lead 10 year	-1011.108 (1266.324)	-94.004 (135.358)	14.809 (356.739)
22	Dummy variable for neighbor fatalities 1000	634.012 (648.937)	-11.482 (110.444)	198.857 (121.178)
23	Country Effects	Yes	Yes	Yes
24	Year Effects	Yes	Yes	Yes
25	R-squared adjusted	0.96	0.97	0.27
26	Obs	2194	2194	2194