Disease and Dissent: Epidemics as a Catalyst for Social Unrest

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Abstract

In this manuscript, we identify a set of theoretical mechanisms that link the outbreak and spread of communicable diseases to temporal and spatial patterns of social unrest. Epidemics, as well as the policies that governments implement to tackle them, often generate acute grievances among the public and create new opportunities for collective dissent, the combination of which promotes unrest. We examine this relationship using sub-national data on communicable disease outbreaks and geo-located social unrest events data in 60 African and Latin American countries from 1990 to 2017 and find support for our argument.

Introduction

The global COVID-19 pandemic has created complex sets of public health and political challenges for many countries.[1] In response to the grave threats posed by the rapid spread of the novel coronavirus responsible for COVID-19, many countries have imposed policies that place significant restrictions on citizens' rights and privileges. While governments deem these prescriptions necessary to protect public health, citizens have sometimes challenged their implementation and actively resisted authorities' efforts to enforce them. Indeed, policies intended to contain or mitigate the spread of COVID-19 have prompted public backlash and social unrest in several countries. Efforts by French police to enforce lockdown policies provoked protests and violent clashes between officers and immigrant youths in the Paris outskirts (Bremner 2020). Migrant workers in India clashed with police during protests against the government's lockdown policies (Khanna 2020). And the reintroduction of restrictions intended to counter a second wave of COVID-19 infections prompted demonstration in several Italian cities, some of which resulted in violent altercations between police and protesters (Di Donato and Dewan 2020).

COVID-19-related unrest represents only the most recent example of dissent associated with outbreaks of contagious diseases. In the 19th century, demonstrations, riots, and violent clashes with state authorities routinely occurred during cholera epidemics in Great Britain, the Russian Empire, and the United States (US) (Sahadeo 2005; Cohn 2018). Small pox outbreaks in the US and Canada during the early 20th centuries also occasionally sparked unrest, which lasted for weeks in some cities (Cohn 2018, 63-64). Social violence has also accompanied Ebola outbreaks in West and

[1] *Epidemic* refers to a disease outbreak that spreads within communities and geographic areas at higher rates than expected. *Pandemics* are epidemics that have affected large numbers of people and spread across borders into multiple countries (see Porta 2014). As pandemics are a subset of epidemics, we rely primarily on the term epidemic throughout.

Central African countries in recent years (BBC 2014a; NPR 2014; Gonzalez-Torres and Esposito 2020).

Contemporary media reports as well as historical accounts illustrate how unrest can develop and spread during large-scale disease outbreaks. Yet, social scientists have thus far largely overlooked the ways that epidemics and pandemics might influence the likelihood of political upheaval and social conflict in the areas in which they occur.[2] We therefore take this opportunity to conduct an initial investigation of this potential relationship, and we identify a set of theoretical mechanisms that plausibly link disease epidemics and social unrest. In broad terms, we contend that large-scale communicable disease outbreaks create conditions that are conducive to an increase in social unrest and popular dissent. More specifically, we highlight how epidemics and pandemics contribute to several factors that previous studies suggest explain the onset or incidence of social unrest events.

We evaluate the empirical validity of our argument by analyzing fine-grained, geo-referenced data on the occurrence of disease epidemics and social unrest (demonstrations and riots) in a sample of first-order administrative units in 60 African and Latin American countries between 1990 and 2017. In order to account for the possible non-random assignment of epidemics across subnational units, we employ matching techniques that pair units that experienced epidemics with highly similar units that did not experience epidemics. Even after accounting for potential selection bias, results from a series of regression models suggest that the frequency of social unrest increases in areas that experience large-scale outbreaks of infectious disease.

This study is among the first efforts to systematically evaluate the relationship between epidemics and social violence and unrest. The argument and results we present herein highlight a potentially important but hitherto underappreciated empirical relationship between outbreaks of

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[2] Though past studies have demonstrated the long-term adverse consequences of violent social conflict on public health outcomes (e.g., Huth, Goborah, and Russett 2003; Iqbal 2006).

communicable disease and observed levels of social discord. In particular, our study indicates that the association between epidemics and dissent extends beyond the demonstrations recently observed in many countries during the COVID-19 pandemic and suggests that epidemics caused by a variety of different pathogens over time influence spatial patterns of social unrest events.

Models of Public Discord and Dissent

Social unrest manifests in a variety of ways, ranging from organized acts of civil disobedience and non-violent demonstrations to violent, sometimes deadly intra-communal riots and insurrections. While different forms of unrest possess distinctive qualities, all types of collective dissent reflect situations in which groups of individuals coordinate (to some degree) their actions in order to express collective grievances and seek redress those for grievances by attempting to impose costs on their perceived source (e.g., the government, other societal groups, etc.).[3]

Theories of social unrest often explain its onset and expansion by focusing on either the collective grievances that motivate dissent and violence (e.g., Gurr 1970) or structural and organizational changes within groups and polities that create new opportunities for mobilization (e.g., McAdam, Tarrow and Tilly 2004). While these theoretical frameworks privilege different explanatory factors and identify different mechanism responsible for dissent, they are rarely mutually exclusive. However, the ubiquitous nature of grievances implies that expanding opportunities are often required for the transformation of public dissatisfaction into popular mobilization (Oberschall 1978; Jenkins 1983). As such, the presence of political opportunities likely conditions the role of grievances in motivating collective dissent (Grasso and Giugni 2016). As we discuss in greater detail

[3] While riots are often viewed as spontaneous outbursts of irrational violence, participants often have rational motives, and their actions are purposeful and calculated (Mason 1984; Wilkinson 2009).

below, epidemics often produce grievances as well as create opportunities for mobilization, increasing the likelihood of social unrest in affected locales.

Grievance-oriented mobilization theories highlight material factors such as relative economic deprivation, income inequality, and worsening macro-economic conditions. Despite ambiguous empirical support in earlier studies regarding the role of deprivation and structural inequality in driving protest and rebellion, several recent studies indicate that material grievances are important motivators of social unrest. For example, Mueller (2013) finds that contrary to the conventional wisdom of many international observers contemporary protests in Africa are often driven by economic grievances. Similarly, Kawalerowicz and Biggs (2015) demonstrate that economic deprivation and material grievances were strongly associated with participation in the 2011 London Riots. Other studies likewise suggest that acute financial losses, unexpected labor market contractions, and rising inter-group competition over resources are associated with social unrest (della Porta 2008; Grasso and Giugni 2016; Olzak and Shanahan 1996), while economic growth appears to inhibit some forms of unrest (Bohlken and Sergenti 2010). A related body of research identifies food insecurity and food price volatility, which often generate grievances and exacerbate resource competition, as important catalysts for social unrest and violent conflict (e.g., Bellemare 2014; Hendrix and Haggard 2015). Patterns of civil unrest are also heavily influenced by how authorities respond to public grievances, dissident demands, and prior patterns of dissent (Wilkinson 2009). In particular, state repression is often viewed as a source of collective grievances that motivates dissent (Opp and Roehl 1990; Rasler 1996) and encourages dissidents to adopt more violent tactics (Moore 1998; Ives and Lewis 2019).

In contrast to grievance-based arguments, political opportunity arguments stress the central role of structural or organizational changes that raise or lower the costs of mobilization or influence the perceived odds of its success. Conceptualizations of political opportunity vary substantially, and scholars have identified a large number of specific factors that represent new or expanding opportunities for dissent. These include (but are not limited to) changes in activists' perception of threat, weakened state repressive capacity, diminished state bureaucratic capabilities, and declining government legitimacy (e.g., Boudreau 1996; Brocket 1991; Meyer 2004). The presence or proliferation of these factors encourages dissent among aggrieved members of the community, thus increasing the odds of unrest.

Insights from these broad theoretical traditions inform our argument regarding the expected relationship between epidemics and unrest. The brief review of the literature above highlights a set of intermediary factors that we argue link large-scale disease outbreaks and patterns of social unrest. More specifically, we contend that protests, riots, and other forms of unrest emerge as collective responses to the conditions epidemics create in affected communities and the policies governments adopt as they attempt to manage the disease outbreak. In this sense, we view the relationship between epidemics and unrest as similar to the links scholars now commonly draw between exogenous environmental factors such as climate change or natural disasters and sociopolitical conflict. For example, climate change itself has little direct influence on the location or timing of social conflict and dissent. Rather, the droughts, floods, or shorter growing seasons associated with climate change influence resource availability, food prices and supply, migration, and economic growth, which in turn influence the timing and locations of social conflict (e.g., Hendrix and Salehyan 2012; Jones, Mattiacci and Braumoeller 2017; Nördas and Gleditsch 2007; Raleigh 2010). Similarly, natural disasters are linked to political violence, instability, dissent, and repression through largely indirect mechanisms. These include the adverse impact of disasters on resource scarcity, inequality and deprivation, pre-existing social cleavages, and state capacity (Drury and Olson 1998; Quiroz Flores and Smith 2013; Wood and Wright 2016).

As with climate change and natural disasters, epidemics are not the proximate cause of unrest. Instead, large-scale outbreaks of infectious disease often create conditions that are conducive to collective dissent, unrest, and popular resistance to authority. Epidemics induce fear and heighten uncertainty, diminish state capacity, generate acute economic losses, create resource shortages and competition, undermine leaders' legitimacy, and intensify existing iniquities in societies. These factors in turn create opportunities and incentives for members of the public to mobilize—sometimes violently—against the government or against other social groups that participants hold responsible for collective grievances.

Linking Epidemics and Social Unrest

Large-scale disease outbreaks often provoke intense emotional responses among the population in the areas they most acutely affect. Such feelings are particularly common when a pathogen is novel or manifests itself in unexpected ways that undermine the effectiveness of the tools and methods authorities commonly employ to control them (Strong 1990). Fear and anxiety are powerful influencers of political participation and can increase citizens' engagement in the political process, but these emotions also create opportunities for manipulation, scapegoating, and social discord (Albertson and Gadarian 2015). During crises, citizens look to trusted institutions and leaders to provide guidance, certainty, and safety. Yet, inadequate or inequitable government responses to public health crises can undermine citizens' trust in government and intensify popular grievances (e.g., Blair, Morse and Tsai 2017), thus incentivizing challenges to authority and encouraging violence against vulnerable groups.

As with natural disasters, how promptly and how effectively a state responds to an epidemic can serve as a focal point for public evaluations of state capacity and attitudes toward the incumbent government (see Dionne 2011; Wood and Wright 2016). If authorities fail to contain the spread of the disease or causalities remain high for extended period of times, citizens are likely to perceive the government as incompetent or ineffectual. State authorities may therefore become targets of public animosity. As popular grievances increase and faith in government weakens, groups of individuals may spontaneously engage in rioting to express anger and frustration with authorities or may participate in more organized protests intended to draw attention to their concerns and increase pressure on the government to mount a more satisfactory public health response. For instance, Brazilian President Bolsonaro's poor handling of the COVID-19 crisis sparked protests as cases rapidly escalated (Nuyen 2020). The expansion of HIV/AIDS activism over the course of the 1980s and 1990s likewise arose in reaction to tepid responses to the crisis from US health officials and politicians (Piot 2015; Snowden 2020).

Epidemics also have a deleterious effect on macro-economic conditions and can produce acute resource shortages, both of which are linked to public discord and unrest. The 2014 West African Ebola outbreaks are estimated to have resulted in up to $32 billion in lost GDP among affected countries (Huber, Finelli and Stevens 2018). Moreover, in Liberia, the Ebola outbreak was associated with an appreciable decline in household income (Gatiso et al. 2018). Similarly, the costs associated with the 1991 Peruvian cholera epidemic have been estimated at nearly $150 million (~$266 million in 2020 dollars) (Suarez and Bradford 1993). While the total economic impact of the COVID-19 pandemic is still unknown, the Organization for Economic Co-operation and Development (OECD) estimates that many of the world's largest economies will suffer a net fall in GDP of between 6% and 11%, resulting in job losses comparable to those observed during the Great Depression (Inman 2020; Mutikani 2020). Consequently, to the extent that epidemics weaken economies, reduce wages, and increase unemployment, they may also create incentives for popular mobilization or violence.

Disease outbreaks can also create acute resource scarcities, which can exacerbate existing inequalities or underlying social tensions, fuel grievances, and promote challenges to the state. In particular, epidemics (as well as government responses to them) can produce or worsen food insecurity. Epidemic-induced food insecurity occurs when illness among workers produces labor shortages or when mobility restrictions (e.g., travel bans and community quarantines) adversely impact food production and transportation. For instance, quarantine measures introduced to contain the spread of Ebola in Sierra Leone prevented agricultural workers from harvesting crops, which in turn disrupted supply chains and threatened the country's food supply (Kodish et al. 2019). Similarly, Ebola outbreaks reduced crop yields among Liberian farm household and exacerbated food insecurity in some parts of the country (Gatiso et al. 2018). For these reasons, health officials and policymakers have recently expressed concerns about the strain the COVID-19 pandemic has placed on global food supply chains, particularly in the developing world (Gunia 2020; Harvey 2020). Given previous findings (e.g., Bellemare 2014), the risk of social unrest is likely to increase where epidemics produce food insecurity or contribute to the rapid escalation of food prices. Historical and contemporary examples likewise illustrate this relationship. Quarantine measures imposed on French cities during an outbreak of plague in the early 18th century led to food shortages and rising prices, which in turn provoked large-scale urban unrest (Hays 2005, 138-140). During the early months of the COVID-19 pandemic, Lebanese citizens protested against food shortages despite government lockdowns (Mazjoub 2020; Mounzer 2020). Similarly, temporary food shortages created by the government's lockdown measures resulted in protests in Chile (Fuentes 2020).

During epidemics, authorities often impose new restrictions on the freedoms and privileges citizens normally enjoy. While viewed by public health officials as critical strategies for containing the spread of disease, these measures often generate grievances among the population, particularly when they are viewed as arbitrary or unnecessary constraints on citizens' rights. Curfews, travel prohibitions, school closures, and restrictions on commerce adopted during the COVID-19 pandemic have produced protests and clashes with police in many countries. For instance, in response to anti-COVID-19 lockdown measures a group of armed protesters staged a demonstration in the Michigan State Capitol building (Beckett 2020). Similarly, violent protests erupted when the Serbian government attempted to impose a national curfew in response to rising coronavirus infections (Walker 2020). Disease mitigation policies are particularly likely to generate resentment and resistance when the population is poorly informed about the nature of disease transmission, authorities inadequately explain the purpose of the policies, or where citizens mistrust the motives of the medical community and lack confidence in its methods (Blair, Morse and Tsai 2017). For instance, the suspicion and resentment felt by local communities at the unexplained arrival of state officials, troops, and medical personnel purportedly did more to provoke the European Cholera riots of the 19th century than the outbreak of the disease (Evans 1988; see also Gill, Burrell and Brown 2001).

Epidemics may also worsen public mistrust of authorities by exacerbating reinforcing existing social and ethnic cleavages. In particular, where class, religion, or ethnicity separate the authorities from populations in areas where the epidemic takes hold, suspicion and resistance are more common. For example, experimental evidence from Guinea suggests that members of marginalized groups express greater mistrust of the government and are less likely to follow public health advisories on HIV/AIDS prevention when representatives of the national government deliver health recommendations compared to local religious or political leaders (Arriola and Grossman 2020). In addition to decreasing compliance with health recommendations, suspicion and mistrust of authorities during public health crises can also facilitate unrest. Longstanding mistrust of Tsarist (Russian) authorities by the local Central Asian population coupled with resentment toward government efforts to contain an outbreak of cholera in the predominantly Asian parts of the city sparked inter-communal riots (and reciprocal violence) in Tashkent in 1892 (Sahedeo 2005). In a similar manner, restrictions that contradicted or impeded cultural and religious practices sparked riots during outbreaks of plague in India and Cholera in Europe and the US (Cohn 2018; Evans 1988, 143). As these examples suggest, epidemics as well as the rules states adopt to quell them often exacerbate social pre-existing cleavages and provoke public resentment, thereby increasing the odds of resistance.

The severity of epidemic control measures also influences the likelihood of social unrest. Public health warnings, restrictions on foreign travel, or prohibitions on large gatherings may be viewed unfavorably but are unlikely to produce intense popular grievances. On the other hand, business closures, curfews, community quarantines, or the creation of *cordons sanitaire* that limit access to specific geographic areas, thus effectively isolating large numbers of persons from the rest of the country, may promote widespread dissatisfaction with the government. Moreover, due to the grievances they induce, such policies often require police or military enforcement, which can create further tensions between the population and authorities. Quarantine rules have often provoked public resistance, riots, and violent clashes with authorities (Evans 1988; Hays 2005). For example, Ebola-related quarantine efforts produced social unrest and violence in Liberia's capital in 2014 (BBC 2014b; McNeil 2014). More recently, residents of one German community rioted in response to police efforts to enforce a quarantine order during the COVID-19 pandemic (CNBC 2020). As these examples demonstrate, government restrictions adopted to protect public can produce resentment and instigate unrest.

Overzealous enforcement of policies imposed to mitigate the epidemic by police can also incite unrest. For example, hundreds of Kenyans demonstrated against the use of lethal violence by police to enforce COVID-19-related curfews (Sperber 2020). The reciprocal relationship between state repression and dissent is well established (Carey 2006). In some cases, constraints on civil liberties and pre-emptive repression can successfully deter popular mobilization (Ritter and Conrad 2016). Yet, state violence often serves as a catalyst for violent and non-violent behavioral challenges to the state, particularly where the public perceives the coercive response as illegitimate or excessive (Opp and Roehl 1990; Rasler 1996). Even where the population broadly supports government efforts to control the epidemic, violence and repression targeted at individuals and groups that disobey newly imposed regulations may prompt backlash, including demonstrations or riots.

The vilification of already marginalized populations, who are often (incorrectly) blamed for the introduction and spread of disease, represents an additional threat to social order. During crises, the combination of fear, anxiety, and mounting grievances contribute to scapegoating and can encourage violence against out-groups within society (e.g., Staub 1989). For these reasons, epidemics have often resulted in the stigmatization of religious, ethnic, or sexual minorities, particularly when the disease disproportionally affects those communities (Barrett and Brown 2008). Both observational and experimental evidence suggest that exposure to disease promotes exclusionary attitudes and increases mistrust of members of out-groups (Dutta and Rao 2015; Faulkner et al. 2004). Discrimination against Haitian immigrants and gay men in the US rose dramatically in the early years of the AIDS pandemic (Chavez, 2012; Snowden 2020), which in turn promoted activism and prompted demonstrations challenging restrictions targeting such communities (Lorch 1990). The scapegoating and stigmatization frequently associated with epidemics can also provoke unrest, inter-ethnic conflict, and violence against minorities and other marginalized communities (Price-Smith 2008, 20; Dutta and Rao 2015). The Black Death (1348-1351) unleashed waves of brutal mob violence in Europe as Jews were blamed for outbreaks of the plague (Cohn 2007; Jedwab, Johnson and Koyama 2019). More recently, inflammatory rhetoric that incorrectly blamed the spread of coronavirus in India on the country's Muslim community resulted in ethnic riots (Ellis-Peterson, 2020). This dynamic may also promote violence against refugees and immigrants or produce restrictions targeting these vulnerable populations (Braithwaite, Frith, and Ghosn 2020). Most countries have fully or partially closed their borders during the COVID-19 pandemic, and nearly half make no exception to asylum seekers (UNHCR 2020). This volatile combination of scapegoating, tightening border controls, and frustration among the communities upon which restrictions are imposed and prejudices are directed can rapidly evolve into unrest. For instance, the imposition COVID-related restrictions implemented by some host government exacerbated tensions among authorities, citizens, and the inhabitants of refugee camps, resulting in protests, riots, and clashes with police during the spring and summer of 2020 (Aljazeera 2020; Smith 2020; Ssuuna 2020).

In addition to generating grievances, epidemics can also expand opportunities for collective mobilization. Most directly, disease outbreaks often diminish the monitoring and sanctioning capabilities of state authorities. This occurs principally as a result of the detrimental impact of infectious disease on the preparedness, fighting effectiveness, and organizational competencies of security services (Bailey 2013; Enemark 2009; Peterson 2009). For example, during the early years of the American Revolution sporadic outbreaks of smallpox hindered recruitment, increased the rate of desertion, and reduced the fighting capacity of Colonial forces (Becker 2004). Similarly, influenza infection among US troops reportedly contributed to their poor performance in the Meuse-Argonne Offense in 1918 (Byerly 2005; Price-Smith 2008).

Disease outbreaks can affect domestic security forces in similarly adverse ways. Because police routinely serve as first responders and interact closely and frequently with the public, infection rates within the police forces are often relatively high (Jennings and Perez 2020; Laufs and Waseem 2020). Rising infection rates among members of the security services reduce the number of officers available to patrol the streets, monitor the actions of dissident groups, or respond to unrest when it occurs. In a similar manner, ensuring compliance with new pandemic restrictions (e.g., quarantines, curfews, travel restrictions, etc.) creates additional pressures on police and can strain their human capital and organizational capacity. Enforcement of these regulations often produces tensions between the police and the community, threatens public trust in the police, and reduces community cooperation with policing efforts (Laufs and Waseem 2020). These factors in turn increase the costs of monitoring and sanctions, thus potentially creating space of public resistance. Because declining repressive capacity represents a key political opportunity factor that facilitates dissent (Brockett 1991), epidemics may create new windows of opportunity for social unrest.

As the previous discussion highlights, several theoretical mechanisms potentially link the occurrence of disease epidemics and the incidence or rate of social unrest. The argument suggests that sustained outbreaks of communicable disease, as well as government responses to them, may incentivize or create conditions conducive to acts of resistance and dissent by the affected communities. We thus derive the following testable hypothesis:

H1: *Disease epidemics are associated with an increase in the prevalence of social unrest in the geographic areas in which they occur.*

Data and Methods

We evaluate this hypothesis by analyzing fine-grained, geo-located data on the presence of epidemics and prevalence of social unrest events (demonstrations and riots). We construct our sample by merging information on epidemics from the Center for Research on the Epidemiology of Disasters (CRED) Emergency Events Database (EM-DAT) International Disaster Database (CRED 2020) [4] and events data on social unrest activities from the Social Conflict Analysis Database (SCAD)

[4] To our knowledge, EM-DAT is the most reliable source of cross-national, geo-located information on epidemics currently available.

(Salehyan et al. 2012).[5] Because the information contained in both datasets are geo-referenced, we are able to examine the co-variation in disease outbreaks and dissent at a low level of geographic aggregation.

We organize our data at the level of the first-order administrative unit-year (state, district, commune, etc.). We use the administrative unit as the spatial unit for three reasons. Principally, the socio-political implications of epidemics are often observed at the local level. Additionally, the epidemics included in EM-DAT are tagged with the name of the geographic location (up to and including the first-order administrative level), the type of disease, dates of the epidemic outbreak, and total number of deaths and individuals affected by the epidemic. Finally, we prefer to use administrative units over grid squares because the former allow us to leverage the information inherent in political boundaries while the latter are strictly arbitrary geographic units that ignore important political, social, cultural, and topographical factors that often explain the way administrative unit boundaries are drawn.

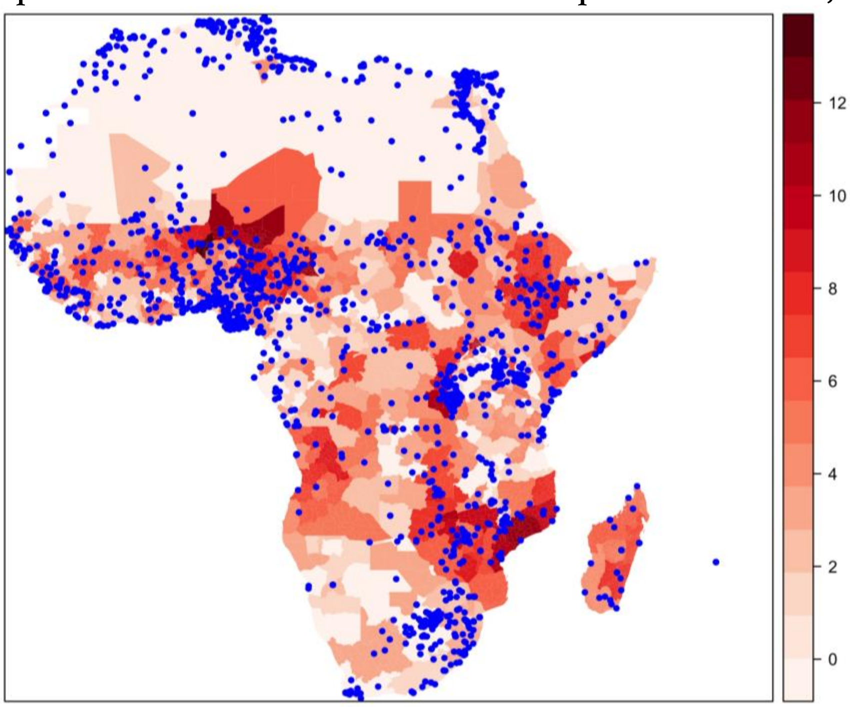
While EM-DAT includes qualitative information on the locations in which disease outbreaks occurred, the geographic reference provided does not always include the name of the first order administrative unit. Rather, EM-DAT often lists the name of the municipality, district, or other subnational unit place name. Consequently, the data require processing in order to aggregate the epidemics to the appropriate unit of analysis. In order to spatially join information on epidemics and social unrest at the first-order administrative level we first geocoded each epidemic in the EM-DAT dataset. This process required parsing the unique locations (e.g., village or cities names) for disease outbreaks in the data from a list of multiple locations and using dictionaries of place names to assign each epidemic to a first-order administrative region. Merging these two distinct datasets results in a pre-matched sample of 27,664 first-order administrative unit-years, representing events in 60 African

[5] Previously known as the *Social Conflict in Africa Database*.

and Latin American countries between 1990 and 2017.[6] As we discuss below, we also estimate the effect of epidemics on social unrest using a matched subset of 3,778 first-order administrative-year units.

A measure of social unrest constructed from information available in SCAD serves as the dependent variable in our analyses. *Social Unrest* represents a count of the total number of all demonstrations or riots that take place within a first-order administrative unit in a given year. We exclude events where the sub-national location is unspecified and where a first-order administrative unit cannot be assigned due to missing information.[7]

Figure 1: Spatial Distribution of Social Unrest and Epidemics in Africa, 1990-2017



Note: Blue points represent the location of a social unrest event using SCAD. Darker shaded first-order administrative units indicate a greater number of epidemic outbreaks using EM-DAT.

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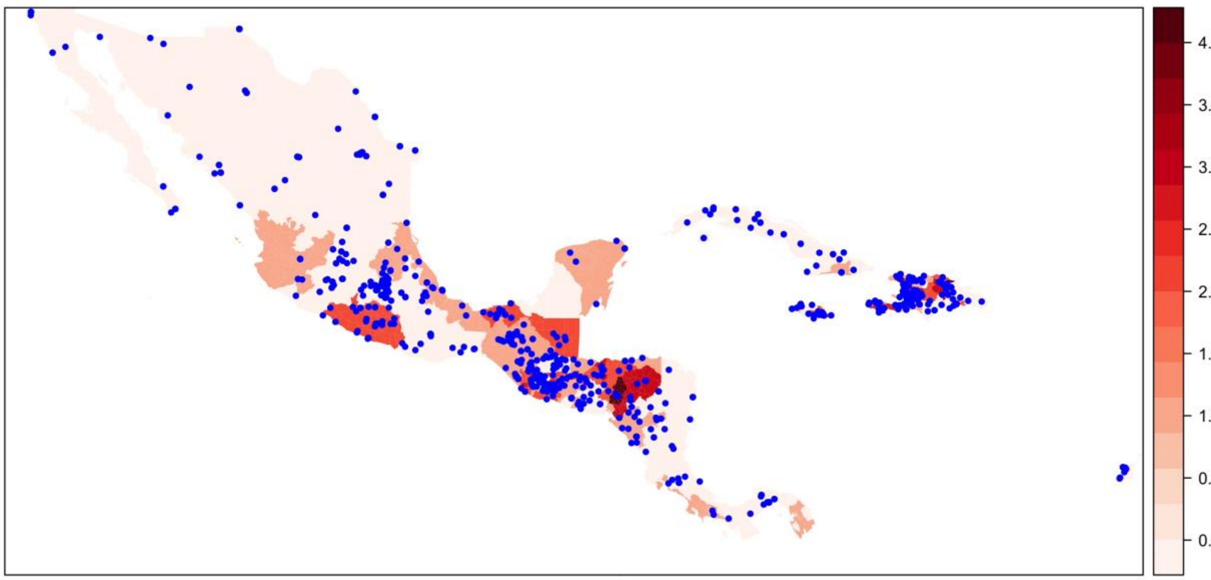
[6] Currently, *SCAD* coverage of Latin America consists of Mexico, Central America, and the Caribbean for the years in our sample.

[7] This includes a total of 2,798 events (12% of observations) consisting of 2,128 nationwide events, 592 events where the sub-national location is unknown, and 78 events where the latitude and longitude coordinates are not recognized by GIS software.

Figure 2: Spatial Distribution of Social Unrest and Epidemics in Latin America, 1990-2017



Note: Blue points represent the location of a social unrest event using SCAD. Darker shaded first-order administrative units indicate a greater number of epidemic outbreaks using EM-DAT.

The epidemics reported in EM-DAT comprise a variety of communicable diseases (e.g., cholera, Ebola, influenza, typhoid, and yellow fever). To be included in the dataset, a disease outbreak must meet at least one of the following conditions: more than 10 people died, more than 100 people were affected, the country's government declared of a state of emergency, or the country made a formal call for international assistance. Ideally, we would include an estimate of the severity of disease outbreak (e.g., annual count of deaths) as our primary predictor. Unfortunately, however, EM-DAT only provides a single, event-level measure of epidemic severity, making it impossible to map variations in severity to the first-order administrative unit. Consequently, in our analyses we rely on a binary variable that is able to capture subnational variation in the locations in which the epidemic occurred. The variable *Epidemic* is coded "1" if an epidemic took place in the given administrative unit during a year and "0" otherwise. Figure 1 and 2 displays the spatial distribution of all recorded social unrest events from 1990 to 2017, represented by blue points, and the total number of epidemic outbreaks within a first-order administration for the same period, with darker shades indicating a greater number of epidemics in a unit.

We account for a range of unit-specific and national level confounders that might influence the likelihood of social unrest in our models. First, we control for temporal and spatial dependence. To address possible temporal autocorrelation, we include a one-period lag of the dependent variable in all of our models (*Social Unrest*$_{t-1}$). We likewise create a spatially weighted version of our dependent variable, *Spatially Weighted Social Unrest,* using a row-standardized approach that divides each neighbor weight by the sum of all neighbor weights. We also account for state repression against dissident activities within the administrative unit in the prior year because repression and dissent are often reciprocal responses (*Repression*$_{t-1}$). This lagged binary measure is constructed from information in SCAD and indicates that state forces employed coercive violence against at least one dissent event in the previous year.

We control for the *Population Density* of the administrative unit under observation because greater densities of inhabitants facilitate collective action and is also linked to the spread of communicable disease. This log-transformed indicator is taken from the Center for International Earth Science Information Network (CIESIN) Gridded Population of the World dataset (CIESIN 2005). Poor development and poverty are also linked to both the likelihood of social unrest and prevalence of disease outbreaks. We therefore proxy unit-level wealth with the natural logarithm of total *Stable Night Light* for a first-order administrative unit in a given year using the DMSP-OLS Nighttime Lights Time Series dataset from the US Air Force Weather Agency (n.d.).[8] We control for *Conflict Intensity* due to the negative effect that civil conflict has on the security and living conditions within society, which can increase the likelihood of protests and violent riots. This indictor reflects

[8] We use stable night light data as a proxy for economic development because of the questionable reliability of sub-national GDP data (see Chen and Nordhaus 2011; Sutton et al. 2007).

the natural logarithm of the total number of civilian fatalities generated by armed conflict occurring in a first-order administrative unit in a given year using the Uppsala Conflict Data Program's (UCDP) Georeferenced Event Dataset (Ralph and Melander 2013). We also control for whether a politically excluded group resides within a first-order administrative unit within a given year to account for a potential increase in the number of social unrest events due to ethnically based grievances. *Politically Excluded Group* is a binary indicator denoting that at least one identified communal group resident in the unit was considered powerless, discriminated against or self-excluded from executive state power according to the Geo-referencing Ethnic Power Relations (Geo-EPR) dataset (Vogt, Bormann et al. 2015).

Country-year indicators include *Democracy, GDPpc, GDP Growth, Population, Federalism* and *HIV*. For our *Democracy* indicator we use Coppedge et al. (2021) Varieties of Democracy (V-Dem) electoral democracy measure. We control for a country's level of democracy as previous research indicates democratic countries are more likely to experience social unrest and better able to respond to disease outbreaks. Information on *GDP Growth, GDPpc*, and *Population* are taken from World Bank (2021) World Development Indicators Dataset (WDI). *GDP Growth* indicates the annual percentage of GDP growth. *GDPpc* and *Population* are log-transformed. *Federalism* is a dummy variable indicating whether or not the country has a federal system. We include this measure because of the greater control administrative units have in responding to public health crises in federal systems. We also account for the prevalence of *HIV* in a country because of the substantial burden the disease has inflicted on public health systems in many countries in Sub-Saharan Africa, which arguably impede a state's ability to effectively respond to new epidemics. We use the natural logarithm of the number of HIV-infected persons in a country in a given year using the UNAIDS (2020) dataset. We include a table of descriptive statics for the pre-matched sample in the appendices (Table A1).

To assess the linkages between epidemics and unrest, we use multi-level negative binomial models controlling for random and fixed effect to estimate the count of unrest events in an administrative district in a given year.[9] This method accounts for the hierarchical structure of our data which includes first-order administrative units nested within countries.[10] To reduce bias and improve our estimation of the effect of disease outbreaks on social unrest, we use Mahalanobis Distance Matching to create a matched sample of first-order administrative-year units (see King and Nielsen 2019). Observational studies are limited by their ability to accurately estimate causal effects due to the non-random assignment of observations to the treatment group (epidemic). To overcome this limitation, we create a matched sample of 3,778 first-order administrative unit-year units from our initial sample of 27,664 administrative unit-years that have similar distributions in the treatment and control group on observable confounders that are most likely to predict whether a first-order administrative unit experiences an epidemic in a given year. This preprocessing step ensures that those units in the treatment group (presence of epidemic) are more comparable to those units in the counterfactual control group (absence of epidemic). In light of previous findings that link disease outbreaks to units with larger populations, lower economic development, prevalence of conflict, and level of democracy we match cases based on *Population Density, Stable Night Light, Conflict Intensity (log), Democracy, Population (log) and GDPpc (log)*. We also include the variable *Physicians per 1000* in the matching stage because epidemics are influenced by the strength of a state's health infrastructure. This indicator reflects the estimated number of physicians per 1000 people for each country in a given year and comes from WDI (World Bank 2021). We include imbalance statistics for the pre- and post-matched sample in the appendices in Table A2. The overall multivariate imbalance L1

[9] We use a negative binomial model rather than Poisson because we find significant overdispersion in the data. The results are similar regardless of the distributional assumptions we make.

[10] We follow the approach recommended by Langford, Bentham and McDonald (1998).

decreases from 0.96 to 0.80 post-matching. To avoid post-treatment bias and ensure that matched observations have the same covariate history and are independent from one another, we match each treated unit to a control unit in the same time period using the average values for each matching variable three years prior to the treatment year.[11]

Results

The results of our analyses are reported in Table 1. Model 1-4 display the results for analyses of the relationship between epidemics and the aggregate number of *Social Unrest* events in a unit. Models 1 and 2 display results using the pre-matched sample. Model 3 and 4 display results for the post-matched sample. Models 1 and 3 represent baseline models that include only the independent variable and key administrative-level control variables. Model 2 and 4 constitute the full models and include our independent variable and all the control variables. The results provide support for our hypothesis. As shown in Models 1-4, the coefficient for *Epidemic* is positive and statistically significant.

Table 1: Multi-level Negative Binomial Regression Results

	Model 1	**Model 2**	**Model 3**	**Model 4**
	Social Unrest		*Social Unrest*	
	Pre-matched Sample		*Post-matched Sample*	
Administrative unit-level Variables				
Epidemic	0.17***	0.11**	0.26***	0.21***

[11] Here we follow the recommendations of Imai et al. (2020)

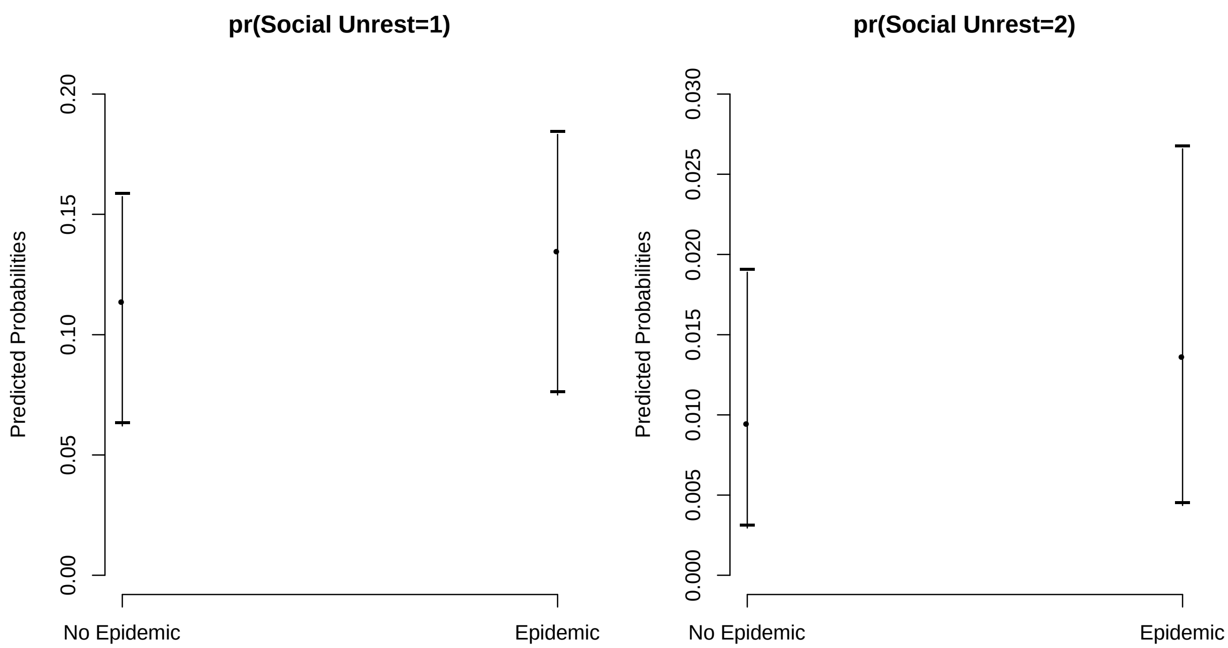
	(0.07)	(0.07)	(0.09)	(0.08)
Population Density‡	0.31***	0.19***	0.19***	0.09***
	(0.01)	(0.01)	(0.03)	(0.03)
Stable Night Lights‡	0.59***	0.49***	0.72***	0.59***
	(0.02)	(0.02)	(0.04)	(0.04)
Conflict Intensity‡	0.34***	0.28***	0.34***	0.26***
	(0.02)	(0.02)	(0.04)	(0.03)
Politically Excluded Group	-0.20***	-0.08*	-0.46***	-0.26***
	(0.05)	(0.06)	(0.12)	(0.11)
Spatially Weighted Lag Social Unrest		0.20***		0.10**
		(0.02)		(0.05)
Social Unrest$_{(t-1)}$		0.16***		0.16***
		(0.01)		(0.02)
Repression$_{(t-1)}$		0.69***		0.65***
		(0.06)		(0.11)
County-level Variables				
Democracy		0.36*		-0.30
		(0.22)		(0.47)
GDPpc‡		-0.39***		-0.58***
		(0.09)		(0.12)
GDP Growth		0.01***		-0.03***

		(0.00)		(0.01)
Population‡		-0.08		-0.30^{***}
		(0.09)		(0.11)
Federalism		-0.76^{*}		0.32
		(0.47)		(0.38)
HIV Cases‡		0.15^{***}		-0.00
		(0.04)		(0.06)
Constant	-8.86^{***}	-5.23^{***}	-8.97^{***}	1.82
	(0.23)	(1.44)	(0.42)	(1.87)
Observations	26880	23498	3778	3742
Log Likelihood	-13297.784	-11146.36	-2478.84	-2291.519
Pseudo R^2	26611.568	22326.72	4973.68	4617.039
Prob> X^2	26677.161	22463.82	5023.575	4722.904

Notes: Coefficients with standard errors in parentheses (one-tailed test). ****p*<0.01, ***p*<0.05, **p*<0.1 ‡=natural log.

In order to evaluate the substantive effects of our findings, we present the predicted probabilities of observing social unrest events in the presence of an epidemic versus its absence in Figure 3. We limit the presentation of predicted probabilities to *Social Unrest* using the post-matched sample because these are the outcomes for which our results are most robust. Because social unrest is a relatively rare event, the predicted probability of observing any unrest in a given unit-year is quite small; however, the *change* in the predicted probabilities for those units with an epidemic compared to those without is substantively large. Based on the predictions presented in the left-hand panel of Figure 3, the probability of observing of observing a single *Social Unrest* event is expected to increase from 11.4% to 13.5% when a first-order administrative unit experiences an epidemic outbreak. While absolute risk of unrest might initially appear quite low, the point estimates from the predictions reflect a 18% change in the probability of observing unrest. As illustrated in the right-hand panel of Figure 3, the presence of an epidemic increases the probability of observing two *Social Unrest* events from 0.9% to 1.4%, reflecting approximately a 44% change in risk of unrest. As these predictions illustrate, the substantive effect of epidemics on unrest is non-trivial.

Figure 3: Predicted Probabilities of Social Unrest Events



Note: Predicted probabilities (and 95% CIs) of observing one and two *Social Unrest* events respectively in first-order administrative units. Based on results from Model 4.

Discussion and Conclusion

Disease outbreaks can produce intense feelings of fear, anger, resentment, and alienation among the populations they effect. Anecdotal evidence from historical cases and contemporary media reports of the COVID-19 pandemic further suggest that epidemics may create conditions conducive to social unrest. We have therefore sought to identity the theoretical linkages between disease and dissent and to systematically evaluate the potential empirical relationship between the two events. We described several mechanisms through which unrest potentially emerges as a societal response to how governments tackle the spread of infectious diseases. First, anger and mistrust of the state's response to the epidemic may induce backlash and spur dissent. These responses occur because a state's mitigation efforts are lackluster or because the public perceives the policies as an intrusive overreach by local or national authorities. Unrest may also emerge from more indirect pathways, such as from grievances related to increased economic hardship, resource scarcity or scapegoating of specific groups. In either scenario, the odds of popular mobilization or acts of violent dissent are expected to increase. Our empirical results are consistent with these expectations.

Our argument and tentative results are both timely and relevant to scholars of international politics, global health researchers, and policies makers. The advent and rapid global diffusion of the novel coronavirus responsible for the COVID-19 pandemic has not only created a global public health crisis but also produced political and social turmoil in many states. As many of the examples in this article illustrate, the socio-political implications of the COVID-19 outbreak are often observed at the local level and in some circumstances include protests, demonstrations, riots, and state repression. Yet, as our results demonstrate, the relationship between epidemics and unrest is not unique to the contemporary COVID-19 pandemic. Given the high likelihood of witnessing future pandemics (Fan, Jameson and Summers 2018), our findings should serve as the basis for additional research in this area of inquiry. Most importantly, understanding the manner in which populations respond to disease outbreaks as well as how groups and individuals perceive the legitimacy and necessity of government efforts to control the disease are crucial factors in determining the success of pandemic responses. Where individuals remain suspicious of public health and political authorities, successful interventions are at greater risk of failure (Dionne 2018; Arriola and Grossman 2020). Moreover, where the disease or government responses exacerbate these sentiments, dissent and unrest are more likely. Such actions, even when undertaken in response to unfair, uneven, or illegitimate state policies, risk worsening the epidemic by increasing transmission and weakening already strained public health infrastructure.

Our findings suggest several areas for future research. First, scholars investigating this topic should explicitly explore and evaluate the influences of the specific mechanics we describe. For example, it is possible that community level fear and anxiety produced by a disease outbreak are sufficient conditions to provoke unrest. If this is the case, epidemics might be directly causally linked to riots and demonstrations. Yet, there is little reason to believe that fear alone lowers the barriers to collective action or facilitates mobilization. Rather, it is more likely that specific actions undertaken by government authorities serve as focal points for popular actions. In this sense, containment strategies and government policies intended to arrest the spread of the diseases are more likely to drive unrest. At the least, these strategies should serve to moderate or condition the underlying fears or tensions created by the disease. Scholars should therefore consider the effects of the specific policies adopted by governments during an epidemic on the probability or frequency of dissent activities. For example, rapid deliveries of medical supplies and expansions of the public health infrastructure may reassure the public and minimize dissent, while the imposition of quarantines or economic lockdowns are more likely to spur unrest.

Scholars should also more thoroughly map the complex casual sequences that potentially link epidemics and unrest. For instance, epidemics result in the adoption of specific public health policies. Such mitigation strategies might, in turn, contribute to economic upheaval and disruption (Sly 2020), which then acts as the proximate stimulus of unrest. Indeed, much of the economic cost resulting from the COVID-19 pandemic stems from lockdowns and stay-at-home orders rather than the disease itself. As such, the mechanisms we identify herein may interact to influence the likelihood of social unrest rather than representing independent causal factors. Some of these potential relationships include how epidemics and the economy interact with pre-existing social fault lines, which could exacerbate long-standing grievances within society. In particular, as the contemporary reporting on the COVID-19 pandemic suggest, the adverse consequences of epidemics are often most acute among populations that already suffer from poverty, exclusion, and marginalization. Disease outbreaks are likely to intensify these conditions, and thus the combination of rising mortality and morbidity among a distinct population, worsening economic conditions, and (often) uneven discriminatory government responses may jointly produce severe social discord and violent unrest.

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Appendices

Table A1: Descriptive Statistics of Independent and Control Variables

	N	Mean	SD	Min	Max
Administrative-level Variables					
Epidemic	27664	0.076	0.265	0	1
Population Density‡	26880	6.742	3.041	0	22.387
Stable Night Lights‡	27664	7.538	2.937	0	13.331
Conflict Intensity‡	27664	0.232	0.907	0	12.696
Politically Excluded Group	27664	0.58	0.494	0	1
Spatially Weighted Lag Social Unrest	27664	0.304	0.936	0	30.833
Social Unrest$_{(t-1)}$	26676	0.34	2.128	0	167
Repression$_{(t-1)}$	26676	0.088	0.283	0	1
Country-level Variables					
Democracy	27298	0.407	0.195	0.067	0.912
GDPPC‡	26452	7.339	1.035	5.102	9.745
GDP Growth	26417	3.854	6.166	-62.076	123.14
Population‡	27516	16.398	1.204	13.764	19.067
Federalism	27664	0.108	0.311	0	1
HIV Cases‡	26404	11.147	2.309	4.605	15.803

‡=natural log.

Table A2: Imbalance Statistics, Pre-matched and Post-matched Sample

Matching Variables	Mean Difference		L1	
	Pre-matched sample	*Post-matched sample*	*Pre-matched Sample*	*Post-matched Sample*
Population Density‡	-0.481	-0.115	0.113	0.05
Stable Night Lights‡	0.004	-0.129	0.05	0.03
Conflict Intensity‡	-0.148	-0.004	0.04	0.007
Democracy	-0.001	0	0	0
GDPPC‡	0.522	0.038	0.054	0.028
Population‡	-0.394	-0.055	0.051	0.056
Physicians per 1000	0.436	0.046	0.296	0.026

Note: Mean difference of matching variables between treatment and control group before and after Mahalanobis Distance Matching. Overall L1 multivariate imbalance measure decreases from 0.96 for the pre-matched sample to 0.80 for the post-matched sample. ‡=natural log.