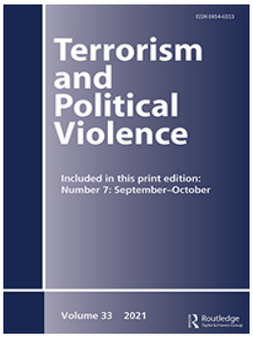

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Silver Lining? The Effects of Epidemics on Terrorist Groups

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ABSTRACT
In this study we examine the effects of epidemics on terrorist groups' attack capacities. We consider two theoretical relationships between epidemics and terrorist groups. By weakening government counterterrorism defenses and increasing popular grievances, epidemics can provide a strategic environment that is conducive to terrorist groups, enhancing their capacity to commit more attacks, yield higher casualties and launch more logistically complex attacks. Conversely, epidemics can impair the abilities of terrorist groups to launch attacks by eroding group capacity and access to resources while incentivizing the state to increase its surveillance and policing capabilities. We test these two competing arguments using a database of over 620 terrorist groups for the period of 1970 to 2016. Our findings support the second argument. Terrorist groups based or operating in countries experiencing more and more intense epidemics commit fewer attacks, generally produce fewer casualties, commit a lower ratio of transnational to domestic attacks and less frequently use multi-mode attacks. We conclude with a discussion of the implications of these findings.

KEYWORDS
Terrorism; terrorist groups; natural disasters; epidemics; terrorist tactics

As of mid-2021, the COVID-19 pandemic has infected over 180 million people worldwide and has killed almost 4 million. COVID has also significantly impacted the global economy, further threatening the wellbeing of people across the world. To add to these anxiety-inducing conditions, many observers, journalists, policy commentators, academics, and even some world leaders have warned that terrorist groups are positioned to exploit the chaos and instability brought about by the pandemic. United Nations Secretary-General António Guterres cautioned that while we cannot yet fully assess the situation, "we know that Islamic State in Iraq and the Levant (ISIL/Da'esh), Al-Qaida and their regional affiliates—as well as neo-Nazis, white supremacists and other hate groups—seek to exploit divisions, local conflicts, governance failures and grievances to advance their objectives."[1] Several experts have observed that the disruptions accompanying COVID enabled ISIS to increase its number of attacks in 2020, move more easily within and between Iraq and Syria, and strengthen its presence in West Africa and the Sahel region.[2]

Despite these observations, it remains unclear what effect the COVID-19 pandemic will have on terrorism. Some experts argue that the pandemic could lead to a broad increase in terrorism across the globe as governments divert resources away from counterterrorism initiatives, and as people's lives are seriously disrupted and grievances rise.[3] Such concerns are not without merit as a variety of types of large natural disasters and emergencies have been linked to increased rates of terrorism[4] and civil war

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onset (e.g.),[5] with similar theoretical justifications cited. Scholars note that multiple terrorist actors have mobilized to take advantage of the pandemic by tailoring their propaganda, online presence, recruitment efforts, and provision of relief to exploit the hardships of COVID.[6]

However, others have postulated that the COVID pandemic will actually decrease terrorism.[7] Note that COVID-related travel restrictions impair terrorist group movement and the flow of foreign fighters. Moreover, the salience of terrorist attacks will decrease as media coverage focuses more on COVID-19, robbing terrorist groups of the ability to use attacks to influence a wider audience. Finally, there is some evidence that in some cases global emergencies decrease the activity of militant organizations, as these cataclysmic events decrease the resources available to these groups.[8]

In this study, we examine the effects of epidemics like COVID-19 on terrorist actors. Using data on epidemics from 1970 to 2016, we evaluate these competing claims and find that epidemics are associated with a reduction in terrorist group capacity to commit attacks. We find that terrorist organizations based in countries experiencing significant epidemics suffer a decline in overall attacks, a potentially reduced ability to conduct more lethal attacks, and an impaired ability to conduct transnational attacks and employ a greater diversity of attack modes per year.

This study makes several contributions. First, to our knowledge, we provide the first systematic analysis of the relationship between epidemics and terrorism. Though previous work by[9] did find a positive relationship between other types of natural disasters and terrorism, it focused on climatological, geophysical, meteorological, and hydrological events rather than on epidemics. Second, our study underscores the importance of examining the effects of epidemics on terrorism as a specific form of political violence. Previous research by[10] (footnote 28) failed to find a statistically significant association between epidemics and civil war onset. Our findings show that the relationship works differently for terrorism. Finally, unlike previous studies, we examine the impact of epidemics on terrorist actors and their behavior. Previous work on severe disasters and terrorism has limited itself to the effects of disasters on counts of terrorist events within countries without a consideration of the behavior of terrorist groups. In the next section, we discuss how epidemics, as a disaster event, might be expected to increase or reduce terrorist activity.

Natural disasters and political violence

While little research has been conducted on how epidemics affect terrorism and terrorist organizations, there is an extensive body of literature that investigates how other forms of natural disasters, such as earthquakes, tsunamis or floods affect the onset, conduct, and resolution of violent conflict, including terrorist campaigns. This literature is germane to our study as experts have noted important parallels between epidemics and other natural disaster events. Epidemics and other forms of natural disasters all produce humanitarian catastrophes that can trigger severe social, political, economic and psychological/personal crises and challenges.[11] argue that like all other natural disasters, epidemics are at their core the product of societal vulnerabilities, which themselves are the result of political and economic policy decisions.[12]

From a legal and policy standpoint, epidemics are included as part of the repertoire of natural disasters. Disaster planning and management by state authorities includes epidemics along with, and usually in tandem with, other types of natural disasters.[13] More recently, in the United States, COVID-19 has been legally treated like other natural disasters for the purposes of business contract obligations.[14] Finally, the data source we use for our analyses classifies epidemics as simply a category of natural disasters, creating empirical and conceptual parallels.[15] Because of these parallels, we regard the broader literature on the effect of natural disasters on political violence to be relevant to our study.

The broader literature theorizes that natural disasters can both increase and reduce armed conflict within states. Scholars point to three ways in which natural disasters can be expected to drive conflict. First, natural disasters produce damages that adversely affect wellbeing within societies, drive social

group grievances and divisions, prompt conflict over scarce resources, and produce orphans that are vulnerable to rebel recruitment.[16] All of these consequences of natural disasters motivate conflict and provide strategic opportunities for armed actors. Second, scholars observe that governments frequently increase their use of repression in the wake of natural disasters, prompting political violence as a backlash.[17] Finally, natural disasters ravage state capacity, providing armed nonstate actors opportunities to increase their activities.[18]

Other research illustrates how natural disasters might reduce conflict activity within countries. For example, natural disasters can reduce the resources of nonstate armed actors thereby hampering their abilities to mobilize militants.[19] At the same time, during and after disasters, governments, foreign governments and international agencies often augment their presence in countries to address humanitarian needs.[20] argues that natural disasters increase incentives for governments to end existing conflicts and disputes so that they can concentrate their efforts and resources on disaster recovery.

Empirical evidence for these assertions is mixed. While multiple studies find a positive association between the occurrence of natural disasters and political violence, including terrorism,[21] other studies find that disasters reduce conflict, mostly by degrading rebel group resources.[22] Still other research finds that the effects of natural disasters on conflict are conditional on factors such as the type of natural disaster, economic development, state capacity, and regime type (e.g.[23]). Finally,[24] are unable to find a significant relationship between natural disasters and conflict at all.

Within this body of literature on disasters and political violence, there are some important gaps. First, as previously noted, most empirical studies have been conducted at the country or conflict-levels (for example),[25] obscuring important militant group-level dynamics. Those that do adopt a group-level focus typically examine individual groups or smaller sets of groups (for example).[26] Our study fills this gap by adopting a systematic cross-sectional time series analysis of the impact of epidemics on a sample of over 600 terrorist organizations world-wide.

Second and more importantly, the role of epidemics has been largely ignored in the literature on political violence and none of these studies examine the relationship between epidemics and terrorism.

Third, we note that it is crucial to study epidemics because they differ from other types of natural disasters more commonly examined by scholars in several important ways that have consequences for understanding the impact on political violence and terrorism. Epidemics are not usually rapid-onset disasters and do not usually destroy infrastructure. Importantly, as explained below, government relief efforts to combat epidemics are structured very differently than for other kinds of natural disasters. A focus on the impact of epidemics on terrorism is therefore needed.

Do epidemics increase terrorism?

Epidemics and grievances

Epidemics may increase terrorism by producing grievances that may motivate more terrorist activity. There are several potential components to the grievance argument. On the individual level, epidemics produce personal losses and sharpen individual frustrations, fears, and anxieties. In discussing the case of COVID-19,[27] Nel and Righarts 2008 argue that the pandemic has exacerbated these feelings and that this has aided the radicalization process by which individuals lose faith in the status quo and become more receptive to extremist viewpoints and actors. The authors observe that anti-government attitudes have soared during the pandemic. According to Ackerman and Peterson, many individuals perceive their governments to be inadequately and incompetently handling the crisis, while others view mandates like social distancing and masking as severe government overreach. The attitudes of the latter group have led to an increase in COVID-related conspiracy theories, some of which are being disseminated and exploited by violent extremist groups.

Second, epidemics can also exacerbate social inequalities which further fuels grievances that can be exploited by violent extremists.[28] Nel and Righards (2008) argue that during natural disasters, preexisting social inequalities are made more salient to the public, particularly if access to life-

sustaining resources becomes strained and government authorities fail to equally and efficiently distribute relief aid among social groups.[29] Furthermore,[30] argues that militant group recruitment will be more successful following natural disasters because an increasing number of vulnerable individuals will be looking for resources and protection. If epidemics and the government responses to epidemics worsen inequality or enhance social group discrimination and frustration, this may improve the environment for terrorist activity. An established body of research finds that social inequality and social group discrimination is associated with higher levels of terrorism (see).[31] In the context of epidemics, research by[32] suggests that terrorist groups like ISIS are liable to exploit the inequalities highlighted by, and stemming from, the COVID-19 pandemic to mobilize recruits.

Third, governments often increase repression following natural disasters in order to preempt dissident,[33] which can lead to more terrorism in response.[34] If during epidemics, governments tend to crack down and human rights violations increase, terrorism will become more likely (see, for example).[35]

Epidemics, opportunities, and incentives

Grievances caused by epidemics are not likely in and of themselves to be sufficient to increase terrorism. According to Nel and Righarts 2008,[36] the opportunities and incentives that arise from natural disasters are also crucial for providing an environment in which political violence can occur. Natural disasters frequently weaken the capacity of states to crack down on insurgent movements as governments are often forced to reallocate dwindling resources to relief efforts (e.g.[37]).

Facing similar resource scarcities due to COVID-19, governments have reallocated counterterrorism funds and security forces to address pandemic relief needs.[38] This suggests that during pandemics, state capacity to project force against terrorists may be diminished, thereby lowering the costs of committing acts of terrorism and incentivizing groups to attack hard targets that have been temporarily weakened.[39] Given that other research shows that diminished state capacity creates an environment in which terrorist groups can conduct more attacks (see),[40] we expect that epidemic-driven impairment of state capacity will similarly provide opportunities for terrorist groups to become more active.

Relatedly, the incentives to commit acts of terror are higher following natural disasters as the benefits are higher (access to scarce resources) and the costs are lower because of decreased state capacity.[41] Resources that are fought over because of natural disasters can include food, land, and government aid.[42] similarly detail a variety of ways in which the COVID-19 pandemic has increased the incentives and opportunities for terrorism.

Aside from the strategic opportunities epidemics may afford groups, public health disasters also allow armed extremist actors to build public support by providing social services. Of course, not all groups have the capacity to provide such services. However,[43] explain that during the COVID-19 pandemic, multiple armed Islamist groups have stepped in to provide COVID relief to local populations when governments have failed to do so. Employing experimental evidence,[44] show that providing social services not only increases the perceived legitimacy of insurgent movements, but offsets some of the reputational costs of killing civilians.

Finally, foreign aid to help combat epidemics might actually incentivize political violence.[45] Kikuta (2019) argues that groups will increase their violence following natural disasters if they perceive their authority over an area to be threatened by an increase in domestic and international authorities.[46] posits that after natural disasters, violent conflict can increase between governments and rebels fighting over resources used for reconstruction efforts. For instance, during an outbreak of Ebola in the Democratic Republic of the Congo (DRC) in 2019, Ebola treatment centers endured almost daily attacks by militants, significantly undermining the efforts of domestic and international actors to try to contain the spread of the disease.[47]

If the above arguments about the COVID-19 pandemic and other types of natural disasters are applicable to epidemics as a whole, then we should expect to see a positive association between these types of biological disasters and terrorism. Epidemics could increase grievances by increasing the health and economic vulnerabilities of individuals, anti-government sentiments, and existing inequalities. Reduced state capacity and the diversion of government funds to epidemic relief efforts lowers the costs of perpetrating terrorism and enables groups to increase their popularity by providing services that governments are unable to. The increased presence of domestic and international authorities might also further incentivize violence. These conditions should increase terrorism in countries as a whole as well as increase the activities and capabilities of individual terrorist groups. This leads us to our first set of hypotheses that:

H1a: Epidemics increase the capacity of terrorist groups to commit more attacks.

H1b: Epidemics increase the capacity of terrorist groups to commit higher casualty attacks.

H1c: Epidemics increase the capacity of terrorist groups to commit more logistically complex attacks.

Do epidemics limit terrorism?

Conversely, epidemics might adversely impact violent extremist actors. We theorize two ways that this might happen: by reducing terrorist organization capacity and by enhancing the capacity of the state to engage in counterterrorism.

Terrorist group capacity

Epidemics might actually make it more difficult for terrorist groups to operate. Terrorist groups in many countries have had difficulty moving around and operating during the COVID-19 pandemic because of travel restrictions put in places by governments; similarly, foreign fighters have found their mobility reduced.[48] In addition to travel restrictions, extensive movement in areas suffering from epidemics can be unsafe. While other types of natural disasters can destroy infrastructure in ways that can make travel difficult, epidemics make all movement risky. Terrorist groups can adapt to challenges like destroyed roads or bridges by finding alternative routes. Epidemics, however, can really only be avoided through demobilization and sheltering in place. While terrorists with apocalyptic or millenarian ideologies may not care about these risks,[49] most militant organizations are likely to be sensitive to the risks and associated costs to group capacity posed by operating during a pandemic.

Furthermore, pandemics might impoverish the target environment for terrorist organizations. Public health measures enacted during pandemics often require that people self-isolate and avoid public gatherings. This reduces target availability and particularly impedes indiscriminate high-casualty events that would hit public venues where people congregate.

These constraints, coupled with economic downturns from epidemics, might also reduce resources available to terrorist organizations. As noted above, scholars have argued natural disasters can dampen rebel recruitment efforts by depleting the resources these groups need to attract and filter out recruits.[50] Similarly, epidemics can deplete terrorist group resources, making it more difficult to recruit combatants and support existing ones. Epidemics also tax the attention and focus terrorist groups rely upon from members and constituents.[51] anticipate that terrorist movements will have difficulty attracting recruits and motivating their cadres during the COVID-19 pandemic because people have their attention focused on the pandemic. These factors combined together could result in a reduction in terrorist violence.

State capacity

Epidemics may also change the security environment in ways that empower the monitoring and control capabilities of the state to the detriment of terrorist actors. This is due, in part, to features of epidemics that are distinct from other types of natural disasters. While all types of natural disasters can place strain on governments—possibly forcing them to divert counterterrorism and counterinsurgency funds to relief efforts[52]—epidemics are distinct because they typically do not destroy infrastructure within countries, leaving government control capacity more intact. This has important implications for armed non-state actors. Countries affected by natural disasters that destroy infrastructure find their ability to monitor and neutralize militants severely limited.[53] illustrate this in the case of the 1976 earthquake during the Guatemalan civil war which impaired the government's ability to counter rebel forces in areas of the country where the earthquake had devastated infrastructure and, by extension, government authority and ability to project power.

Epidemics, like other slow onset natural disasters, typically do not produce physical damage to all or parts of countries in ways that reduce the government's ability to exert authority and project force. Indeed, we argue that epidemics are likely to have the opposite effect. To combat epidemics and to protect public health, governments frequently mobilize resources, including foreign assistance, to track the progress of public health threats, monitor the population for disease, identify, treat and quarantine infected persons and the people they have come into contact with. During epidemics, governments construct intrusive surveillance regimes, close borders and control the domestic and international movement of people. They mobilize reserve police and military forces, force the closure of businesses and other private sector spaces and sometimes impose public curfews. Governments may also impose lockdowns on subnational regions affected by epidemics, exerting greater control over their domestic territory. All of these efforts have been strategies employed by governments fighting COVID-19 and the transmission of pathogens in previous pandemics, such as the Ebola outbreak in 2014.[54]

These efforts produce, as a byproduct, a disadvantageous and perilous strategic environment for terrorist actors. Some experts have noted the similarities between government contact tracing during epidemics and certain counterterrorism tools.[55] The case of Israel during the COVID-19 pandemic provides a useful example. During the pandemic, the Israel Security Agency (ISA) was employed to oversee a national movement and contact tracing regime using citizens' cell phones. This gave the Israeli government enhanced ability to monitor the movements of citizens and residents. When infections declined in Israel, the ISA continued to monitor the population through their cell phones.[56] Israel continues to utilize counterterrorism assets to aid its contact tracing efforts during COVID.[57] The net impact of ramped-up efforts to preserve public health during pandemics is a reduced opportunity for militant groups to engage in terrorist activities.

The silver lining

Contrary to the fears of many observers, the above discussion highlights how epidemics might actually serve to reduce terrorism. Thus, we should expect to observe both fewer terrorist attacks in countries suffering from epidemics as well as the reduction in the capacity of terrorist groups operating in these places. Therefore we propose the hypotheses that:

H2a: Epidemics decrease the capacity of terrorist groups to commit more attacks.

H2b: Epidemics decrease the capacity of terrorist groups to commit higher casualty attacks.

H2c: Epidemics decrease the capacity of terrorist groups to commit more logistically complex attacks.

Research design

To test these competing hypotheses, we conduct a series of regression analyses on a sample of 623 to 634 terrorist groups for the period 1970 to 2016. Our unit of analysis is the terrorist group-year and our estimations include around 7,700 observations each. Our primary data source for the analyses is a new cross-sectional time series terrorist group database titled the Extended Data on Terrorist Groups or "EDTG."[58] Our research design assesses the impact of epidemics on four measures of terrorist group capacity: annual attacks by terrorist groups; annual casualties produced by attacks by terrorist groups; group ability to commit a high ratio of transnational attacks to domestic attacks; and ability to commit multi-mode attacks. These four indicators represent a variety of measures of terrorist group capacity, from the amount and intensity of violence they are able to project to the complexity and logistical difficulty of the attacks they can deploy.

Dependent variables

The first dependent variable captures terrorist group ability to launch attacks (*H1a* and *H2a*), the most basic indicator of group capacity. It is a group-year annual count of all attacks perpetrated by the group derived from the "total_atks" variable in EDTG. This variable ranges from zero—in around 66 percent of the observations terrorist groups do not commit a single attack for the year—to 1,132, the number of attacks launched by the Islamic State of Iraq and the Levant in 2016. Because the total attacks variable is a count, we use a negative binomial estimation technique to analyze it (see).[59]

The second dependent variable is a group-year annual count of the number of casualties yielded by terrorist attacks by the group. This allows us to measure the effects of epidemics on groups' abilities to launch higher intensity attacks (*H1b* and *H2b)*. Casualties include persons who are killed or wounded by an attack. This variable is derived from the "total_casualties" indicator in the EDTG. Total annual casualties vary widely in the sample and exhibit a skewed distribution. In around 75 percent of the group-year observations in the data terrorist groups killed or wounded zero people for the year. In around 86 percent of the observations, groups produced 10 or fewer casualties for the year. High-casualty group-years are very rare. In only around seven percent of observations did groups kill or wound more than 50 people in a year. In a little over 1 percent of group-year observations, attacks by groups produced 500 or more casualties annually. Because the distribution of total casualties is skewed, we conducted a robustness check using a dichotomous variable coded 1 for all group-year observations featuring at least one terrorism casualty. This test reproduces the main findings of the study.[60]

The third and fourth dependent variables capture the impact of epidemics on terrorist group capacity to attack more difficult targets using more complex and challenging logistics (*H1c* and *H2c)*. The first measure of logistical complexity is the terrorist group share of transnational attacks per year vis-à-vis its domestic attacks. This variable, derived from the "shr_trans" variable in EDTG, is the percentage of terrorist attacks either perpetrated outside of the group's main country of operation or perpetrated against foreign nationals within the groups' main country of operation. Because transnational attacks tend to be more complex and difficult to carry out relative to domestic attacks, they require increased group capacity.

The transnational attacks share variable is a ratio of transnational attacks to domestic attacks. It ranges from zero, indicating a group that committed only domestic attacks, or no attacks, during that year, to one, indicating a group committed only transnational attacks during that year. In most years in the sample, this variable takes the value of zero. Around 85 percent of the observations in the data are coded zero for share transnational attacks. However, in around five percent of observations, groups committed exclusively transnational attacks for the year. Because the terrorist group share of transnational attacks per year variable is a ratio measure with upper and lower bounds of one and zero, we analyze it using a Tobit estimation technique (see).[61]

The fourth and final dependent variable we use, group attack diversity, also helps to capture the logistical sophistication of terrorist groups. Our assumption is that groups that launch attacks using a variety of tactics over the course of a year possess more equipment and personnel with a wider range of skill sets than groups capable of only launching one type of attack. Groups exhibiting a wide diversity of attack tactics and modes likely have higher capacity. We derive this variable from the EDTG using the "diversity" indicator. The diversity indicator measures the diversity of attack tactics or modes used by terrorist groups over the course of the year. Scholars have previously used attack diversity as an indicator of group capacity. For example,[62] demonstrate that terrorist organizations that use a greater diversity of attack modes have greater capacity and are more enduring, specifically because doing so makes it more difficult for governments to successfully formulate and execute counterterrorism responses. Tactical diversity is indicative of terrorists possessing sufficient resources to adapt to government counterterrorism measures.[63]

In building this variable,[64] considered nine different possible attack modes[65] and calculated a Herfindahl index ranging from zero, indicating that a group used only one, or no, mode of attack during the year, to .825, indicating that the group used a wide diversity of attack modes during the year. Importantly, this variable does not capture changes in tactics over time. Instead, it measures how diverse groups' tactical portfolios are. Thus, higher values of this variable are unlikely to capture many instances of groups shifting to reliance on other types of attacks because of their inability to combat government forces. Rather, this variable indicates the ability of groups to plan and execute many types of attacks.

High levels of attack diversity are uncommon in the sample and most groups stick to only one mode of attack in a year: around 84 percent of the observations feature the use of only one, or no, attack mode by groups. Like the terrorist group share of transnational attacks, the group attack diversity measure is bounded at zero and .825. We therefore use a Tobit estimation technique when analyzing it.

Independent variables

We employ two different independent variables to assess the effects of epidemics on terrorist group capacity. One variable is an annual count of epidemics[66] occurring within the country where the terrorist group is primarily based or active and the other is a logged count of the number of people affected by the epidemic.[67] The EDTG database codes a base country for each terrorist movement ("base"). Around 76 percent of terrorist groups in the EDTG are coded as having only one country as a base while the remaining 24 percent are coded as having more than one country as a base. For the 23 percent of multi-country-base groups in EDTG, we conducted an investigation to identify one country that could be considered the primary base or the country where the group was primarily active for each year. To do this, we consulted a variety of sources[68] to determine where the leadership of the group was located or the country where the majority of the group's attacks or activities occurred.

Using data from Emergency Events (EM-DAT) International Disaster Database published by the Centre for Research on the Epidemiology of Disasters (CRED)[69] we separated into counts incidents of epidemics, a subset of natural disasters classified as "biological disasters" and assigned them to the base country of each terrorist group.

Epidemics are rare in the sample. For around 78 percent of the terrorist group-year observations no epidemics occurred. For around 12 percent of observations, only one epidemic occurred. For nearly five percent of the observations, two epidemics occurred. The remaining five percent of observations exhibited three of more epidemics. In one country, the Democratic Republic of the Congo in 2002, there were 11 epidemics. The count of epidemics occurring in the base country of a terrorist movement is the first independent variable of our study.

However, even within the subset of countries experiencing epidemics, some suffer much worse than others. For instance, among countries in our sample suffering from epidemics, some experience no deaths related to the disaster (all infected individuals survived), while others experience thousands of

deaths related to the epidemic. Relatedly, while only a handful of people are affected by some epidemics, the EM-DAT data indicate that some epidemics affect millions of people. In their study on the effects of natural disasters on government repression,[70] employ the logged number of people affected by rapid-onset natural disasters to account for variation in severity among countries experiencing natural disasters. Like Wood and Wright, we take the natural log of the number of people affected because the distribution of the untransformed variable is highly skewed. As robustness checks, we also examined the impact of the logged count of deaths due to epidemics, and present the results in the online appendix. For both the raw count of people affected and killed, we treat non-epidemic years as zero; we treat country-years with ongoing epidemics with missing values on either indicator as missing in our country-year aggregation.

Controls

In all of our tests we also include a set of terrorist group and base country control variables. These include a measure of the size of the terrorist group. Larger groups are better able to commit more attacks, yield more casualties and commit a higher share of transnational attacks and attacks utilizing a diversity of modes. Groups with larger memberships might also be more durable and therefore better able to continue their operations in the face of exogenous challenges like epidemics. Larger groups might also find it easier to replace lost members and cadres who have succumbed to illness during epidemics. Because the EDTG database "size" measure is not available for all groups, we created a dichotomous measure we titled "Group Size: Large" that is coded one for groups that are in the highest ordinal category for group peak size—10,000 members or more—and coded all other groups with a zero. We noted that the majority that were not assigned a group "size" in EDTG were smaller, less institutionalized and generally shorter lived groups. This gave us confidence that the terrorist groups coded with one in our "Group Size: Large" variable represent the largest groups in our sample with the highest group capacity. As a check, however, we reran all models without our "Group Size: Large" variable and found that these reproduce the main findings of the study.[71]

We control for the ideological orientation of the terr orist group. To do this we use three dichotomous variables from EDTG to indicate whether the group has a left-wing ideology ("left"), a nationalist-separatist ("nat") ideology or a right-wing ideology ("right"). We exclude the religious ideological category ("rel") to serve as the reference category. In our main models, we do not include variables available in the EDTG measuring the goal of the group.[72] However, we do include them in robustness checks and do not find them to change the main results.[73]

We include a dichotomous control variable coded 1 for terrorist groups that have bases in more than one country. We derived this variable from the EDTG database base country ("base") indicator by simply coding a 1 for every group that has multiple countries listed as bases. Around 24 percent of groups-year observations in our sample are coded 1 for multi-base terrorist groups. It is crucial to control for whether or not a group has multiple bases. This allows us to hold constant a baseline measure of terrorist group strength when evaluating the impact of epidemics on group behavior and capacity to commit attacks abroad or diverse attacks.

Scholars have argued that the presence of multiple, competing terrorist movements within a conflict prompts terrorist groups to step up the amount and intensity of their attack behavior.[74] Because of this, we also control for the logged number of other groups in the same base country. This variable is taken from.[75]

We hold constant the wider environment in which these groups operate. Because the level of economic development in the base country where terrorist groups operate can affect group attack behavior by producing or ameliorating grievances, or providing the state resources to deploy for counterterrorism, we control for the natural log of the base country gross domestic product. Our source for this variable is derived from the United Nations National Accounts database and we measure it using a base-10 natural log.[76] More populous countries might provide advantages to

terrorist movements, as countries with larger populations present more challenging surveillance and policing challenges for state officials. We therefore include a natural logged measure of the national population of the base country.

The political regime type of the base country can also affect terrorist group behaviors. Democratic countries may provide a more hospitable environment for terrorist organizations by restricting the executive. Nondemocratic countries, on the other hand, might fuel terrorist groups by increasing popular grievances and closing nonviolent means to redress those grievances. We therefore also control for regime type by including the Polity 2 measure derived from the Polity IV database.[77] This index ranges from -10, indicating a complete dictatorship, to +10, indicating a complete democracy. A wide range of political regime types are present in our sample. However, the median country registers between a 5 and 6 on the Polity 2 scale, indicating that it is on the borderline between a democratic regime and a hybrid democracy or anocracy.

We control for whether or not the base country is experiencing an intrastate conflict using data from the UCDP/PRIO Armed Conflict dataset.[78] This is important because terrorist activity has been found to flourish in countries experiencing civil wars (see).[79] The intrastate war variable ranges from zero, indicating the absence of an intrastate war, to 10, indicating a very high intensity civil war is occurring. In our sample, 47.7 percent of the group-year observations—a plurality—featured no detectable intrastate or civil wars while around 39 percent featured an intrastate war with a relatively low level of intensity, measured as a 1 to 3 on the UCDP/PRIO intensity scale for intrastate conflicts.

Finally, as previously noted, many terrorist movements provide social services to their communities. These social services, which frequently include health services, are used by terrorist organizations to recruit and retain supporters and members and to boost their reputations among constituents. In theory, they may also affect how well a terrorist movement weathers during public health crises. The EDTG does include a dichotomous variable, "public_service," that is coded 1 for terrorist groups that provide social services. However, it is available only for slightly more than half of the observations in the database. Including it in the main models dramatically reduces, and potentially alters, the sample in our analyses. In our main results, we do not include the social services provision indicator in the estimations. However, as a robustness check we reevaluated all of our estimations with social/public services as a control, using the "public_service" indicator in EDTG, and these models produced the same result as those found in the main analyses.[80]

Descriptive statistics for all variables used in the analysis can be found in Appendix Table A1.

Results

The results of our analyses with our two primary independent variables—the count of epidemics and logged total people affected—are summarized in Tables 1 and 2, respectively. They support our second set of hypotheses. Terrorist groups in countries experiencing more and worse epidemics do commit fewer attacks, produce fewer casualties from attacks and experience degradation of their ability to commit a larger relative share of transnational attacks and more complex multi-mode attacks.

In model 1 in Table 1, terrorist groups based in countries experiencing epidemics are found to commit fewer total attacks. Post-estimation marginal effects simulations predict that each epidemic reduces group attacks by around .895 fewer attacks per year. We find in model 2 that epidemics prompt terrorist groups in affected countries to commit attacks that yield fewer casualties. Marginal effects simulations project that for each epidemic experienced by a country, terrorist groups based in that country produce 3.164 fewer persons killed or wounded per year. In model 3 we found that epidemics also significantly reduce the share of transnational attacks committed per year by terrorist groups. The coefficient[81] in model 3 indicates that for each epidemic affecting the base country of a group, it reduces its share of transnational attacks by around 8.04 percent for the year. Likewise, we find in model 4 that epidemics significantly reduce the diversity of modes of attacks by groups. Each

Table 1. The effects of epidemics on terrorist groups.

	[1]	[2]	[3]	[4]
	Number of Attacks by Groups	Number of Casualties from Attacks by Groups	Group Transnational Attack Share	Group Attack Mode Diversity
Base Country: Number of Epidemics	−0.242***	−0.177**	−0.08*	−0.077***
	(0.059)	(0.063)	(0.03)	(0.020)
Group Size: Large	1.521***	1.899***	0.30*	0.404**
	(0.356)	(0.340)	(0.15)	(0.124)
Group Ideology: Left	−0.268	−1.556**	0.08	0.008
	(0.406)	(0.499)	(0.16)	(0.111)
Group Ideology Nationalist-Separatist	−0.777**	−1.732***	−0.02	−0.114
	(0.296)	(0.343)	(0.15)	(0.095)
Group Ideology: Right	−1.348*	−2.122**	−0.05	−0.254
	(0.803)	(0.787)	(0.31)	(0.230)
Group has Multiple Bases	−0.199	0.271	0.07	0.006
	(0.276)	(0.313)	(0.13)	(0.094)
Log Number of Competitors	−0.189	−0.325*	−0.24***	−0.071*
	(0.157)	(0.174)	(0.05)	(0.040)
Base Country: Log GDP per capita	0.104	−0.118	0.11*	0.012
	(0.095)	(0.120)	(0.04)	(0.029)
Base Country: Log Population	−0.148	−0.230*	−0.08*	−0.033
	(0.112)	(0.112)	(0.04)	(0.027)
Base Country: Polity Score	0.046*	0.018	0.01	0.006
	(0.020)	(0.022)	(0.01)	(0.007)
Base Country: Intrastate Conflict	0.079	0.239***	0.05	0.056**
	(0.055)	(0.067)	(0.03)	(0.018)
Constant	2.153***	9.329***	1.32***	−0.165
	(0.066)	(2.463)	(0.87)	(0.024)
Observations	7,763	7,671	7,716	7,763
Robust standard errors in parentheses				

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.1$.

Table 2. The effects of epidemic intensity on terrorist groups.

	[5]	[6]	[7]	[8]
	Number of Attacks by Groups	Number of Casualties from Attacks by Groups	Group Transnational Attack Share	Group Attack Mode Diversity
Base Country: Logged Total Affected by Epidemics	−0.041*	−0.022	−0.02*	−0.024**
	(0.019)	(0.024)	(0.01)	(0.008)
Group Size: Large	1.615***	1.959***	0.32*	0.416***
	(0.366)	(0.329)	(0.16)	(0.126)
Group Ideology: Left	−0.205	−1.613**	0.11	0.045
	(0.419)	(0.500)	(0.16)	(0.110)
Group Ideology Nationalist-Separatist	−0.754*	−1.780***	−0.01	−0.086
	(0.306)	(0.363)	(0.15)	(0.095)
Group Ideology: Right	−1.192	−2.094*	−0.00	−0.202
	(0.865)	(0.956)	(0.31)	(0.236)
Group has Multiple Bases	−0.262	0.177	0.07	−0.008
	(0.288)	(0.332)	(0.13)	(0.096)
Log Number of Competitors	−0.163	−0.358*	−0.24***	−0.071*
	(0.168)	(0.192)	(0.05)	(0.039)
Base Country: Log GDP per capita	0.125	−0.112	0.12**	0.019
	(0.101)	(0.126)	(0.05)	(0.029)
Base Country: Log Population	−0.159	−0.251*	−0.08*	−0.035
	(0.110)	(0.107)	(0.04)	(0.027)
Base Country: Polity Score	0.046*	0.031	0.01	0.006
	(0.021)	(0.026)	(0.01)	(0.007)
Base Country: Intrastate Conflict	0.058	0.250***	0.04	0.056**
	(0.058)	(0.074)	(0.03)	(0.018)
Constant	3.669	9.672***	−0.60	0.790***
	(2.240)	(0.069)	(0.11)	(0.024)
Observations	7,335	7,248	7,289	7,335

Robust standard errors in parentheses.
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.1$.

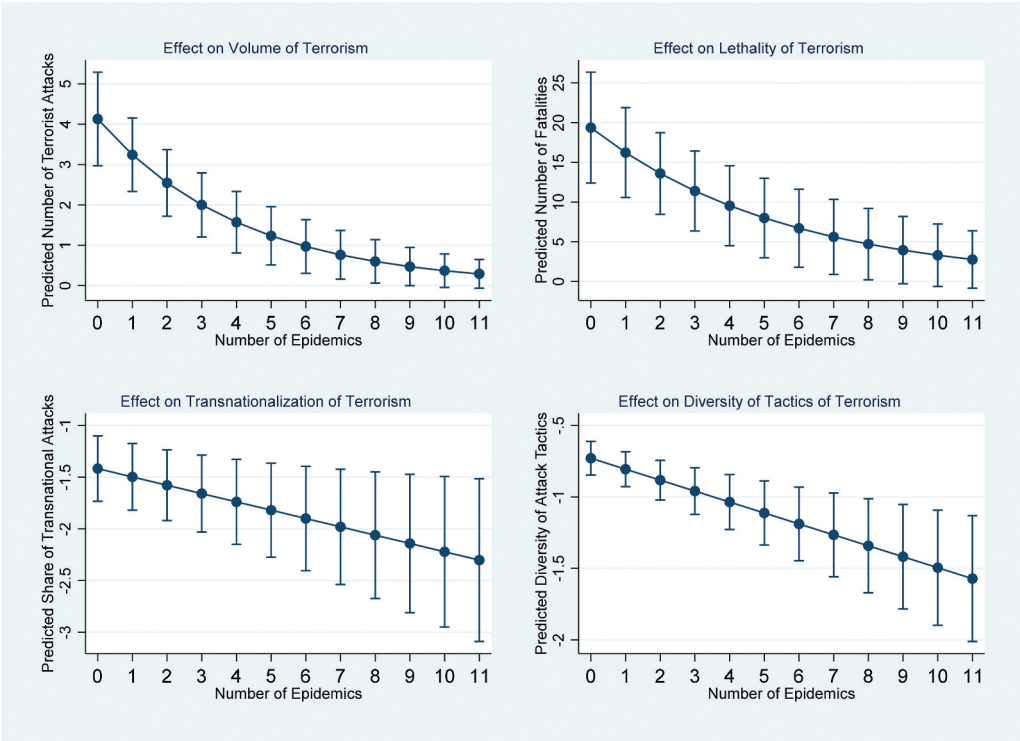

Figure 1. Marginal effects of the number of epidemics on the predicted number of attacks, casualties, share of transnational attacks, and attack diversity by groups. Results are based on Table 1.

epidemic prompts terrorist groups in affected countries to reduce their attack diversity index by around 7.66 percent. Figure 1 graphs the substantive effects of these findings, presenting a downward slope for all four indicators.

In Table 1 only one of the control variables is found to be consistently significant across the estimations. Large terrorist groups are found to commit more total attacks,[82] yield more casualties,[83] have a higher share of transnational attacks,[84] and use a higher diversity of modes of attack.[85] The remaining controls are not consistently significant across the models.

In an effort to determine the effects of magnitude of epidemics, Table 2 replicates the results using the logged total people affected. For the most part, while smaller in substantive effects, the results mirror Table 1, lending further confidence for our second set of hypotheses (H2a, H2b and H2c), that epidemics blunt the volume of terrorism and hamper the transnationalization and diversity of attacks. Only the coefficient on casualties, in model 6, falls below conventional levels of significance but produces a negative effect on the lethality of terrorism. Turning to the Tobit models in models 7 and 8, the coefficients inform us that a unit increase in the logged count of people affected decreases the share of transnational attacks by approximately 4.39 percent for the year, and the diversity of attacks by about, 4.05 percent. The substantive results of these estimations are graphed in Figure 2.

The supplementary appendix presents a battery of sensitivity checks, evaluating the effects of epidemic intensity through an alternate indicator (Table A2), and controlling for group goals (Table A3) and social service provision (Table A3).

In short, when factoring in the severity of epidemics, the results are relatively modest but sound the same note: epidemics blunt both the volume of terrorism and the sophistication and savvy of groups.

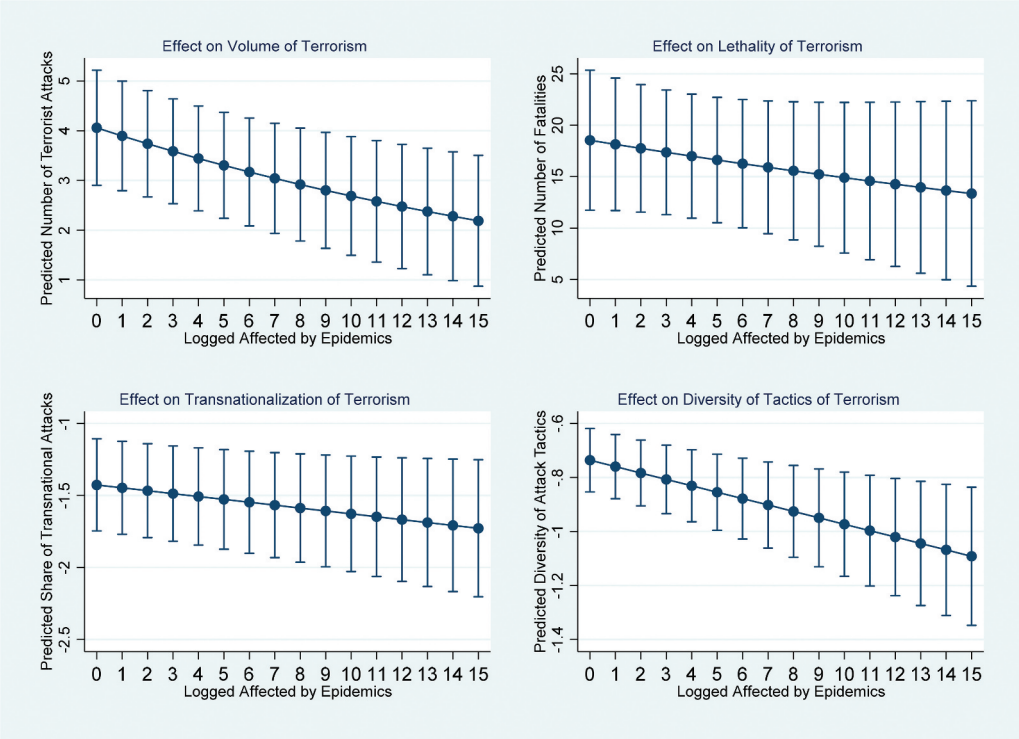

Figure 2. Marginal effects of epidemic intensity on the predicted number of attacks, casualties, share of transnational attacks, and attack diversity by groups. Results are based on Table 2.

Conclusion

Despite growing concern that the COVID-19 pandemic will lead to a surge in terrorism, we do not find evidence that epidemics in general increase the prevalence of terrorism. In fact, our results indicate that epidemics reduce the number of attacks terrorist groups launch, reduce terrorist casualties by groups, reduce the ratio of transnational to domestic attacks by groups and prompt groups to launch lower complexity attacks.

Our study is a first cut that leaves open several promising avenues for future investigation. An obvious future direction would be to tease out how the mechanisms discussed in our theory section undercut terrorist tactics and lethality. We surmise that epidemics strengthen state policing, surveillance, and monitoring capacities, by prompting governments to beef up existing frameworks for conducting reconnaissance and governance. By doing so, epidemics reinforce states' control over their territories and population, shrinking opportunities for terrorist recruitment and planning.

An alternative mechanism is that biological disasters hamper internal and trans-border mobility for militant actors. Plausibly, either or both of these mechanisms may be present, given epidemics, but may relate to the capabilities of groups in different ways. We may imagine, for instance, that increased state capacity disrupts logistical operations, preventing domestic recruitment, and impeding complex operations necessary to mount diverse attacks. Barriers to mobility more directly block international recruitment and dampen transnational attacks. These mechanisms may also have variegated effects on different types of groups. Those with ambitions to go transnational and rely on foreign militants are directly hurt by restrictions on mobility. Future research could investigate this.

A second line of inquiry would differentiate between the short-term and long-term effects of epidemics. In our sample, only a small portion of countries suffered multiple epidemics in a given year; and, most epidemics were annual events. However, epidemics may have enduring ramifications that extend beyond the calendar year, even if the biological event lasts one year. The effects of the COVID-19 pandemic on terrorism, for example, can be disaggregated into waves, with short-term impacts likely to be felt during the current initial outbreak, medium-term impacts felt between the conclusion of the first wave and the attainment of widespread immunity, and long-term impacts manifesting for several years after COVID-19 has been vanquished.[86]

Our paper sheds light on the short-term effects and presents the silver lining of the pandemic. Unfortunately, however, the medium to longer term news may not be as sanguine, especially if we consider the economic fallout resulting from the pandemic. As COVID continues, analysts warn that, similar to climate change, the pandemic can function as an "adverse force-multiplier," compounding existing challenges with acute debilitating effects, especially on states such as Libya and Yemen that are already at the brink of state failure.[87] Skyrocketing unemployment and diminishing purchasing power of citizens could produce strong grievances that fuel further radicalization. Coupled with a bulge of disaffected youth, these conditions are ripe for exploitation by extremist groups. Counter-terrorism expert William Braniff drives this point home, saying "Add the fallout from high unemployment and the re-closing of states and businesses that had been reopening—all within this political pressure-cooker," creating a tinderbox for violent expressions of grievances.[88] In addition, in the longer-term, terrorists' diligent efforts to radicalize and recruit may bear fruit. Likewise, pro-social efforts such as public goods provision may pay dividends down the line, particularly given mounting public disillusionment with their governments' handling of the disaster.

Finally, our focus has been on conventional attacks. While a portion of our findings demonstrate that epidemics do not promote more complex or diverse attack modalities, this does not necessarily entail that epidemics may not precipitate innovation on the part of terrorist groups. Indeed, other scholars present an alarming prospect that given the severe disruption caused so far by COVID-19, more entrepreneurial terrorist groups might become more interested in using biological attacks.[89] Seeing that a viral event can bring even advanced democracies to heel, groups may be drawn to the idea of weaponizing a biological agent. It would be useful for scholars to investigate whether epidemics catalyze violent groups to add unconventional weapons to their arsenal.[90,91,92,93,94,95]

Disclosure statement

No potential conflict of interest was reported by the author(s).

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66. Epidemics are defined as: "Either an unusual increase in the number of cases of an infectious disease, which already exists in the region or population concerned; or the appearance of an infection previously absent from a region." Epidemics therefore exclude non-infectious diseases, those that are endemic to a given country (e.g., seasonal influenza) and, further, are not classed as pandemics. To be included in the data, a disaster must meet at least one of the following criteria: (1) 10 or more people dead; (2) 100 or more people affected; (3) Declaration of a state of emergency; or (4), A call for international assistance.
67. People affected by an epidemic is defined as the number of people, " . . . requiring immediate assistance . . . i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance." See EM-DAT database explanatory notes, available online at: https://www.emdat.be/explanatory-notes.
68. In addition to consulting secondary sources—such as academic books or articles, encyclopedias of terrorism and media reports about groups—we also used the Terrorist Organizational Profiles (TOPs) database to help us determine the main base country for all groups listed in EDTG as having more than one base.
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80. See Appendix Table 5.
81. Tobit coefficients are interpreted in the same manner as ordinary least squares (OLS) coefficients.
82. Around 11.5 more attacks according to marginal effects simulations.
83. Around 85.8 more casualties according to marginal effects simulations.
84. Around 30.1 percent higher share according to marginal effects simulations.
85. Around 40.4 percent higher diversity index according to marginal effects simulations.
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