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Multiple disasters and debt sustainability in Small Island Developing States

Abstract

Small Island Developing States (SIDS) are the most disaster-prone countries in the world. With an increasing frequency over time, they are regularly hit by severe storms and other disasters, causing on average an annual damage of 2.1 percent of GDP. In the aftermath of disasters, reconstruction efforts require massive financial resources which are often covered through external borrowing. On top, small countries are highly dependent and exposed to economic shocks what results in a massive drop of GDP and exports during global crisis such as COVID-19. In order to provide policy makers with tools to maintain debt sustainability, a better understanding of the options and the complexity between disaster response and debt is required. This paper estimates the impact of multiple disasters on debt sustainability indicators in SIDS over the period 1980 to 2018. Applying a fixed-effects and a Synthetic Control estimator, the results indicate an only weak correlation between a severe natural disaster and external debt what can be related to the restrictions of already highly indebted SIDS to access adequate financing. The paper discusses the implications for financing stronger resilience to disasters in the future and calls for stronger multilateral cooperation and greater flexibility in the accessibility to pre- and post-disaster financial instruments.

Key words: Natural disasters, debt, SIDS, panel data

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Introduction

Currently, COVID-19 has shaken the world. In order to fight the pandemic and to recover from the economic downturn, funds have been made available and resources deployed to support those on the front-line of the pandemic with necessary equipment. Large stimulus packages were approved mainly by high-income countries, allowing public debt to increase massively. In the fight against climate change, the front liners are mostly small island developing states (SIDS) which have been regularly hit and shaken by natural disasters. Indeed, over the last 40 years, SIDS have experienced the highest number of occurrence and the largest damage caused by storms, floods and droughts, more than any other country group; and they have experienced some of the deadliest biological disasters over that period.

SIDS are highly vulnerable to external economic and financial shocks due to a high degree of openness and a strong dependence on the global economy through tourism, remittances, financial services, and concessional financing. Figure 1 (left panel) compares past and projected GDP growth rates between SIDS, emerging market and developing economies, and advanced economies. During the financial crisis in 2009, SIDS experienced the hardest drop in GDP growth to -1.3 percent (from 3.7% in 2008), compared to other developing countries and emerging markets (to 2.8 percent from 8.4% in 2008). In 2020, due to the negative impact of COVID-19, SIDS are expected to experience a fall in GDP by 9 percent compared to -3.3 percent in other developing countries. Despite large uncertainties, GDP growth is expected to recover in 2021.[1] Prospects are less optimistic regarding the negative impact on the current account balance (Figure 1; right panel). SIDS need to expect a drop from -2.7 percent of GDP in 2019 to -12.1 percent of GDP in 2020. The negative gap is expected to increase to 12.3 percent in 2021 due to the ongoing crisis. In comparison, for the group of developing countries and emerging markets the current account balance for 2020 is projected at -0.12 percent of GDP. The immense drop in external receipts from abroad is likely to put many countries in a critical position to repay external debt. More than ever, the question of debt sustainability in developing countries has received attention. The likelihood of debt default is even higher when the negative growth effects of the pandemic are exacerbated with a natural disaster. In April 2020, Vanuatu, Fiji, Solomon Islands and Tonga were hit by Cyclone Harold. 160,000 people were affected, and many lost their homes. In the Caribbean islands, two storms have killed at least 12 people in Haiti and the Dominican Republic in August 2020. Critical infrastructure including health facilities, schools and agriculture was damaged.[2] The combined effect of declining macroeconomic output, fighting a pandemic with a weakened health care system, and the threat of a coming natural disaster due to seasonal storms can be devastating for any country, especially SIDS.

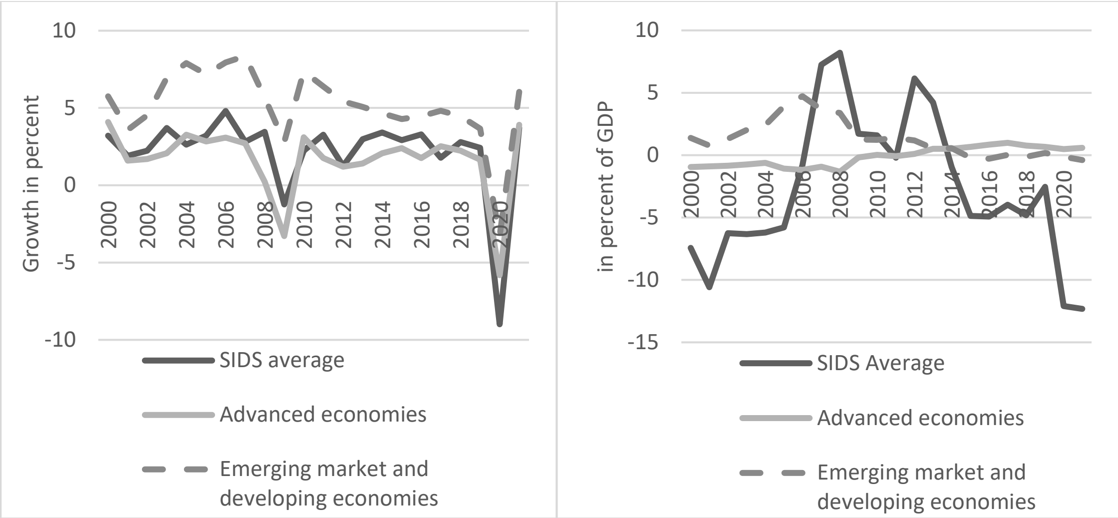
This research paper aims to assess the prospects of debt in the aftermath of a disaster and sheds light on determinants of debt sustainability, such as macroeconomic conditions, price fluctuations and trade openness. Based on data availability across countries and time, debt sustainability is proxied by the external debt-to-GDP ratio and the debt service-to-exports ratio which relates sustainability of debt to the ability for repayment. The main challenge of quantifying the fiscal impact of natural disasters lies in the measurement of the costs of natural disasters. For instance, while meteorological and geophysical disasters cause the highest damage, measured in monetary units, droughts and biological natural disasters have a severe impact on poverty and health. The study contributes to the literature by discussing different dimensions of natural disasters and differentiates *(i)* climate-related natural disasters[3] (meteorological, climatological and hydrological), *(ii)* earth-related disasters (geophysical disasters), and (*iii*) biological disasters (i.e. epidemics), all three factors are supposed to have financial implications. A standard panel-data approach and a Synthetic Control Method are applied to provide a broad assessment of debt sustainability. Both methods allow to identify short- and long-run dimensions of debt in relation to severe natural disasters.

[1] The estimates refer to the projected IMF Economic Outlook as of October 2020. The numbers have been revised downwards compared to earlier projections in 2020.

[2] https://www.undrr.org/news/extreme-weather-events-time-covid-19

[3] The paper does not provide a discussion of the link between climate change and the occurrence of natural disasters, but refers to the literature on the nexus (e.g. https://www.gfdl.noaa.gov/global-warming-and-hurricanes/.)

Figure 1: Real GDP growth rates (left) and current account balance (right) 2000 - 2021, Simple average by respective country group



Source: Author's graph based on IMF World Economic Outlook, 2020 and 2021 projected growth rates; For individual SIDS see Table 9 in the appendix.

The remainder of the paper is as follows: Section 1 provides stylized facts of SIDS' exposure to different types of disasters and discusses financial instruments to recover from such severe external shocks. Section 2 compares debt indicators across SIDS and uses descriptive case studies to outline the potential link between multiple disasters and external debt. A literature review is provided in section 3. The estimation strategy is explained in section 4, followed by the discussion of the results in section 5. Section 6 provides conclusions and policy recommendations.

1. SIDS's vulnerability to natural disasters

1.1 Data and stylized facts

SIDS are especially vulnerable to natural disasters due to a strong exposure to meteorological hazard and rising sea levels[4], their small size, the high density and concentration of population, and high per capita costs of roads, ports and airport infrastructure. For small countries, the costs of post-disaster reconstruction can be exorbitant on a per capita basis. In combination with limitations to diversification and building resilience against external shocks, external debt grows, and debt servicing capacity weakens when exports drop dramatically, such as during the current COVID-19 crisis.

The Emergency Events Database (EM-DAT) launched by the Centre for Research on the Epidemiology of Disasters (CRED)[5] is the most comprehensive database on the global occurrence of natural disasters. Other databases include NatCatSERVICE (Munich Re) and Sigma (Swiss Re).

The classification of natural disasters into climate-related, earth-related and biological disasters is based on the structure of the EM-DAT database:

[4] Rising sea levels are another major threat to infrastructure, but this paper focuses on the fiscal impact of sudden natural disasters.
[5] https://www.emdat.be/. The database differentiates between natural and technological disasters.

i) *Climate-related disasters: Met*eorological[6], *hydrological*[7] and *climatological*[8] disasters;

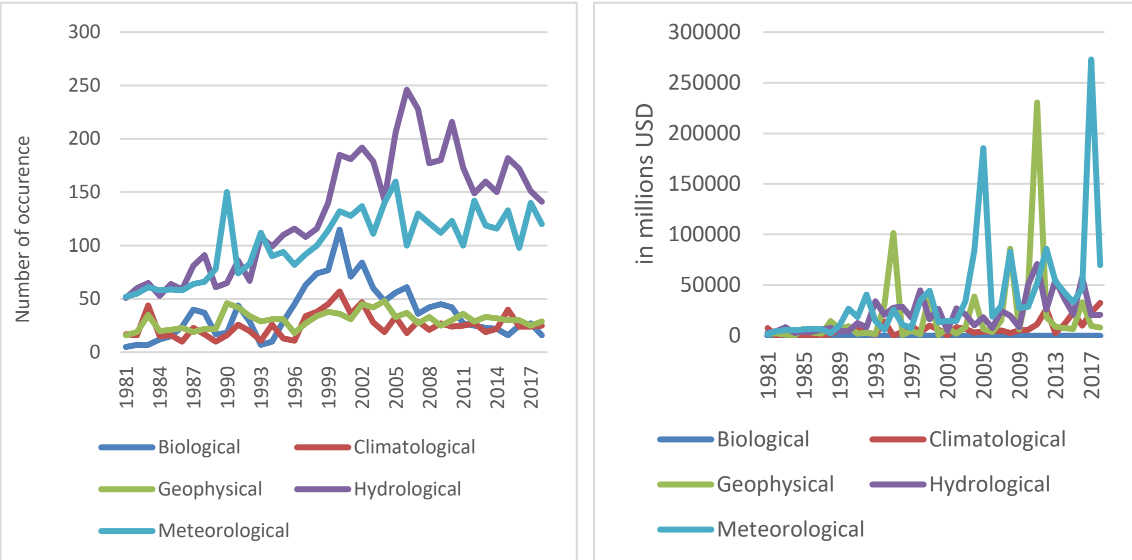
ii) *Earth-related disasters:* Geophysical[9] and extraterrestrial disaster[10];

iii) *Biological disasters (i.e. epidemics)*: A hazard caused by the exposure to living organisms and their toxic substances (e.g. venom, mold) or vector-borne diseases that they may carry.[11]

Some major drawbacks of the database (as well as other databases) are that the data relies on government reports and insurance statements without a common methodology and little transparency. In addition, the capacity of least-developed countries and SIDS to accurately measure the damage of natural disasters is often limited.

According to the available data, world natural disasters and its costs have steadily increased in the last 40 years. Figure 2 shows how climate-related natural disasters (especially meteorological and hydrological ones) have risen more strongly compared to earth-related natural and biological disasters. The occurrence per annum of climate-related disasters (Figure 2, left panel) increased from an annual average of 153 in the 1980s to 308 on average between 2010 and 2018. In terms of the costs associated with it (Figure 2, right panel), meteorological disasters generate the largest amount of annual costs with an increasing trend: from annually US$21 billion over the period 1991 to 2000 to globally US$82 billion per annum from 2010 to 2018.

Figure 2: Global occurrence (left) and damage costs (in US$) (right) of disasters by disaster-type, 1980-2018

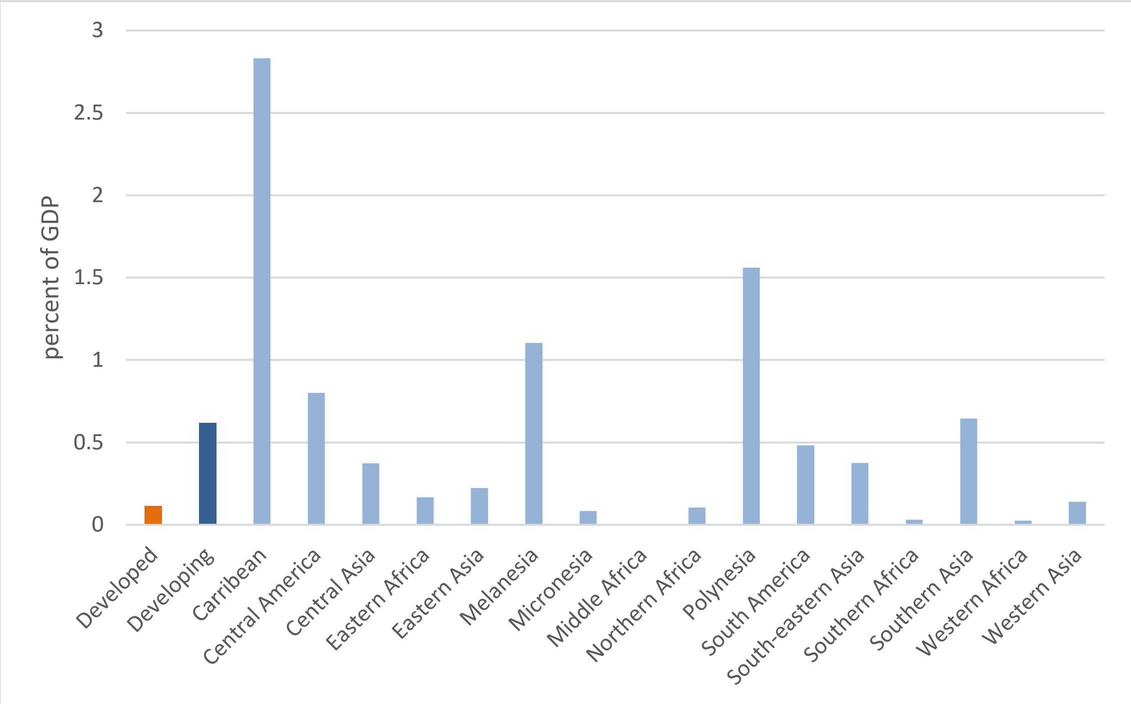


Source: Author's graph based on EMDAT data.

[6] A hazard caused by short-lived, micro- to meso-scale extreme weather and atmospheric conditions that last from minutes to days (e.g extreme temperature, fog, storm).
[7] A hazard caused by the occurrence, movement, and distribution of surface and subsurface freshwater and saltwater (flood, landslide, wave action).
[8] A hazard caused by long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal climate variability (drought, glacial lake outburst, wildfire).
[9] A hazard originating from solid earth. This term is used interchangeably with the term geological hazard (earthquake, mass movement, volcanic activity).
[10] A hazard caused by asteroids, meteoroids, and comets as they pass near-earth, enter the Earth's atmosphere, and/or strike the Earth, and by changes in interplanetary conditions that effect the Earth's magnetosphere, ionosphere, and thermosphere (impact, space weather).
[11] Examples are venomous wildlife and insects, poisonous plants, and mosquitoes carrying disease-causing agents such as parasites, bacteria, or viruses (e.g. malaria, COVID-19). Although some biological disasters might be man-made disasters, they are classified as natural disasters in the EMDAT. This paper adopts the definition according to the reported disaster in the database.

Changes in the global climate amplify the risk of extreme weather disasters. Although the causal link between climate change and natural disasters is not yet fully understood and proven, the increase of the occurrence and the severity in terms of the costs of climate-related natural disasters is observed in the data, and this increase is much larger than that of other natural disasters over time (e.g. earthquakes, volcanic activity).[12] Among the world developing regions, Eastern Asia, the Caribbean, Southern Asia and South-Eastern Asia have been hit the most in terms of absolute costs and occurrences between 1980 and 2019. However, in larger states, damages from natural disasters are localized and therefore represent a relatively small share of the economy. In smaller countries, natural disasters present a systemic risk, as the bulk of their territory could be affected at the same time (Cebotari and Youssef, 2020). For instance, the small states in the Caribbean experience the highest damage in terms of their GDP (Figure 3). Between 1970 and 2018 natural disasters caused on average an annual damage of equivalently 2.8 percent of GDP. Pacific small states faced annual damages of around two percent of GDP. In contrast, the rest of the world faced 0.3 percent of GDP annual costs, and other small states faced 0.2 percent of GDP costs of annual natural disasters (Cebotari and Youssef, 2020).

Figure 3: Annual (1970-2018 average) damage costs of disasters, average by region (including only developing countries), in percent of GDP



Source: Author's calculation based on EMDAT data; figure includes all types of natural disasters; Country classification as reported in the database (https://www.emdat.be/)

Monetary damage indicators are only available for a few natural disasters. Some natural disasters have a smaller impact on physical capital but more strongly affect health and well-being of humans. For instance, a drought may not cause physical damage to infrastructure, but it affects people through food insecurity, malnutrition, lower productivity, loss of income, and rising poverty. In 2016, due to the warm phase of the El Niño–Southern Oscillation the Dry Corridor in Central America experienced one of the worst droughts in decades which has left 3.5 million people food insecure (FAO, 2016).

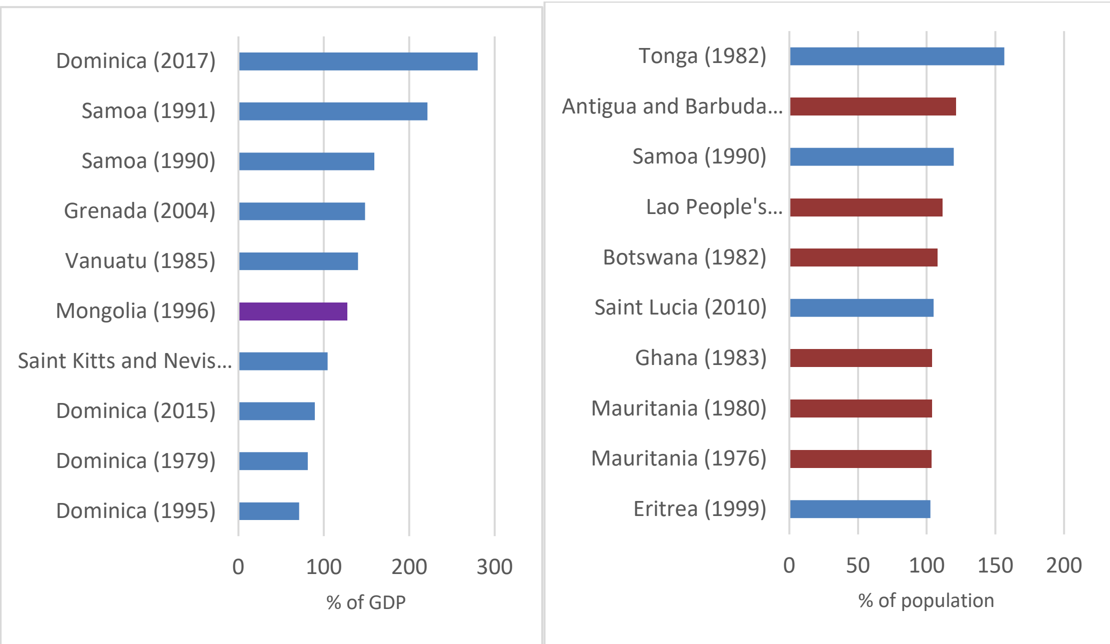
[12] The paper builds on the established link in the literature between climate change and the possibility of more droughts and intensity of storms through more water evaporation into the atmosphere. For instance, according to Mahul et al. (2014) climate change can increase the frequency and severity of extreme weather events by 40-80 percent.

Different measures need to be taken into account for the analysis of natural disasters. EMDAT provides data on affected people[13], injured people[14], homeless people and estimated monetary damage.[15] In the following, the three types of natural disasters (climate-related, earth-related, and biological) are differentiated.

i) Climate-related natural disasters

Figure 4 lists the 10 globally most severe natural disasters over the period 1970 to 2018, in terms of damage-to-GDP (left) and of the affected population per year (right). The worst natural disasters measured by damage relative to GDP have almost exclusively occurred in SIDS (except Mongolia), and are mainly storms. Of the disasters that caused the highest ratio of affected people per population worldwide (Figure 4, right panel), six are droughts and four are storms. The three worst hit countries since 1970 are SIDS (Tonga, Antigua and Barbuda, Samoa). In terms of the number of deaths, the most deadly (relative to population) drought occurred in Sudan in 1983 which killed 150,000 people (equivalent to 0.93 percent of the population). In the same year, in Ethiopia 300,000 people died from the drought (0.8 percent of population).

Figure 4: Most severe climate-related disaster years, by damage (in % of GDP) (left) and affected people (in % of population) (right), Global, 1970 - 2018



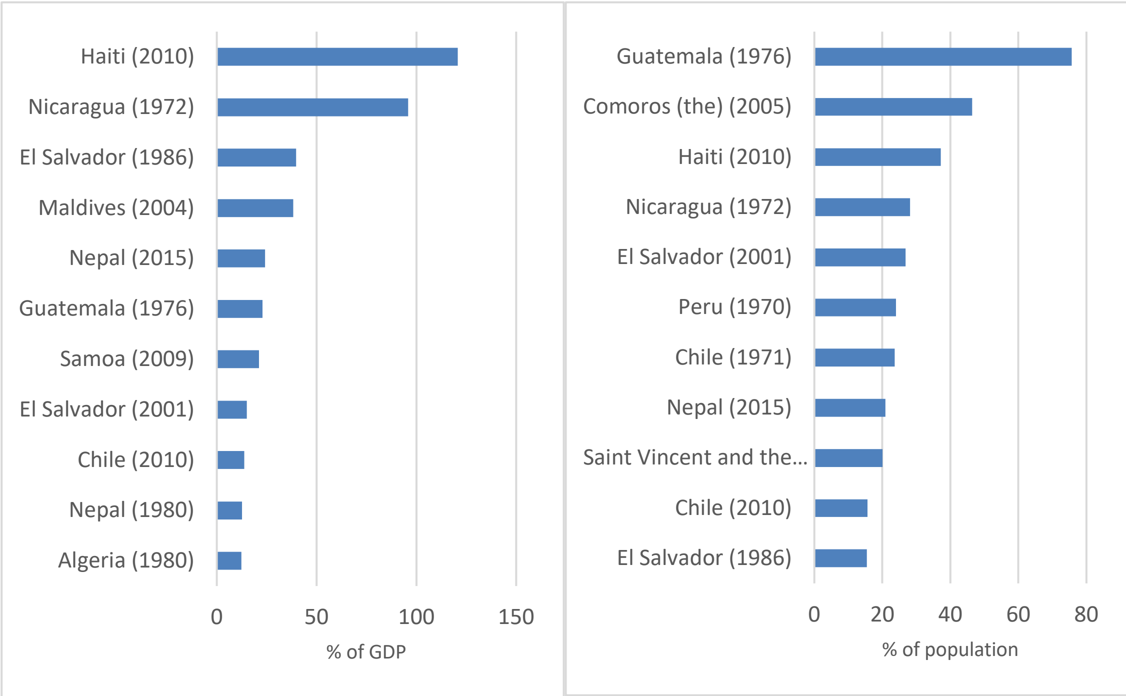
Source: Author's calculation based on EMDAT data.
Note: Climate-related disasters are the sum of meteorological, climatological and hydrological disasters. Droughts highlighted in brown; blue refer to storms and purple to wildfire.

ii) Earth-related natural disasters

The most damaging earthquake happened in Haiti in 2010 with a damage of more than 120 percent of GDP, more than 200,000 fatalities, 300,000 injured and 40 percent of the population directly affected by the earthquake. Similarly, disastrous earthquakes affected Nicaragua in 1972, Guatemala in 1976, the Comoros in 2005 and the Maldives in 2004 (Figure 5).

[13] People requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance.
[14] People suffering from physical injuries, trauma or an illness requiring immediate medical assistance as a direct result of a disaster.
[15] The amount of damage to property, crops, and livestock. For each disaster, the registered figure corresponds to the damage value at the moment of the event, i.e. the figures are shown true to the year of the event (https://www.emdat.be/explanatory-notes).

Figure 5: Most severe earth-related natural disasters, by damage (in % of GDP) (left) and affected people (in % of population) (right), Global, 1970 - 2018



Source: Author's calculation based on EMDAT data.

iii) Biological disasters

Over the period 1970 to 2018 biological disasters have mainly occurred in Africa (i.e. Eastern Africa, Western Africa, Middle Africa), and Southern Asia, in terms of occurrence and total number of deaths. In absolute numbers, SIDS seem to be less exposed to biological disasters.[16] Relative to their small population however, it becomes evident that SIDS are also strongly vulnerable to health-related disasters. Figure 6 lists the 10 most severe biological disasters in terms of the affected population (left panel) and fatalities (right panel) reported in a single year. The difficulty of understanding the devastating impact of a biological disaster for a country's development is illustrated by the observation that of the 1,541 reported cases of biological disasters in EMDAT, only six cases provide an estimate of the damage in monetary units.