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Disaster Risk Preparedness of Households in the Caribbean

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Abstract

Preparing for—and responding to—disasters requires a people-centered approach and a strong understanding of households' ability to cope with shocks. Relying on novel household survey data, this paper examines the ability of households in the Caribbean to cope with disasters caused by natural hazards. The analysis sheds light on disaster preparedness in five "data deprived" countries: Belize, Dominica, Haiti, Saint Lucia, and Suriname. The analysis points to a clear income gradient in possession of emergency supplies needed to cope with disasters. This gradient can be observed at both the country and household levels. In contrast, no such income gradient is observed for other key elements of preparation for disasters: community disaster management systems and discussion of risk mitigation strategies within households (both of which are common in the Caribbean hurricane belt). There is substantial variation in preparedness to cope with disasters across sociodemographic groups, as households with less educated heads, with children, and residing in rural areas are generally less able to handle disasters. All in all, a large share of households in all five countries indicates that they are not prepared to cope with a natural disaster. The COVID-19 pandemic had a negative impact on disaster risk preparedness, primarily due to households' deteriorating financial circumstances.

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1. Introduction

In the Caribbean, disasters caused by natural hazards are both frequent and costly. Many Caribbean countries lie in the path of destructive Atlantic hurricanes and are regularly threatened by tropical cyclones. The estimated human and economic toll of these tropical storms is substantial. For example, 2017 Hurricane Maria killed dozens and came at an estimated cost of 226 percent of GDP on the island of Dominica (Government of the Commonwealth of Dominica, 2017). Global warming is compounding the problem by making these extreme weather events more frequent and severe.

While the Caribbean is frequently in the news during the hurricane season, tropical storms are not the only natural hazard threatening the region. Seismic and volcanic activity is relatively high. As the Caribbean islands are located on the boundary of two tectonic plates, the region is prone to earthquakes, volcanic eruptions, and Tsunamis (see, e.g., U.S. Geological Service, 2018; University of the West Indies (UWI) Seismic Research Centre, Undated). Haiti, for instance, was struck by a catastrophic earthquake in January 2010. Estimates of the human death toll range considerably but point to at least 100,000 casualties. The aftermath of the earthquake was devastating too; many households had lost their homes and belongings, and gender-based violence and food insecurity increased significantly (Kolbe et al., 2010).

With climate change, rainfall patterns in the Caribbean are becoming increasingly erratic and flood risks are increasing. Suriname, for instance, experienced heavy rains at the beginning of 2022, usually a dry time of the year. The resulting floods, especially in the interior of the country, forced the prolonged closure of schools and medical posts. Other examples of floods, droughts, and landslides in the region abound. In total, since 1950, according to Ötker and Srinivasan (2018), hundreds of disasters have hit small states in the Caribbean, "killing 250,000 people and affecting more than 24 million through injury and loss of homes and assets".

Preparing for – and responding to – these disasters, requires a people-centered approach and a strong understanding of households' perceived risks and ability to cope with risks (e.g., U.N. Office for Disaster Risk Reduction, 2023; Upperman et al., 2019). However, many of the Caribbean countries can be considered 'data scarce' and there is little evidence on household preparedness for disaster risk from household survey data. With that in mind, this paper provides primary evidence on both households' exposure to disasters and their ability to cope with these disasters. The paper is based on novel survey data collected in five countries in the region:

Belize, Dominica, Haiti, Saint Lucia, and Suriname. A data collection instrument adapted for the purpose of the exercise is readily available as a public resource.

The data provide insight not only into disaster risk preparedness, but also into the correlates of ability to cope with natural disasters, and the impact of the COVID-19 pandemic on household ability to cope with disasters. The analysis makes clear that the majority of households in the five countries is not well-prepared to cope with disasters. Moreover, there is a clear income gradient in the ability to cope with a disaster risk. One of the most important explanatory factors is that wealthier countries and households have better access to emergency supplies. Households with more highly educated heads, which are more likely to discuss measures to cope with disaster risks, are also better able to cope with disaster risks. Households with children and households residing in rural areas, in contrast, are less able to handle disasters. The COVID-19 pandemic had a negative impact on disaster risk preparedness, primarily due to households' deteriorating financial circumstances. These findings have direct implications for policy, as discussed in the closing section.

This paper contributes to a broader literature on adaptation to climate change and household emergency preparedness (Strömberg, 2007). A literature review by Levac et al. (2012), discusses that "personal and contextual factors", such as the sociodemographic characteristics we examine in this paper, determine preparedness. They further discuss that knowledge and resources, which we examine, are required for effective ability to cope with emergencies. Indeed, various country case studies find that socioeconomic status matters for preparedness. For instance, in Chile working age adults are best prepared to cope with disasters (Bronfman et al., 2019). Likewise, in the U.S. income and education matter for emergency preparedness (Nukpezah and Soujaa, 2018). Relevant for this paper is a study by Ferdinand et al. (2012) assessing ability to cope with disasters at the community level in the Caribbean Windward Islands. The study finds that while strong social ties help them cope with disasters, poorer communities find it harder to engage with third party institutions that can support coping.

This paper starts by providing a discussion of the data and methods in Section 2. Section 3 describes the socioeconomic context of the countries included in the study. Section 4 presents the findings and Section 5 discusses the policy implications of the analysis.

2. Data and methods

2.1 Phone survey

In 2020, as in-person data collection activities of many statistical offices came to a halt, the World Bank started the collection of multiple waves of phone survey data in numerous countries around the world. The aim was to assess the evolution of household wellbeing during the COVID-19 pandemic. The survey comprised modules on different wellbeing dimensions including employment, income, coping mechanisms, access to health, school participation, gender inequalities, and food insecurity. The surveys were designed to be representative at the national level for households and individuals (over 18) who have an active cellphone or a landline at home.[1]

Sample sizes typically ranged from 800 to 1,000 interviews in smaller countries, and to over 2,000 interviews in larger countries (including Haiti). World Bank (2021) gives a detailed description of the sampling design and calculation of survey weights. The surveys were administered over the phone to a random sample of individuals aged 18 or older, identified through so-called random digit dialing. As discussed in World Bank (2021), this "methodology generates virtually all possible telephone numbers in the country under the national telephone numbering plan and then draws a random sample of numbers. This method guarantees full coverage of the population with a phone."

For the countries in our sample, it is either known or reasonable to assume that the vast majority of households has access to a phone. According to the International Telecommunication Union's (ITU) 2019 core household indicators, 93.9 percent of the households in Belize had a mobile phone and 7.7 percent had a landline. In Suriname, 94.4 and 39.4 percent of households, respectively, had a mobile phone and a landline.[2] For Saint Lucia, our own calculations based on the 2016 Survey of Living Conditions and Household Budgetary Survey indicate that 95.4 percent of households had a cell phone while 28.0 percent of the households had a landline. For Dominica and Haiti, no information is available on the share of households with a phone. However, related indicators suggest that this share is high. According to the ITU, the share of the population covered by a mobile-cellular network is 100 percent in Dominica. Haiti compares

[1] World Bank (2022) provides an overview of many resources and findings based on the phone surveys.
[2] See https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2020/CoreHouseholdIndicators.xlsx (consulted on February 12, 2024).

relatively poorly, with only 70 percent covered by a network.[3] Also according to the ITU, the number of mobile cellular subscriptions per 100 people equals 86 in Dominica (2021) and 64 in Haiti (2021).[4] In Saint Lucia we found that when 68.2 percent of individuals have a cell-phone, the share of households with a cell phone is over 95 percent. We therefore consider the share of households with access to a phone to be close to 100 percent in all countries, perhaps with the exception of Haiti where coverage may be a bit lower.

This study relies on a wave of survey data collected in the fourth quarter of 2021 jointly by the World Bank and the U.N. Development Programme (UNDP).[5] The response rate in this survey wave was 49.2 percent in Belize, 47.2 percent in Dominica, 43.9 percent in Haiti, 43.6 percent in St. Lucia, and 34.2 percent in Suriname. Survey weights were adjusted to account for non-response.

2.2 Disaster risk survey module

The survey wave referenced above included a specific module to measure disaster risk awareness and preparedness for Belize, Dominica, Haiti, Saint Lucia, and Suriname. The survey module was adapted from a disaster risk reduction survey guide developed by the Red Cross Societies and Johns Hopkins Bloomberg School of Public Health (2013). It was further adapted for the purpose of the analysis presented in this paper and refined through the solicitation of extensive feedback from numerous development partners in the region.

The disaster risk survey module begins by asking respondents about perceived exposure to 12 types of disaster risks, that can be classified across four disaster risk categories as follows: meteorological (tropical cyclones / hurricanes, severe storms, and extreme rainfall), geophysical (earthquakes, volcanic eruptions, and tsunamis), climatological (heat waves, droughts, and wildfires) and hydrological (floods, landslides, and high swells).[6] In Suriname, after detailed in-country consultations and reflecting the local context, households were only asked about

[3] See the ITU's digital development dashboard: https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx (consulted on February 12, 2024).
[4] See World Development Indicators: https://data.worldbank.org/indicator/IT.CEL.SETS.P2 (consulted on February 12, 2024).
[5] For Suriname, data were collected later, in June 2022.
[6] These four disaster risk categories are not entirely mutually exclusive. For instance, floods (which we classify as hydrological risks) may be caused by heavy rains (which we classify as meteorological risks). See, for instance, Below et al. (2009) for discussion.

exposure to four types of disaster risk, one in each of the four categories: extreme rainfall, earthquakes, droughts, and floods. Subsequently, the survey module contains checklists designed to identify domains of household preparedness to deal with disasters that have been well-documented in disaster research (see, e.g., Brown et al., 2021 and Levac et al., 2012). These checklists cover: supplies owned by the household to deal with a disaster or emergency, household discussion and plans of what to do if a disaster or emergency occurs, and whether the household lives in a community that has an early warning system to monitor natural hazards, detect risks, and inform community members about impending threats. The module also asks households, *inter alia*¸ about self-reported ability to cope with a disaster and the impacts of the COVID-19 pandemic on their ability to deal with a disaster. Appendix 1 displays the full disaster risk survey module.

We supplement the household survey data analysis with descriptive statistics based on EM-DAT, the International Disaster Database of the Centre for Research on the Epidemiology of Disasters. This database:

> *"defines disasters as situations or events which overwhelm local capacity, necessitating a request for external assistance at the national or international level. Disasters are unforeseen and often sudden events that cause significant damage, destruction, and human suffering. EM-DAT globally records at the country level human and economic losses for disasters with at least one of the following criteria:10 fatalities; 100 affected people; a declaration of state of emergency; a call for international assistance"*[7]

The EM-DAT database covers a subset of the events captured in the survey: two types of meteorological events (tropical cyclones and severe storms), one type of geophysical event (earthquakes), two types of climatological events (cold waves and droughts) and three types of hydrological events (floods, landslides, and high sea-swells).

2.3 Methods

We take a straightforward approach in analyzing the survey data. For each of the outcome domains (preparedness to deal with disasters, possession of emergency supplies,

[7] See https://www.emdat.be/ (last accessed on April 13, 2024).

discussion of disaster risk measures in the household, and community resources to deal with disasters), we first show basic descriptive charts by country. Subsequently, we display the results of simple linear regressions, mostly examining the association between the main outcome variables and basic socio-demographic characteristics of the household (location, composition, and economic situation) and the household head (sex and educational attainment).[8] We present results separately by country (instead of pooling the data) because, as discussed in the next section, countries' socioeconomic contexts differ and the disaster risks to which countries are exposed are not identical. Although straightforward, the approach provides useful insight into ability to cope with major disasters, with important policy implications discussed in the closing section of the paper.

3. Context

3.1 Socioeconomic context

In this subsection we describe the socioeconomic context of the countries included in the analysis. We do this by combining descriptive statistics based on socioeconomic variables derived from the phone survey with readily available information from the World Bank's World Development Indicators[9] and the United Nations Development Programme's (UNDP) Human Development Index.[10]

We first discuss the location and population of the five countries, going from west to east on the map. Belize is located in Central America. Bordered by Mexico, Guatemala, and the Caribbean Sea, Belize had a total population of about 405,000 in 2022. Haiti makes up the western part of the island of Hispaniola in the central north of the Caribbean Sea. With an estimated 11,585,000 inhabitants in 2022, it has the biggest population of the five countries included in this study. Dominica and Saint Lucia are small island states, located on the eastern edge of the Caribbean Sea. They respectively had a population of about 73,000 and 180,000 in 2022. Suriname is located to the south-east of the Caribbean Sea. It borders Brazil, Guyana, French Guyana, and the Atlantic Ocean. It had a total population of about 618,000 in 2022. Although located South America, in cultural and economic terms Suriname is usually grouped

[8] The regressions all have binary outcome variables. We apply simple OLS. However, the results are robust to applying Probit regressions instead.
[9] https://data.worldbank.org/ (accessed on April 14, 2024).
[10] https://hdr.undp.org/data-center/country-insights#/ranks (accessed on April 14, 2024).

with the rest of the Caribbean. Like the other four countries in this study, Suriname is a member of the Caribbean Community (CARICOM).

In recent years, Haiti has been rocked by severe economic and political crises. Accordingly, with a 2022 GDP per capita of US$1,748 (in current US$ according to the World Bank's World Development Indicators), Haiti is by far the poorest of all five countries in the sample. The second and third poorest countries are Suriname with a GDP per capita of US$5,859 and Belize with a GDP per capita of US$6,984. The two richest countries are Dominica with a GDP per capita of US$8,351 and Saint Lucia with a GDP per capita of US$13,031. Indeed, in our survey, households in Haiti are markedly more likely to indicate that they find it challenging to meet their basic needs (see Table 1) than households in the other four countries. Here, ability to meet basic needs is defined based on two questions asked to households: (i) "In your opinion, how much does a home like yours need to cover your basic needs, per month?" and (ii) "Does your household currently have [amount mentioned in response to question (i)] to cover the cost of basic necessities?" In Haiti, only 14 percent of households responded positively to this last question. The share of households indicating that they can meet their basic needs ranges from 42 to 44 percent in the other four countries.

On non-monetary development outcomes Haiti also compares relatively poorly. It ranked 158 out of 193 countries on the UNDPs Human Development Index in 2022, a score classified as "medium" (but close to low) human development by the UNDP. The ranking of Suriname (124) is also considered "medium". The scores of Belize (118), Saint Lucia (108), and Dominica (97) are considered "high". Our survey data provides additional insight into the socioeconomic context, as shown in Table 1. To facilitate comparisons by level of economic development, here and throughout all other exhibits in this paper we order countries by GDP per capita. The share of households headed by a woman ranges from 30 percent in Belize to a little over 40 percent in Haiti. The share of household heads who completed tertiary education ranges from 15 percent in Suriname to 27 percent in Dominica and Saint Lucia. Self-reported urbanization rates differ substantially across countries. There is also substantial variation in the demographic characteristics of households across countries. The share of households with children ranges from 32 percent in Saint Lucia to 86 percent in Suriname, whereas the share of households with elderly members ranges from 24 percent in Suriname to 81 percent in Haiti.

3.2 Exposure to disasters

The EM-DAT data provide insight into the Caribbean's exposure to major natural disasters. In the countries included in this study, the disaster categories captured in the EM-DAT database combined to a total of 188 events that were large enough to overwhelm local capacity since 1950 (Figure 1a). Meteorological events and hydrological events occurred most frequently, while geophysical events and climatological events were less common. Haiti stands out as the most frequently affected of the five countries. It experienced a total of 126 events, 44 of which were meteorological and 68 of which were hydrological in nature. It is also the only country to experience geophysical and climatological events on a somewhat regular basis. Meteorological events are also common in the other countries in the Caribbean hurricane belt; Belize, Dominica, and Saint Lucia respectively experienced 17, 13, and 15 meteorological events. Belize and Saint Lucia respectively also experienced five and four hydrological events. Suriname, which is not located in the Caribbean hurricane belt, recorded the lowest number of disasters with five hydrological events.

A clear increase in the number of major events can be observed over time. Figure 1b shows the number of events experienced per country in 10-year intervals (11-year period from 1950 to 1960 and 13-year period from 2021 to 2023). Especially the number of meteorological and hydrological events amplified visibly over the period from 1950 to 2023. For instance, before the 2000s the number of events experienced by Haiti in each category tended to be in the low single digits. By the 2000s, the number of meteorological and hydrological events was in the double digits. Likewise, before the 2000s, Suriname experienced only one hydrological event. In the 2000s, it experienced four. Moreover, a comparison with other regions (not displayed) makes clear that the prominence of meteorological events sets the Caribbean apart. In contrast, in each of the main regions in the EM-DAT database (Oceania, Europe, Africa, Americas, Asia), the data show a predominance of hydrological events.

The latter is important because meteorological events tend to impact a high number of people in the countries we study. In Belize, Dominica, Haiti, and Saint Lucia, the average meteorological event affects about 31,000, 15,000, 163,000, and 19,000 people respectively. Figure 1c expresses the average number of people affected by individual natural disasters as a share of the total population in the country at the time of the event. In Dominica and Saint Lucia, the average meteorological event affects nearly one in three people. In Belize it affects nearly

one in five, while in Haiti (which has a much larger population than the other three countries), the share of the population affected is lower at about three percent of the population. Hydrological events tend to affect a smaller share of the population, on average well-below 10 percent in each of the study countries. Importantly, the impacts of geophysical and climatological events in Haiti tend to be sizeable, affecting about a tenth of the population, or over a million people on average.

We can compare exposure to the major events listed in EM-DAT to reported exposure to disaster risk in the survey data. The vast majority of households in the five countries in our sample indicates being exposed to at least one of the twelve measured disaster risks (see Figure 2).[11] Even in the country with the lowest aggregate risk, Belize, over 75 percent of households perceived at least one natural hazard as a direct risk. In the other countries, exposure to at least one risk exceeds 80 percent and even 90 percent in Haiti. In line with the high number of households affected by meteorological events according to the EM-DAT data, meteorological risks are mentioned often. In the four countries located in the Caribbean hurricane belt (Belize, Dominica, Haiti, and Saint Lucia) over half of households indicates that they are exposed to tropical cyclones and hurricanes, and a large share of households is exposed to severe storms. Households in Haiti and Suriname indicate being exposed to extreme rainfall, the latter in accordance with several major floods hitting the country in recent years.

Moreover, the information from the household survey indicates that households perceive exposure to a wider range of risks, including those that are geophysical, climatological, and hydrological in nature. Earthquakes are the most commonly mentioned geophysical risk. In Dominica in particular, 70 percent of households indicates being exposed to earthquakes and 44 percent to volcanic eruptions. Households in Saint Lucia also commonly refer to the risk of earthquakes (62 percent). While these risks may not feature prominently in the EM-DAT, these results are in line with the monitoring of geophysical risks by the UWI Seismic Research Centre. According to the UWI Seismic Research Centre (2023), there were 186 earthquakes in the English-speaking islands of the Eastern Caribbean in the period from August 1, 2022, to July 31, 2023, alone. And the Volcanic Hazard Atlas of the Lesser Antilles[12] (Lindsay et al., undated)

[11] Households were also asked about any 'other' perceived risks. In Haiti and Suriname, respectively, 4.5 and 10.7 percent of households reported this option. No households in other countries reported other risks.
[12] See https://uwiseismic.com/downloads/volcanic-hazard-atlas-of-the-lesser-antilles/ (last accessed on May 8, 2024).

describes that the island of Domica has nine potentially active volcanoes and concludes that it is "extremely vulnerable to volcanic hazard".

Respondents in Haiti are most likely to indicate that they are exposed to climatological events, with 60 percent of households exposed to heat waves and 56 percent to droughts. Floods are the most common hydrological risk mentioned by 39 percent of households in Haiti, 44 percent of households in Suriname, and 33 percent of households in Belize.[13] It is common for households to indicate that they are exposed to multiple (at least 2) risks: Haiti (81 percent), Suriname (55 percent), Belize (63 percent), Dominica (79 percent), Saint Lucia (72 percent) (results not displayed).

3.3 Disaster risk management in the Caribbean

The Caribbean Disaster Emergency Management Agency (CDEMA) leads the CARICOM's regional disaster management efforts. Founded in 2009 as the successor to the Caribbean Disaster Emergency Response Agency (CDERA), it coordinates emergency response based on the principles of "Comprehensive Disaster Management". In other terms, CDEMA's function relates both to the preparation for disasters and the response to disasters. The former consists of promotion of the adoption of appropriate policies, response mechanisms and capabilities. The latter consists among others of "mobilizing and coordinating" the immediate response to disasters.[14]

The countries in the region also have their own national disaster management agencies. These agencies too are involved both in a combination of preparation for disasters and post-disaster relief efforts. Their activities have a wide range, including prevention and mitigation assessments and strategies, preparedness for disasters at the household, community and national level, disaster warning systems, the coordination of actual emergency response, and post-disaster recovery support.[15] These agencies provide direct advice to citizens on how to prepare for

[13] The importance of droughts and heat waves in Haiti, and those of floods in Haiti, Suriname, and Belize, are also reflected in other monitoring efforts. See the World Bank's Climate Change Knowledge Portal. E.g.: https://climateknowledgeportal.worldbank.org/country/haiti/vulnerability#pill-B (last accessed on May 8, 2024). The importance of so-called 'flash droughts' in the Caribbean is described in Ramseyer and Miller (2023).
[14] https://www.cdema.org/index.php/about (last accessed on April 29, 2024).
[15] See, e.g., the website of Dominica's Office of Disaster Management: https://odm.gov.dm/who-we-are-office-of-disaster-management/ (last accessed on April 30, 2024).

disasters, including the emergency supplies needed in case of a disaster.[16] They also maintain and provide information to households on emergency shelters and other community level emergency preparation systems.[17]

4. Findings

4.1 Preparedness to cope with disaster

We now proceed to examine three well-established factors that contribute to households' ability to cope with a disaster: possession of emergency supplies, discussion of measures to cope with disaster risks within the household, and community level resources to mitigate the impact of disasters.

At only about 12 percent, the share of households responding that they own any emergency supplies is lowest in Haiti (Figure 3). This should not come as a surprise both because Haiti is the poorest of all five countries in the sample and because, at the time of the interviews, Haiti was going through a period of significant political turmoil. It is reasonable to assume that high poverty levels and political disarray are important factors behind limited ability to cope with negative shocks. More generally, there is a clear country-level income gradient in possession of emergency supplies. In the two wealthiest countries in our sample, Dominica and Saint Lucia, nearly six in ten households (59 and 58 percent respectively) own at least one emergency supply. In Belize and Suriname, the share of households owning emergency supplies is 43 and 28 percent respectively. The causal relation between income and preparedness to deal with disasters may run in two directions. Higher income may enable countries to better prepare for disasters caused by natural hazards, for instance through the purchase of emergency supplies. And, vice versa, better preparation for disasters may reduce their often-high economic costs and thus contribute to economic growth.[18]

Households in Belize, Dominica, Saint Lucia, and Suriname were asked which emergency supplies they own (see Table 2). This question was not included in the Haiti survey. Emergency supplies commonly mentioned by households include packaged food, flashlights,

[16] See, e.g., the website of Belize's and Saint Lucia's National Emergency Management Organizations: https://site.nemo.org.bz/preparedness-guidelines/assemble-disaster-kit/ and https://nemo.gov.lc/Tips/To-Do-Checklist. (last accessed on April 30, 2024).
[17] See, e.g., https://nemo.gov.lc/Shelter-Listing. (last accessed on April 30, 2024).
[18] Prior evidence supports the hypothesis that catastrophic meteorological events have a negative impact on economic growth (Hsiang and Jina, 2014).

bottled water, first aid kits, and to a lesser extent battery powered radios, important documents and eyeglasses.

It is quite common for households in the hurricane belt to discuss coping measures in the household (Figure 3). Perhaps because discussing these measures does not entail a monetary cost, we do not observe a pronounced income gradient at the country level. Over 50 percent of households in Belize, Dominica, and Haiti, and nearly 40 percent of households in Saint Lucia, have discussed measures to cope with disaster risks. In contrast, the share is not even 20 percent in Suriname. The measures most discussed by households are shelters, escape and evacuation plans, emergency supplies, and meeting places (see Table 2).

Households in the four countries in the Caribbean hurricane belt (Belize, Dominica, Haiti, and Saint Lucia) generally have at least some access to community level disaster management systems (Figure 3). In Belize and Dominica, more than 9 in 10 households live in a community with one or more disaster management systems. In Saint Lucia the share is nearly 90 percent. Even in Haiti, by far the poorest of these four countries, approximately 80 percent of the households live in a community with at least one disaster management system.

As shown in Table 2, in Belize, Dominica, and Saint Lucia, close to 9 in 10 households live in a community with a shelter. In Haiti, nearly half of the households live in a community with a shelter. In Belize, Dominica, and Haiti, approximately six in 10 households are aware of evacuation routes in their community. Belize, Dominica, and Saint Lucia, also show comparatively high levels of joint community preparation for disasters, including training of community members, setting up disaster committees, and drafting disaster response plans. In Belize, nearly half of all households live in a community with an early warning system.

4.2 Socio-demographic predictors of ability to cope with disaster

Next, we examine the socio-demographic predictors of ability to cope with a disaster. Panel A of Table 3 displays the results of regressing the indicator for owning at least one emergency supply on indicators for sex of the household head, education level of the household head (secondary or tertiary), household location (urban or rural), household composition (has children and has elderly members), and ability to cover basic needs. As with the country-level analysis, it is important to keep in mind that the results of the household level analysis could be driven by reverse causality.

Higher levels of economic security and education strongly predict possession of emergency supplies. Households indicating that they can cover their basic needs are 16 to 26 percentage points more likely to indicate that they own emergency supplies, while households with a more educated head are 10 to 29 percentage points more likely to own emergency supplies. The findings suggest that higher levels of income (perhaps not surprisingly) enable households to invest in emergency supplies *and* that households with a more educated head are more likely to invest in such supplies. Interestingly, in two of the countries (Belize and Haiti) households with children are less likely to own emergency supplies, whereas in three of the countries (Belize, Dominica, and Haiti) households with elderly members are *more* likely to own emergency supplies. The latter may also reflect that households with children are often less wealthy. Likewise, there appears to be a tendency (statistically significant only in Haiti) for households with a female head to be less likely to own emergency supplies. Finally, in two of the countries, Haiti and Saint Lucia, households in urban areas are more likely to own emergency supplies.

Panel B of Table 3 shows the results of the same regression, but with the indicator for discussing measures to cope with disasters as the outcome variable. The analysis indicates that more educated household heads are more likely to invest time in discussing emergency measures. There is a positive association between the level of education of the household head and the probability that a household discussed measures to cope with disaster risks in Belize, Saint Lucia, and Suriname. Further, the presence of children increases the likelihood that households feel compelled to discuss emergency measures (statistically significant in Belize, Haiti and Saint Lucia). Worryingly, in Dominica households with elderly members are eight percentage points less likely to discuss measures to cope with disasters. We find a modest positive correlation between discussion of emergency measures and household ability to meet basic needs in Belize, Dominica, and Suriname.

Finally, Panel C of Table 3 shows the results of a regression with the indicator for availability of community level disaster management systems as the outcome variable. The results are more ambiguous. In Haiti, Saint Lucia, and Suriname, households with a more highly educated head are more likely to live in communities with at least one disaster management system. However, in Dominica they appear to be less likely to live in a community with at least one disaster management system. Households with children are more likely to reside in

communities with a disaster management system in Haiti, but the opposite holds for Suriname. Likewise, households with a female head are more likely to reside in communities with a disaster management system in Saint Lucia, but less likely to do so in Haiti. The most unambiguous finding is that households in urban areas are generally less likely to live in a community with at least one disaster management system.

4.3 Perceived ability to cope with disaster

The majority of households in the five countries considers themselves poorly prepared to cope with disasters. This is clear from household responses to the following question: "Do you feel like your household is very prepared, somewhat prepared, or not prepared to handle a disaster or emergency at the moment?" The share of households responding that they are "not prepared" ranges from nearly nine out of ten households in Haiti to 35 percent in Dominica (Figure 4), again pointing to a strong income gradient.

Possession of emergency supplies appears to play an important role in self-reported ability to cope with a disaster. This is clear from Table 4, in which we regress the indicator for self-reported preparedness to cope with a disaster on the indicators for possession of emergency supplies, discussion of measures to cope with disaster risks within the household, and community level resources to mitigate the impact of disasters. When they possess emergency supplies, the probability that households are somewhat or very prepared to cope with a disaster is 45 percentage points higher in Belize, 40 percentage points higher in Dominica, 37 percentage points higher in Haiti, 47 percentage points higher in Saint Lucia, and 22 percentage points higher in Suriname.

The two other domains (discussion of measures to cope with disaster risks within the household and community level resources to mitigate the impact of disasters) also matter for self-reported ability to cope with a disaster. However, the association is less pronounced. In three of the five countries, we observe a positive correlation between discussing measures to cope with disasters among household members and reported ability to cope with disasters: Belize (6 percentage points), Haiti (3 percentage points), and Suriname (19 percentage points). In the same three countries, living in a community with community-level disaster management systems is positively correlated with ability to cope with disasters: Belize (13 percentage points), Haiti (4 percentage points), and Suriname (14 percentage points).

Appendix Table A2.1 examines the association between self-reported ability to cope with a disaster and the socio-demographic characteristics examined previously. It shows that self-reported ability to cope with disasters is higher in households with better economic security and a more educated head. Household demographics appear to play a role too, albeit a less-pronounced one. Households with children and with a female head appear to be less likely to report that they can cope with a disaster.

Again, the analysis does not identify causal relationships and the interpretation needs to be conservative. However, the findings are consistent with a few intuitive explanations. First, higher economic security enables households to invest in emergency supplies, which increases ability to cope with disasters. Second, households with children (which generally tend to be poorer) are less able to invest in emergency supplies, which reduces their ability to cope with disasters. This impact is partially offset by a higher propensity to discuss measures to cope with disasters. And finally, higher levels of education of the household head correlate positively with investment in emergency supplies and, to a lesser extent, with discussing measures to cope with disasters and living in communities with disaster management systems, all of which enhance their ability to cope with disasters.

4.4 The impact of COVID-19 on ability to cope with disaster

Finally, COVID-19 appears to have had broadly negative implications for households' ability to handle a disaster. In three of the countries (Belize, Haiti, and Saint Lucia), the share of households indicating that they are less prepared to handle a disaster, compared to before the pandemic, exceeded the share indicating that they are more prepared (see Figure 5). In Dominica, the share of households indicating that they were more and less prepared to handle a disaster was balanced. Only in Suriname was the share indicating that they are more prepared, compared to before the pandemic, higher than the share indicating that they are less prepared. When asked about the reasons for deteriorating ability to cope, households generally mention financial reasons, such as reduced earnings and family being worse off financially (results not displayed).

5. Concluding discussion

As our climate changes, preparing for – and responding to - disasters caused by natural hazards in the Caribbean is becoming an increasing priority. World Bank (2018) reported that "within the Caribbean, direct damages due to natural disasters have averaged almost US$1.6 billion per year over the last 20 years." A cursory comparison suggests that these damages already exceeded the total combined value of net official development assistance and official aid revenue received by Caribbean small states (see World Development Indicators) by a factor of about 2.5. And the damages inflicted by natural disasters will only increase as weather events become more erratic, unpredictable, and extreme.

Governments and development partners frequently cite a need for a people-centered approach, and up-to-date information and statistics, to guide preparations and responses to natural disasters. The Caribbean Disaster Emergency Management Agency (2019), for instance, considers research and data management a foundation of its strategy and evidence-based approaches a core principle to enhance resilience. Household survey data are a central part of the information required to enhance to disaster risk management in the Caribbean. However, as described in detail by Rozenberg et al. (2021), such data are frequently lacking. This paper attempts to help address this gap, by presenting analysis of novel survey data collected in five countries in the Caribbean.

The paper shows that it is possible to integrate disaster risk management in planned household survey data collection at scale and at relatively low cost. The survey module used for the analysis presented in this paper can be adapted for future data collection efforts. Including it in a new household survey will only marginally increase interview time and cost of data collection. One advantage of including a disaster risk module in a broader household survey is that it allows for an analysis of the correlates of exposure to and ability to cope with risks. In the case of this paper, for instance, we look in detail at the correlation between household financial wellbeing and ability to deal with disasters.

In a review of the literature on the relationship between poverty and disasters, Hallegatte et al. (2020) discuss that poor people are more often affected by natural disasters (which they call exposure bias), lose more when hit by a disaster (vulnerability bias), and are less able to cope with disasters. The findings presented in our paper are in accordance with these patterns, as we observe an income gradient in ability to cope with shocks, underlining the conclusion of

Hallegatte et al. (2020) that "disaster risk management can be considered as poverty reduction" *and* "poverty reduction can be considered as disaster risk management".

Although we do not establish causal relationships, our analysis points to some of the potential mechanisms through which income affects the impacts of disasters. At the country level, higher economic capacity correlates with investment in emergency supplies and community level prevention. At the household level, higher economic security enables households to invest in emergency supplies. In accordance with prior research indicating that "it is both feasible and cost-effective for countries […] to invest heavily in adaptation" to natural disasters (Hsiang and Narita, 2012), this finding underlines the importance of financing for investment in coping measures, especially for poorer countries and households. While not necessarily straightforward and "no one size fits all" (U.N. Department of Economic and Social Affairs, 2021), the outlays may be limited, especially compared to the dramatic human and financial costs of major disasters (Ötker and Srinivasan, 2018). The investments may not only directly enhance disaster risk preparedness, but also may have indirect benefits such as an improved business climate (Inter-American Development Bank, 2022).

Our analysis also highlights other avenues for public policy to increase disaster risk preparedness. Households with a more educated head generally invest more in emergency supplies and are more likely to discuss measures to deal with disasters. This finding points to the importance of developing communication strategies to inform less educated parts of the population about the relevance of preparing for disasters and approaches to do so. As a large share of households in the surveyed countries do not own emergency supplies and do not discuss emergency measures, the margin for improvement is very large indeed.

Households with children are generally less able to cope with a disaster (even if they are more likely to discuss measures to deal with disasters). There is thus a case for child-sensitive disaster risk management strategies. Such strategies are especially relevant in light of the potentially longer-term implications of exposure to disasters for children, for instance through lasting impacts on their health, development and education (e.g. U.N. Office for Disaster Risk Reduction, 2020). Similarly, in some instances, women headed households and households in rural areas may be less able to cope with disasters and thus deserve special attention in policies that aim to enhance disaster risk preparedness.

Finally, our paper sheds new light on the implications of multiple, overlapping disasters and the challenges they pose to disaster risk management. The COVID-19 pandemic had major implications for the financial wellbeing of households, particularly those whose income was earned in close-contact professions. We document that deteriorating financial circumstances during the COVID-19 pandemic continued to result in reduced disaster risk preparedness even after the peak of the pandemic. The findings underline that addressing disasters will become increasingly complex as climate change will lead to a more volatile and riskier environment.

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Declaration of interest

The authors are not aware of any financial or personal relationships with other people or organizations that could inappropriately influence or bias this work.

Data availability statement

The microdata used in this paper is publicly available through the World Bank Microdata Catalogue for four of the five countries: Belize (https://doi.org/10.48529/6zwy-a603), Dominica (https://doi.org/10.48529/3sf6-h006), Haiti (https://doi.org/10.48529/dj1x-q178), and Saint Lucia (https://doi.org/10.48529/ynvs-3h73). At the time of writing this statement, the team was in the process of publishing the data for Suriname and the Do files to replicate the analysis.

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Figures and tables

Figure 1a. Count of natural disasters that overwhelmed local capacity, 1950-2023

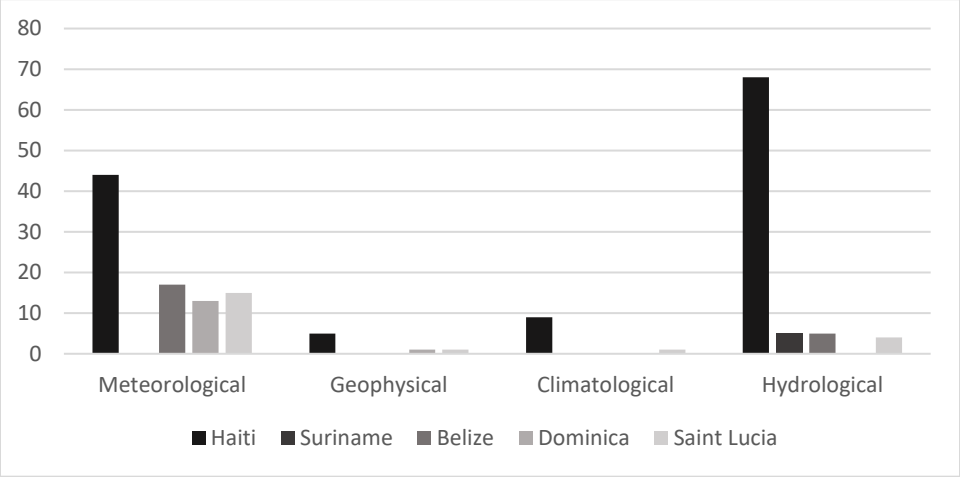


Figure 1b. Count of natural disasters that overwhelmed local capacity, over time

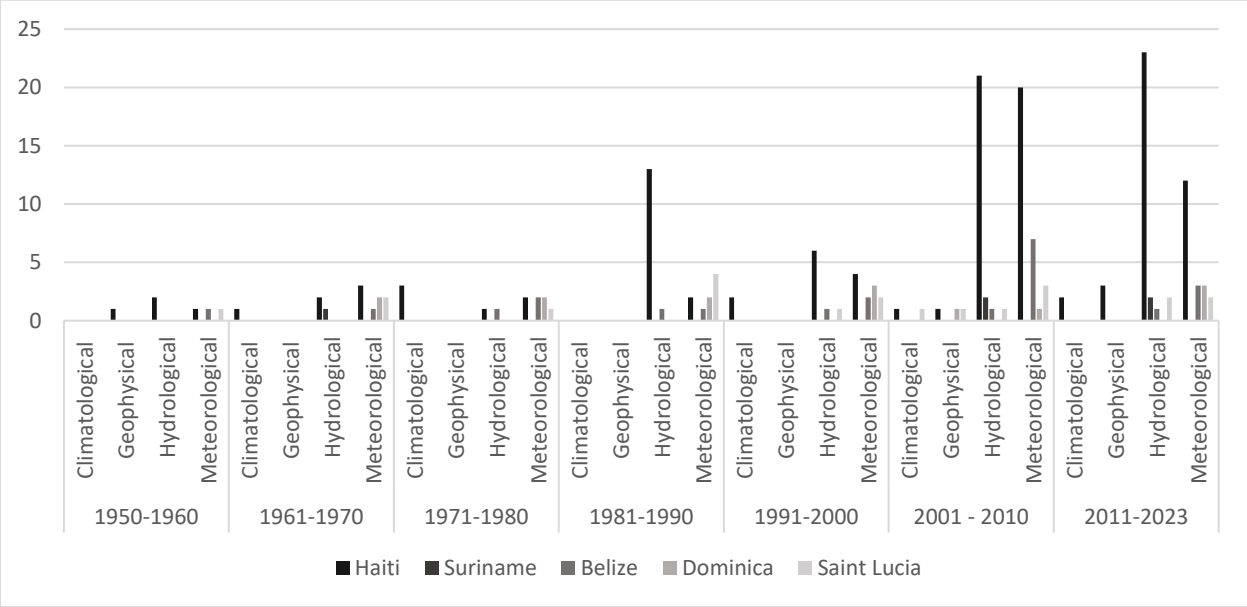
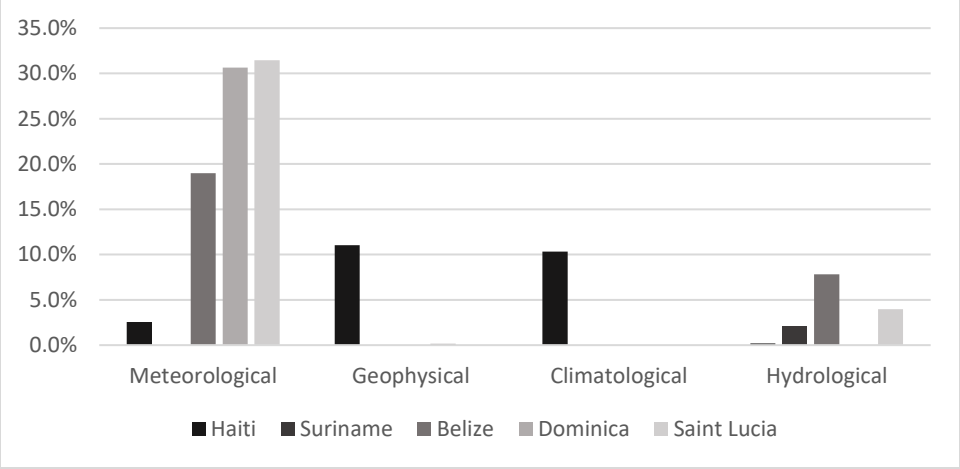


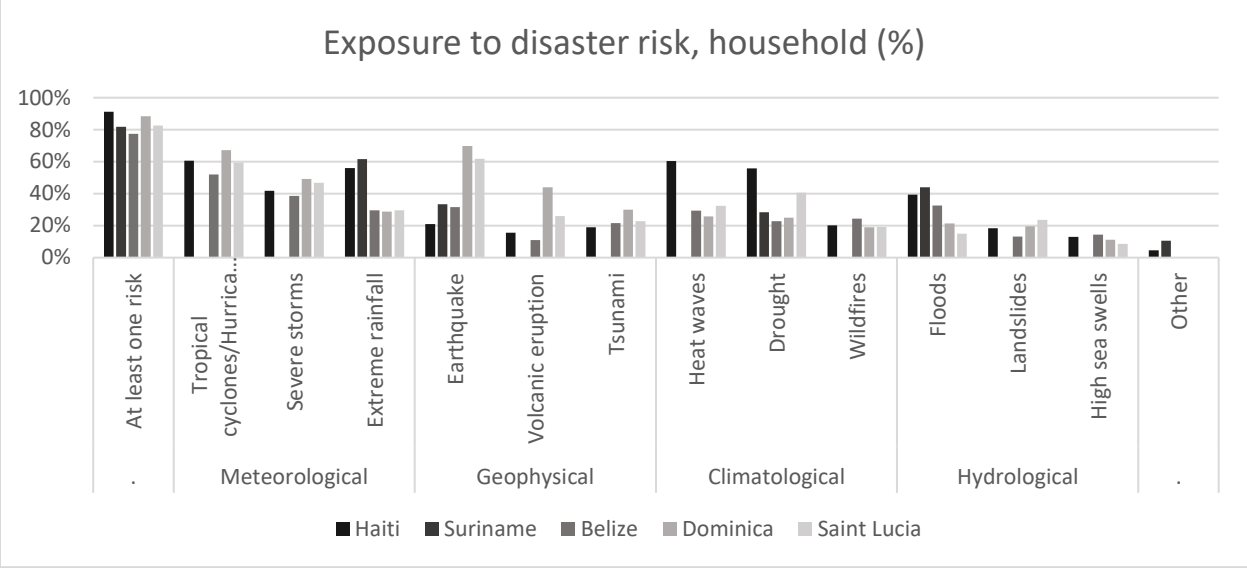
Figure 1c. Average share of the population affected by type of natural disaster, 1960-2023



Source: EM-DAT.

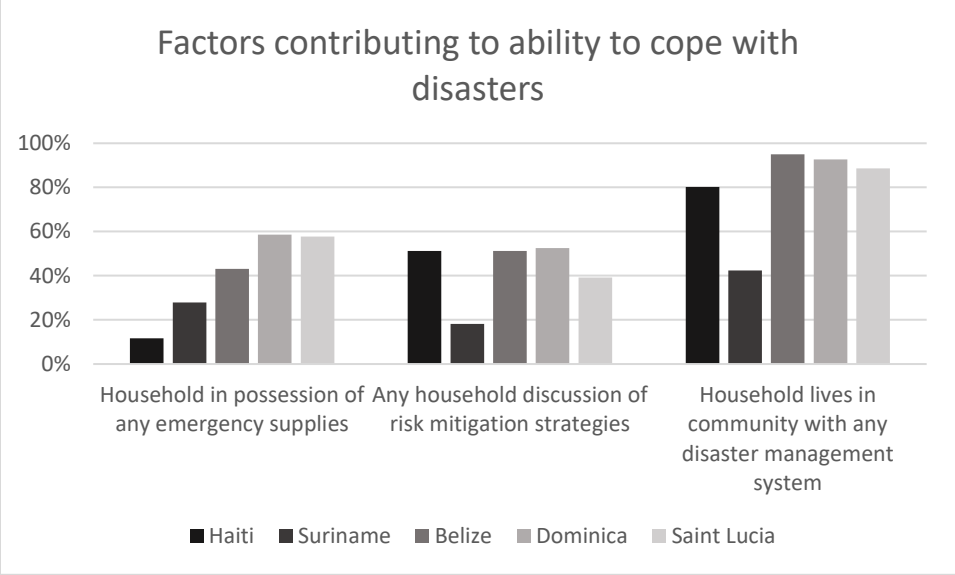
Note: The meteorological category includes tropical cyclones and storms; the geophysical category encompasses ground movements. Climatological events include cold waves and droughts; hydrological events encompass floods, landslides, and coastal floods. Figures 1a and 1b show the cumulative total number of events within each of these categories per country over the period from 1950 to 2023. Figure 1c displays the average share of the population affected by individual natural disasters in the period from 1960 to 2023. The share of the population at the time of the event was calculated based on total population numbers reported in the World Development Indicators, which are available from 1960 onwards.

Figure 2. Self-reported exposure to disaster risks, household (%)



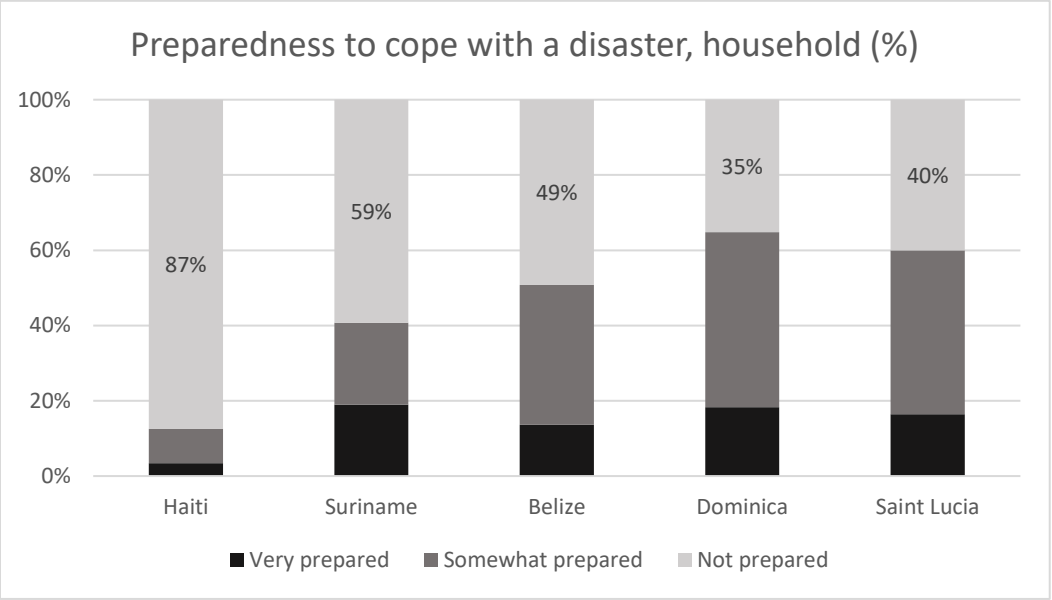
Source: World Bank – UNDP LAC High-Frequency Phone Survey, 2021 - Wave 2.

Figure 3. Factors contributing to ability to cope with disasters, household (%)



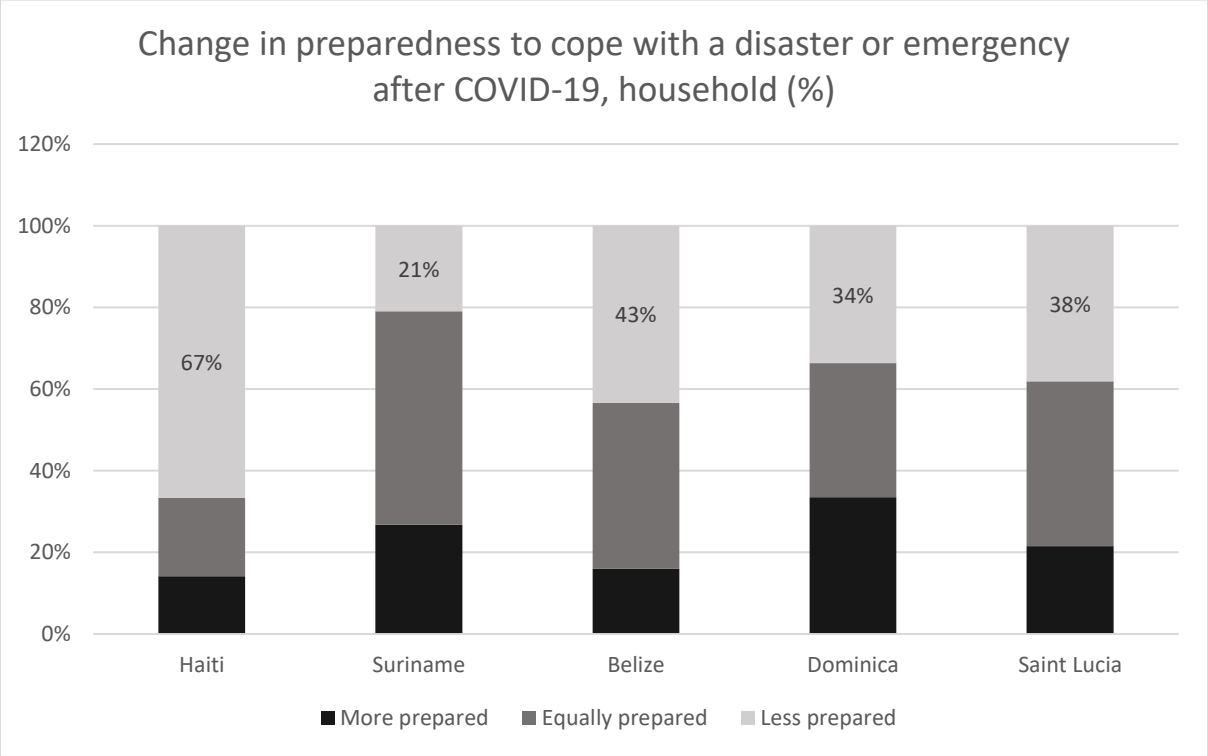
Source: World Bank – UNDP LAC High-Frequency Phone Survey, 2021 – Wave 2.

Figure 4. Preparedness to cope with a disaster, household (%)



Source: World Bank – UNDP LAC High-Frequency Phone Survey, 2021 - Wave 2

Figure 5. Change in preparedness to cope with a disaster or emergency after COVID-19, household (%)



Source: World Bank – UNDP LAC High-Frequency Phone Survey, 2021 - Wave 2.
Note: The sample is restricted to households exposed to at least one risk.

Table 1. Descriptive statistics of household socioeconomic characteristics

		Haiti		Suriname		Belize		Dominica		St. Lucia	
	Definition	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Sex of the household head											
Female	The head of the household is female (Yes/No)	0.43	*0.49*	0.36	*0.48*	0.30	*0.46*	0.39	*0.49*	0.41	*0.49*
Educational attainment household head											
Secondary	The head of household has completed secondary education (Yes/No)	0.40	*0.49*	0.58	*0.49*	0.32	*0.47*	0.36	*0.48*	0.36	*0.48*
Tertiary	The head of household has completed tertiary education (Technical school/University) (Yes/No)	0.18	*0.38*	0.15	*0.36*	0.21	*0.41*	0.27	*0.45*	0.27	*0.44*
Household location											
Urban	The household is located in an urban area (Yes/No)	0.62	*0.49*	0.62	*0.49*	0.42	*0.49*	0.34	*0.48*	0.34	*0.47*
Household composition											
HH has children	At least one person in the household is under the age of 18 (Yes/No)	0.46	*0.50*	0.86	*0.35*	0.54	*0.50*	0.33	*0.47*	0.32	*0.47*
HH has elderly	At least one person in the household is age 65+ (Yes/No)	0.81	*0.39*	0.24	*0.42*	0.68	*0.47*	0.76	*0.43*	0.72	*0.45*
Household economic situation											
Able to cover basic needs	The household can meet its monthly basic needs (based on a self-determined amount or a predetermined amount if a self-determined amount is not reported) (Yes/No)	0.14	*0.35*	0.42	*0.49*	0.44	*0.50*	0.43	*0.49*	0.42	*0.49*
Total Household Interviewed		2,361		820		898		879		860	

Source: Estimates based on World Bank – UNDP LAC High-Frequency Phone Survey, 2021 - Wave 2
Note: Mean and standard deviation (SD) of the socioeconomic background variables used in the analysis.

Table 2. Aspects of factors that contribute to disaster risk preparedness (means in percentages)

	Haiti	Suriname	Belize	Dominica	St. Lucia
	(1)	(2)	(3)	(4)	(5)
Household owns any emergency supply	11.7%	27.9%	43.1%	58.7%	57.7%
Packaged food		11.8%	31.7%	34.3%	43.6%
Flashlight		5.0%	29.1%	32.4%	41.6%
Bottled water		5.9%	24.0%	24.9%	33.9%
First aid kit		2.8%	20.2%	23.5%	19.2%
Battery powered radio		0.9%	15.7%	10.3%	15.6%
Important documents		1.9%	10.1%	13.2%	16.5%
Eyeglasses or medicine		4.1%	6.2%	11.8%	9.3%
Blankets/Sleeping bags		2.4%	7.8%	6.0%	11.0%
Soap/Hand sanitizer		5.2%	6.6%	3.3%	12.7%
Cash		3.0%	4.9%	2.0%	7.4%
Mask		4.3%	4.8%	2.1%	9.2%
Shovel and/or pick		2.0%	5.7%	4.2%	7.7%
Rain clothes		2.7%	5.8%	3.8%	5.8%
Other		10.0%	8.7%	16.8%	8.6%
Household discussed any risk mitigation strategy	51.2%	18.2%	51.3%	52.5%	39.2%
Going to a shelter		4.4%	29.8%	25.7%	18.1%
Escape and evacuation plans		4.6%	22.7%	19.7%	13.7%
Emergency supplies		0.3%	13.7%	16.4%	12.1%
Planned meeting place		4.5%	11.8%	13.4%	10.3%
Measures to strenghten home		5.1%	9.5%	8.9%	6.7%
List of important phone numbers		2.1%	5.0%	3.1%	5.1%
Measures for members with special needs		1.9%	1.6%	1.6%	1.8%
Community warning signals		0.0%	0.5%	1.0%	0.4%
Other		4.2%	1.6%	3.6%	3.2%
Household has access to any community system	80.2%	42.4%	94.9%	92.7%	88.7%
A shelter	48.5%	11.4%	90.0%	86.5%	87.8%
Evacuation routes	62.4%	19.0%	64.2%	57.6%	42.9%
Trained community members	28.4%	21.2%	57.0%	74.1%	54.7%
Disaster committee or group	22.3%	16.5%	61.6%	72.2%	49.4%
Disaster response or emergency plan	10.4%	13.2%	49.4%	60.1%	38.4%
Early warning system	18%	15%	48%	34%	28%

Source: Estimates based on World Bank – UNDP LAC High-Frequency Phone Survey, 2021 - Wave 2

Table 3. Socio-demographic correlates of factors that contribute to ability to cope with disasters

	Panel A: Household owns any emergency supply					Panel B: Household discussed any risk mitigation strategies					Panel C: Household lives in community with at least one DRM system				
	Haiti	Suriname	Belize	Dominica	St. Lucia	Haiti	Suriname	Belize	Dominica	St. Lucia	Haiti	Suriname	Belize	Dominica	St. Lucia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Sex of the household head															
Female head	-0.03**	-0.03	-0.01	-0.03	-0.02	0.00	-0.05*	0.04	-0.05	0.01	-0.05***	-0.05	-0.02	-0.02	0.05**
	(0.01)	(0.03)	(0.04)	(0.04)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)	(0.03)	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)
Educational attainment household head (base: less than secondary)															
Head: Secondary	0.04***	0.09**	0.14***	0.10**	0.12***	-0.00	0.06*	0.04	0.03	0.10**	0.04**	0.01	-0.02	-0.02	0.08***
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.02)	(0.04)	(0.02)	(0.02)	(0.03)
Head: Tertiary	0.10***	0.23***	0.29***	0.22***	0.28***	0.00	0.09**	0.14***	0.05	0.16***	0.04*	0.16***	-0.02	-0.04*	0.05
	(0.02)	(0.05)	(0.04)	(0.04)	(0.04)	(0.03)	(0.05)	(0.05)	(0.05)	(0.05)	(0.03)	(0.06)	(0.02)	(0.02)	(0.03)
Household location															
Urban	0.04***	-0.04	0.02	0.04	0.10***	-0.01	0.00	0.06*	-0.07*	0.02	-0.00	-0.06*	-0.01	-0.06***	-0.09***
	(0.01)	(0.03)	(0.03)	(0.04)	(0.04)	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)
Household composition															
HH has children	-0.03**	-0.04	-0.06*	0.01	-0.03	0.07***	-0.04	0.07**	-0.04	0.13***	0.06***	-0.11**	0.01	0.00	0.00
	(0.01)	(0.05)	(0.03)	(0.04)	(0.04)	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)	(0.02)	(0.05)	(0.02)	(0.02)	(0.02)
HH has elderly	0.04**	0.03	0.08**	0.08**	0.01	-0.04	0.02	0.05	-0.08*	0.04	-0.01	0.02	0.01	0.01	-0.01
	(0.02)	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)
Household economic situation															
Able to cover basic needs	0.16***	0.19***	0.26***	0.20***	0.23***	-0.03	0.05*	0.07**	0.06*	0.02	0.03	0.02	0.02	-0.01	0.01
	(0.02)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)	(0.02)	(0.02)	(0.02)
Constant	0.03	0.18***	0.19***	0.35***	0.34***	0.54***	0.16***	0.34***	0.60***	0.23***	0.78***	0.53***	0.95***	0.97***	0.87***
	(0.02)	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.03)	(0.06)	(0.02)	(0.03)	(0.03)
Observations	1,997	783	842	781	803	2,004	792	843	787	803	2,016	803	850	773	796

Source: Estimates based on World Bank – UNDP LAC High-Frequency Phone Survey, 2021 – Wave 2

Note: The outcome variables in Panels A, B, and C respectively are the indicators taking the value 1 if the household: possesses at least one emergency supply, discussed any risk management strategies, lives in a community with at least one risk management system or strategy. Able to cover basic needs indicates that the household can meet its monthly basic needs (self-determined). The regression is a simple OLS. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two tailed).

Table 4. Factors that may contribute to ability to cope with disasters

	Haiti	Suriname	Belize	Dominica	St. Lucia
	(1)	(2)	(3)	(4)	(5)
Household...					
…has access to at least one emergency supply	0.37***	0.22***	0.45***	0.40***	0.47***
	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)
…has discussed DRM strategies	0.03**	0.19***	0.06*	-0.01	-0.01
	(0.01)	(0.04)	(0.03)	(0.03)	(0.03)
…lives in communitiy with at least one DRM system	0.04**	0.14***	0.13*	-0.08	0.07
	(0.02)	(0.03)	(0.07)	(0.06)	(0.05)
Constant	0.04**	0.25***	0.16**	0.49***	0.27***
	(0.02)	(0.02)	(0.07)	(0.06)	(0.05)
Observations	2,212	757	862	818	818

Source: Estimates based on World Bank – UNDP LAC High-Frequency Phone Survey, 2021 - Wave 2
Note: The outcome variable is the indicator taking the value 1 if the household is "somewhat prepared" or "very prepared" to cope with a disaster or emergency. The regression is a simple OLS. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two tailed).

Appendix 1. Disaster risk management survey module

15.03 Do you think your household is threatened by the following natural hazards…

a. Extreme rainfall?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

b Severe storms?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

c Floods?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

d Tropical cyclones / hurricanes?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

e Heat waves?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

f Drought?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

g Wildfires?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

h Volcanic eruption?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

i Earthquake?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

j Landslides?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

k High sea swells?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

l Tsunami?
- 1 YES
- 2 NO
- 98 DOES NOT KNOW

m. Other (Specify) _____

15.04 Do you feel like your household is very prepared, somewhat prepared, or not prepared to handle a disaster or emergency at the moment?

1 VERY PREPARED
2 SOMEWHAT PREPARED
3 NOT PREPARED
98 DOES NOT KNOW

15.05 We would like to better understand how prepared your household is in case of a disaster or emergency. Do you have supplies or other things in your home that could be used to help your household in a disaster or emergency?

1 YES
2 NO >> 15.07
98 DOES NOT KNOW >> 15.07

15.06 What supplies do you have?

[ENUMERATOR: PLEASE PROMPT THE RESPONDENT FOR ADDITIONAL/OTHER SUPPLIES. MULTIPLE ANSWERS ALLOWED]

a PACKAGED FOOD
b BOTTLED WATER
c BATTERY POWERED RADIO
d FIRST AID KIT
e FLASHLIGHT
f CASH
g EYEGLASSES OR MEDICINE
h IMPORTANT DOCUMENTS
i SHOVEL AND/OR PICK
j RAIN CLOTHES
k BLANKETS AND/OR SLEEPING BAGS
l MASKS
m SOAP AND/OR HAND SANITIZER
o OTHER (SPECIFY)

15.07 Have you and your family members ever spoken about or planned what you would do if a disaster or emergency occurs?

1 YES
2 NO >> 15.09
98 DOES NOT KNOW >> 15.09

15.08 What did you discuss?

[ENUMERATOR PLEASE PROMPT REPONDENT FOR ADDITIONAL/OTHER TOPICS DISCUSSED. MULTIPLE ANSWERS ALLOWED]

a. PLANNED MEETING PLACE FOR FAMILY MEMBERS
b. LIST OF IMPORTANT PHONE NUMBERS OR CONTACTS
c. MEASURES TO STRENGTHEN YOUR HOME OR REDUCE RISK OR DAMAGE TO YOUR PROPERTY
d. EMERGENCY SUPPLIERS OR A PLANNED LIST OF ITEMS AND DOCUMENTS TO TAKE IN CASE THE FAMILY LEAVES HOME
e. MEASURES FOR FAMILY MEMBERS WITH SPECIAL NEEDS
f. COMMUNITY WARNING SIGNALS
g. ESCAPE AND EVACUATION PLANS
h. GOING TO A SHELTER/PLACE TO STAY
i. other (specify)

15.09 Compared to just before the pandemic, do you feel like your household is more prepared, equally prepared, or less prepared to handle a disaster or emergency?

1 MORE PREPARED >> 15.11
2 EQUALLY PREPARE >> 15.11
3 LESS PREPARED
98 DOES NOT KNOW >> 15.11

15.10 Why do you think your household is less able to handle a disaster or emergency?

[ENUMERATOR PLEASE PROMPT RESPONDENTS FOR ADDITIONAL OR OTHER REASONS WHY THEY FEEL THEY ARE LESS PREPARED TO HANDLE A DISASTER OR EMERGENCY. MULTIPLE ANSWERS ALLOWED]

a. LOST JOB OR INCOME
b. REDUCED EARNINGS (SAME JOB/INCOME EARNING ACTIVITIES)
c. FAMILY MEMBER DIED OR MOVED AWAY
d. FAMILY MEMBER BECAME SICK, DISABLED OR COULDN'T WORK FOR HEALTH REASONS
e. FAMILY IS WORSE OF FINANCIALLY THAN BEFORE BECAUSE COST OF LIVING HAS INCREASED
f.. FAMILY HAS NO MORE SAVINGS
g. FAMILY LOST OR SOLD LIFESTOCK
h. FAMILY CANNOT TAKE OUT ANY MORE LOANS FROM FORMAL SOURCES
i. REDUCED ACCESS TO EXTERNAL ASSITANCE TO MEET FOOD AND OTHER ESSENTIAL NEEDS
j. REDUCED ACCESS TO EXTERNAL ASSISTANCE TO EVACUATE TO A SAFE PLACE IN THE EVENT OF A DISASTER
k. REDUCED REMITTANCES FROM RELATIVES
l. other (specify)

15.11 Does your community have an early warning system to monitor natural hazards, detect risks, and inform community members about impending threats?

1 YES
2 NO
98 DOES NOT KNOW

15.12 Does your community have?

a. A disaster response or emergency plan?
   1 YES
   2 NO
   98 DOES NOT KNOW

b. A committee or organized group that decides what to do in disasters or emergencies?
   1 YES
   2 NO
   98 DOES NOT KNOW

c. Trained community members to assist others in the event of a disaster?
   1 YES
   2 NO
   98 DOES NOT KNOW

d. Evacuation routes
   1 YES
   2 NO
   98 DOES NOT KNOW

e. A shelter identified where people can go in the event of a disaster?
   1 YES
   2 NO
   98 DOES NOT KNOW

Appendix 2. Additional results

Appendix Table A2.1. Socio-demographic correlates of preparedness to cope with a disaster

	Haiti	Suriname	Belize	Dominica	St. Lucia
	(1)	(2)	(3)	(4)	(5)
Sex of the household head					
Female head	-0.01	-0.07*	-0.01	-0.06*	-0.04
	(0.02)	(0.04)	(0.04)	(0.03)	(0.03)
Educational attainment household head (base: less than secondary)					
Head: Secondary	0.04**	-0.07	0.12***	0.10**	0.06
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)
Head: Tertiary	0.11***	-0.03	0.24***	0.24***	0.21***
	(0.02)	(0.06)	(0.04)	(0.04)	(0.04)
Household location					
Urban	-0.01	-0.05	0.01	0.07*	0.07**
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)
Household composition					
HH has children	-0.02	-0.10*	-0.06*	-0.13***	-0.04
	(0.02)	(0.05)	(0.03)	(0.04)	(0.04)
HH has elderly	-0.01	0.06	0.00	0.00	-0.08**
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)
Household economic situation					
Able to cover basic needs	0.16***	0.20***	0.25***	0.11***	0.28***
	(0.02)	(0.04)	(0.03)	(0.03)	(0.03)
Constant	0.11***	0.50***	0.34***	0.54***	0.46***
	(0.02)	(0.06)	(0.05)	(0.05)	(0.04)
Observations	1,941	761	830	766	784

Source: Estimates based on World Bank – UNDP LAC High-Frequency Phone Survey, 2021 - Wave 2

Note: The outcome variable is the indicators taking the value 1 if the household is "somewhat prepared" or "very prepared" to cope with a disaster or emergency. Able to cover basic needs indicates that the household can meet its monthly basic needs (self-determined). The regression is a simple OLS. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively (two tailed).