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Short communication

Public understanding of climate change and health in the Caribbean: Results and recommendations from a 10-country perceptions survey

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1. Introduction

The Caribbean is a massive archipelago which spans more than 106 thousand square miles and includes more than 37 million residents living at increasing vulnerability due to coastal flooding from low-lying geography and lifestyles impacted by increased population density, limited economic activities, and a high dependence on imported products. Inequality due to race, gender, and education remains one of the leading barriers to growth in the Caribbean, intensified by the impacts of COVID-19 [1]. Health inequalities also exist and, while it has been estimated that the average Caribbean country health expenditure represents 6% of GDP, per capita spending on health ranges from Guyana (USD$250.00) to the Bahamas (USD $1621) [2].

This region of the Americas is at the forefront of the human impact from climate change and it is becoming increasingly clear that this situation is altering Caribbean life [3]. An increasingly noteworthy priority for the sustainable development of these small island developing states is the establishment of resilient health systems [4]. A core principle of public health practice is to help individuals understand risks to their health so that they can make informed decisions about how best to reduce those risks. Organizations working to promote climate and health resiliency must incorporate an understanding of their audiences to develop effective public engagement programs.

Globally, the extent to which the public is informed about climate change and health is unclear [5]. Most research on public perceptions has been concentrated in developed nations, particularly the USA. That research suggests public understanding of the health implications of climate change is limited [6], but that providing information about the health impacts and solutions can increase public engagement [7,8]. There has been less emphasis on the Caribbean subregion which presents a challenge for organizations focused on informing the public, communicating to climate and health stakeholders and in the planning of climate and health projects.

Among the limited population data collected over the past decade, Caribbean research has found that health care providers view climate change and health as an urgent priority [9]. They note the direct effects from increasing temperatures on both morbidity and mortality [10] and recognize the impact on the social and environmental determinants of health. A survey of students and community members found a moderate degree of knowledge on the linkages between climate change and health, particularly as it relates to increasing temperature, increasing rainfall and contamination of food [11]. Beyond this handful of studies, no multi-country Caribbean survey has been administered to date.

To address these gaps in our understanding of Caribbean perceptions on climate and health, we conducted a survey to assess the knowledge, attitudes, and perceptions of the Caribbean people. The main objectives of the survey were the following: 1) reach an understanding of public perceptions to better inform climate and health

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communication plans; 2) establish a baseline for tracking progress in public understanding and engagement; 3) address the current lack of region-specific data on climate change and health public perceptions; and 4) share findings with the Caribbean community to promote and prioritize further research.

2. Survey design

The survey instrument was designed and analyzed by The University of the West Indies, St Augustine (UWI-STA) and the Pan American Health Organization (PAHO), in collaboration with George Mason University. Study data were collected and managed using REDCap electronic data capture tools hosted at The University of the West Indies, Cave Hill [12,13]. Self-administered REDCap survey links were disseminated in Spring 2021 through DIGICEL's online LOOP newspaper and mobile phone network short message service (SMS), targeting a convenience sample of 3000 participants across ten English-speaking countries. DIGICEL, UWI-STA and PAHO social media channels were used to promote the survey which included sections related to demographics, general awareness, public perceptions, and sources of information on climate and health. The study received ethical approval from ethics committees of both The UWI-STA and PAHO.

3. Survey demographics

Of 2761 persons from ten English-speaking Caribbean countries who responded to the survey, 2599 provided informed consent (Table 1). There were a disproportionate number of responses from countries with larger populations, with Jamaica and Trinidad and Tobago representing almost 40% of all respondents. Most respondents were female (67%), aged 25 to 54 years (63%), had completed at least secondary school (96%), and lived in a suburban or urban setting (63%).

Table 1
Demographics of climate change respondents, selected english-speaking Caribbean Countries, 2021.

Demographic	*n*	%
Gender (*n*=2251)		
Male	747	33.2
Female	1504	66.8
Age Group (*n*=2267)		
18–24 years old	210	9.3
25–34 years old	444	19.6
35–44 years old	523	23.1
45–54 years old	467	20.6
55–64 years old	366	16.1
>65 years old	257	11.4
Education Completed (*n*=2249)		
No Formal Schooling	6	0.3
Primary School	79	3.5
Secondary School (High School)	599	26.6
Tertiary	1656	69.6
Urbanicity (*n*=2599)		
Urban	486	21.7
Suburban	924	41.3
Rural	826	36.9
Country (*n*=2599)		
Antigua and Barbuda	90	3.5
Barbados	367	14.1
Dominica	122	4.7
Grenada	227	8.7
Guyana	228	8.8
Jamaica	624	24.0
St. Kitts and Nevis	42	1.6
St. Lucia	282	10.9
St. Vincent and the Grenadines	202	7.8
Trinidad and Tobago	415	16.0

4. Risk perceptions

Among 2599 respondents, 60% believed that climate change was linked entirely or mostly to human activities and 34% believed that climate change was caused equally by human and natural changes. Respondents were asked their thoughts on how much climate change might affect human health and 76% believed it was likely to have a moderate to large impact. These findings agree with a recent global survey which found that respondents from vulnerable countries find climate change to generally be harmful to health [5]. The proportion of respondents who believed climate change had an impact on various health-related factors ranged from about 60% for extreme weather events, extreme heat, and air pollution to only one-third for hunger/malnutrition and contaminated water and one-quarter for contaminated food (Fig. 1).

5. Perceived vulnerable groups

Of 2599 respondents, most (62%) believed that climate change would affect the health of some groups of people more than others. However, consistent with prior research [6], few respondents were able to accurately identify which specific populations would be more vulnerable to health problems because of climate change (Fig. 2). The only group identified as more vulnerable by at least half of respondents were those with pre-existing health conditions. Immigrants and indigenous people were recognized as more vulnerable to climate change by fewer than 20% of the respondents.

6. Support for action to address health effects of climate change

A large proportion (84%) indicated that Caribbean nations included in the sample should make a large-scale effort to protect people from the harmful health effects of climate change (*n*=2245). Moreover, about four-fifths or more of respondents felt that a variety of organizations should be doing more to protect people from health problems related to climate change, including the Ministry of Health and other government ministries, community-based organizations, local government officials, regional CARICOM organizations, international organizations, and universities (Fig. 3).

7. News exposure and trusted sources of information

Over the past year, 61% of respondents said they had seen or read at least one news story on climate change (*n*=2234). Ministry of Health officials and local doctors and nurses were the most trusted sources for information about the health effects of climate change, with 37% of respondents saying they trust these sources "a great deal", and 38% "a moderate amount" (Fig. 4). This underscores the need to support health care providers, who already exhibit a strong willingness to educate the public and serve as advocates [14]. Approximately 33% of respondents reported trusting more traditional news sources (TV and radio news) a great deal, as compared to only 19% trusting social media a great deal. This emphasizes a reduced level of trust in social as compared to more traditional media outlets, as well as people's reliance on both traditional and more modern means of communication.

8. Conclusions and limitations

Those who responded to this survey were generally a younger and more educated segment of the Caribbean population, with the majority of whom had completed tertiary education. This may have resulted in respondents giving more informed answers to the questions than would have been the case with a truly random sample. Respondents noted concern about climate change and health, recognized the human contributions and believed that support from

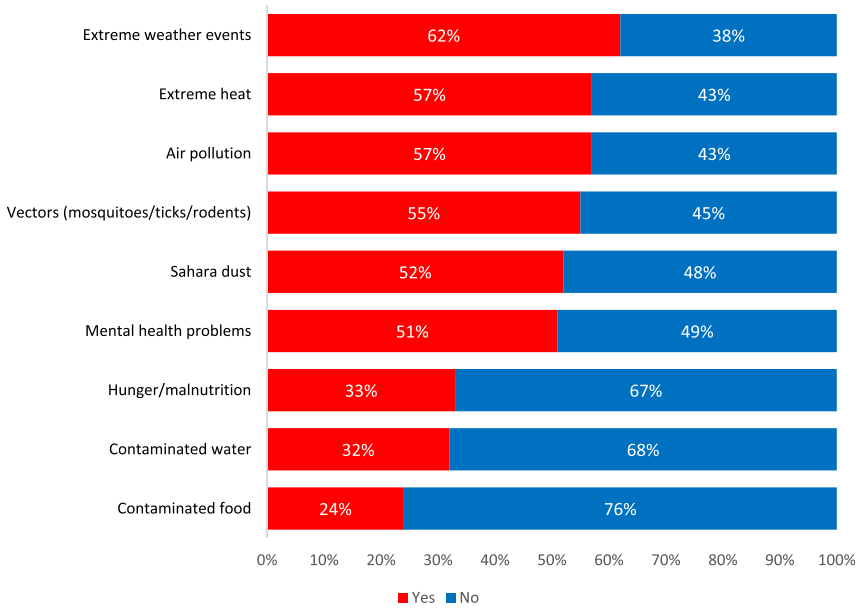

Fig. 1. Perception of Climate Change Impact on Human Health, Selected English-Speaking Caribbean Countries, 2021 (*n*=2599) What are the main impacts of climate change that you believe most affect human health in your country? (Check all that apply) Extreme weather events (e.g. floods, storms, etc.), Extreme heat | Air pollution from cars and power plants (e.g. poor air quality emissions) | Mosquito, tick, and rodent-borne disease | Air pollution from Sahara dust | Mental health problems | Hunger/malnutrition (drought/fisheries) | Illness caused by contaminated water | Illness caused by contaminated food.

governments and other organizations was important. There was limited public awareness of the potential impacts on water and food safety and security, and of which groups most vulnerable to the health risks of climate change. Importantly, poor public understanding of the disproportionate health effects of climate change on certain populations could exacerbate existing health disparities. More research is needed on effective strategies to raise awareness of these disparities and build public support for policies to improve health equity [15,16].

Of concern was the large proportion of respondents who had not viewed any articles on climate and health in the media, indicative of the need for human-interest stories and other communication methods to provide an emotional portrayal of the impacts on the most vulnerable Caribbean populations. In terms of further educating and serving as advocates, the training of health care providers as trusted sources of information is recommended.

The study utilized a convenience sampling strategy, thus limiting generalizability as well as increasing the possibility for selection bias toward those having an interest in climate change. Additionally, the study did not include any of the non-English speaking territories of the Caribbean. While this sample indicated that the Caribbean public were supportive of national climate change and health efforts, the

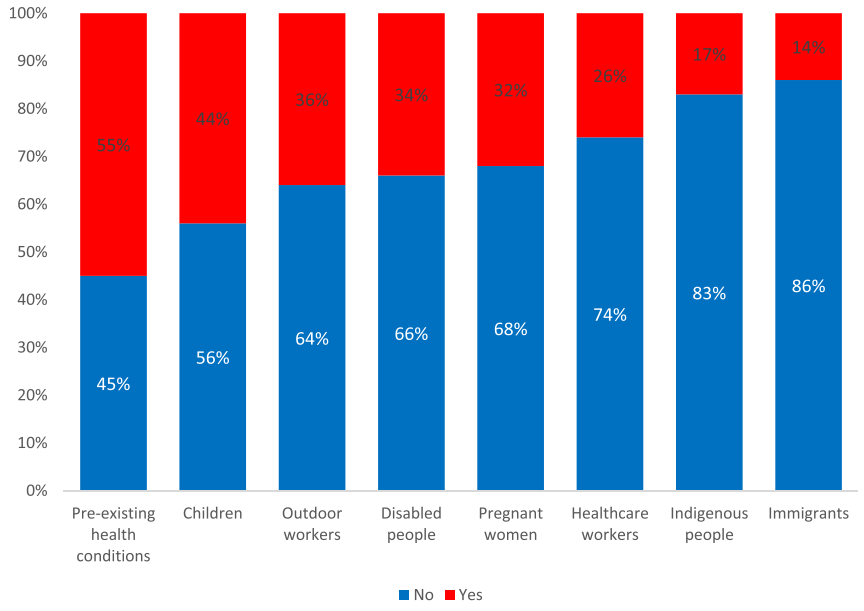

Fig. 2. Perception of Vulnerable Groups Most Likely to Experience Climate Change Health Related Problems, Selected English-Speaking Caribbean Countries, 2021 (*n*=2599) Which groups or types of people in the Caribbean do you think are more likely than others to experience health problems related to climate change? (Check all that apply) People with pre-existing health conditions | Children | Outdoor workers | Disabled people | Pregnant women | Health care workers | Indigenous peoples | Immigrants.

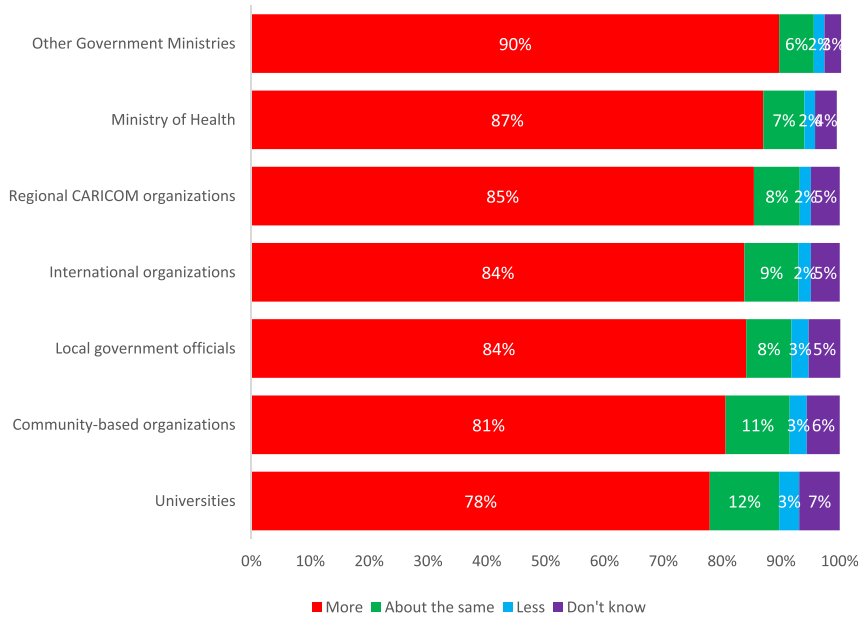

Fig. 3. Perception of Entities that should Work to Protect People from Climate Change Health Related Problems, Selected English-Speaking Caribbean Countries, 2021 (*n*=2245) Fig. 3: In your opinion, should each of the following entities/organizations be doing (more, less, or about the same) amount of work as they are doing now to protect people from health problems related to climate change? (Check all that apply) Other Government Ministries (e.g. Agriculture, Environment, Energy, etc.) | Ministry of Health | Regional CARICOM organizations (e.g. CARPHA, CDEMA, Caribbean Community Climate Change centre) | International organizations (e.g. Pan American Health Organization (PAHO), FAO, UNICEF) | Local government officials | Community-based organizations | Universities.

survey did not further detail national programs to address health impacts. A further limitation was the omission of questions related to inequalities or socioeconomic status.

As this was the first sub-regional survey covering a significant number of the Caribbean countries, there remains the need for institutions to collect public perceptions data to design appropriate social and behavioral communication strategies. This study found limited public knowledge of the relationship between areas such as climate and environmental determinants of health, as well as mental health issues. The Caribbean health authorities, and the non-health ministries that contribute to health and well-being (water, environment, land use/planning, etc.), should seek out ways to further engage the public in messaging around climate and health.

Given the predictions of a worsening climate crisis in the Caribbean, health should be at the forefront of a collective vision, and the public should be a key partner in this effort. Finally, the results of the study send a strong signal to Caribbean institutions in the English-speaking Caribbean to build trust with the public as climate change adaptation takes place. Without trust in the authorities, we are unlikely to see participatory action.

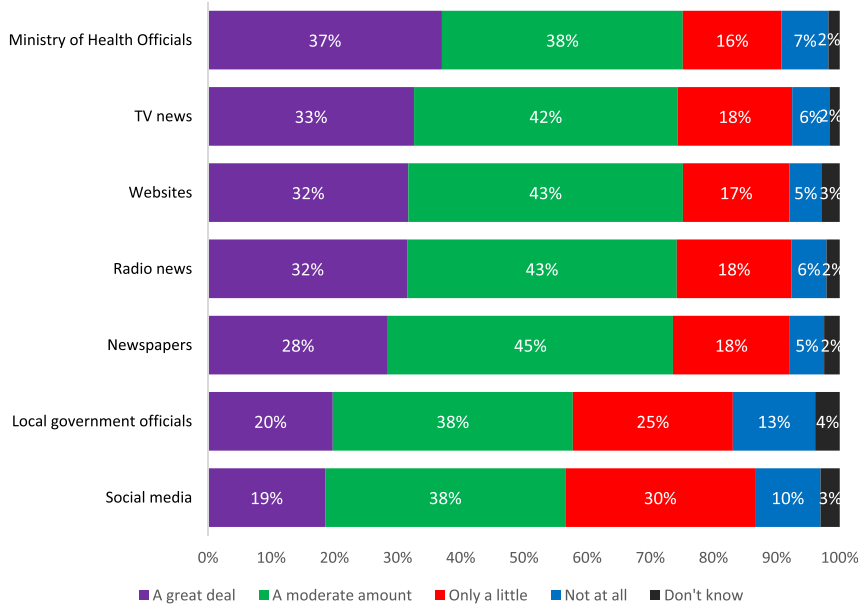

Fig. 4. Reported Trusted Sources of Information on Harmful Health Effects of Climate Change, Selected English-Speaking Caribbean Countries, 2021 (*n*=2234) How much do you trust each of the following, as accurate sources of information regarding the harmful health effects of climate change? (Check all that apply) Ministry of Health officials | TV news | Websites | Radio news | Newspapers | Local government officials | Social media.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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