

Climate Change Affects Health: Are We Listening?

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Received December 16, 2021. Accepted for publication March 16, 2022.

Global Pediatric Health
Volume 9: 1–4
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DOI: 10.1177/2333794X221091799
journals.sagepub.com/home/gph



Introduction

Climate change (CC) is a rapidly escalating crisis which poses a significant risk to child health.¹ CC principally results from the emission of greenhouse gases (including Carbon Dioxide, Nitrogen, and Methane) which traps heat-energy from the sun and causes the planet to warm.² Ninety-seven percent of climate scientists concur that the acceleration in climate-warming trends is due to human activities. Contributors include agriculture (25% of global emissions),² industry (99% of plastic is from fossil fuels and by 2050, plastic is hypothesized to be responsible for 13% of the total “carbon budget”)³ and energy/transportation (39% of global emissions).⁴

The health concerns arising from CC include increasing rates of respiratory and infectious diseases, scarcity of food/water, wildlife extinction, extreme weather, damages to infrastructure, mental illness, and death.⁵ These effects disproportionately impact racial minorities and low-income families as 34% of US Black/African-Americans persons more likely to live in areas with higher projected asthma diagnoses and Latinx individuals are 43% more likely to live in areas at risk of extreme temperature.⁶ This is relevant to our study population of New Brunswick, NJ where 85% are Latinx/Black and 50% live below the poverty line.

A significant proportion of the population are still unsure as to the extent of CC. Surveys report that 25% of the US population do not consider CC to be a “serious problem,” 23% still believe CC is due to “natural changes”⁷ and only 14% list “health consequences” as impacts of CC.⁸

This study measured the level of understanding of CC in a pediatric outpatient facility in New Brunswick, NJ and addressed any deficiencies via a comprehensive program of education. CC is the biggest global health threat of the 21st century¹ and a national and international consensus is required to address this crisis.

Methods

We developed a 10-question survey⁹ in English, Spanish, Mandarin and Arabic (Supplemental Table. 1). Email

addresses were collected via consent forms and survey-links were emailed in 2021 to parents of children less than 19 years old (1/family) at the Saint Peter’s University Hospital’s (SPUH) Family Health Center located in New Brunswick, NJ. Respondents were offered a \$5 Amazon voucher. Respondents also consented to a follow-up study following the implantation of our education program. Statistical analysis was performed using Excel and R.¹⁰ *P* values indicate the probability of the null hypothesis that the Spearman Correlation coefficient is 0. IRB approval was granted for this project at SPUH. The educational program included literature (a leaflet and poster for the outpatient facility) and community engagement (attending local community events to distribute the literature and promote this project).

Results

One hundred forty participants were approached, 98 enrolled and 70 completed the survey (N=70). Forty percent were White; 19% Black/African American; 23% Latinx, 7% Asian and 10% “Other.” Thirty-seven percent of respondents reported a child with a chronic health problem (predominantly asthma).

The overall median level of CC concern (1[low]-10[high]) was 7, inter-quartile range = 4% to 8. Thirty-one percent of respondents reported a concern score <5 (Figure 1A). Twenty-nine percent of respondents reported a likelihood of changing their behavior based on CC as <5 (1[not likely]-10[very likely])

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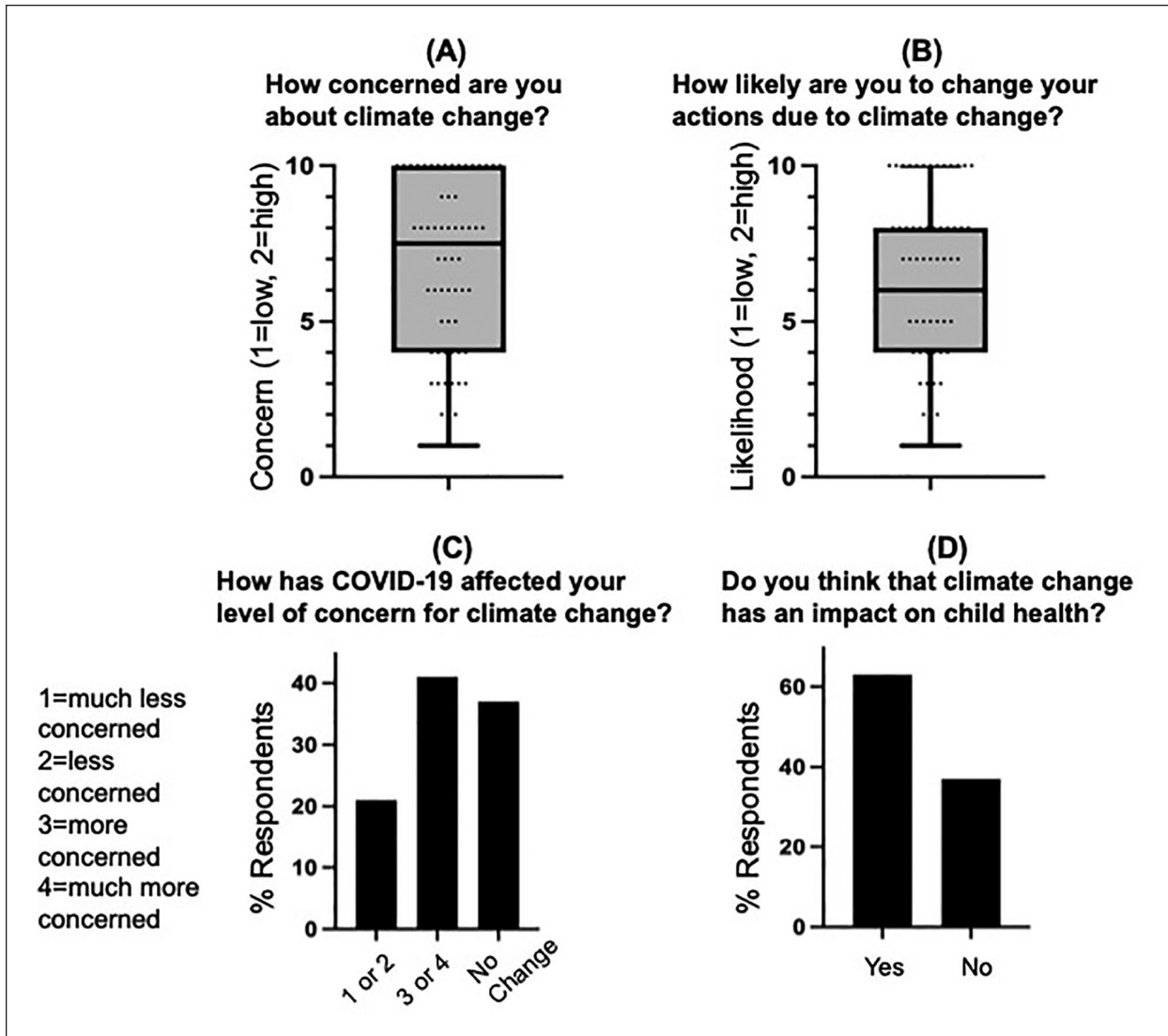


Figure 1. (A) Respondent's level of concern for climate change, (B) likelihood of respondent changing their action based on climate change. Rating is between 1 (low) and 10 (high). Box and whisker plots show median, interquartile range and range. (C) Impact of COVID-19 on respondent's level of concern and (D) Whether respondent believes Climate Change affects child health. N=70.

(inter-quartile range=4-8) (Figure 1B). Fifty-eight percent of respondents reported that COVID-19 has reduced or had no impact on their level of CC concern (Figure 1C). Sixty-three percent of respondents felt that CC impacted their child's health, citing respiratory illness, and allergies as the primary impacts (Figure 1D).

A strong positive correlation is noted between respondent's level of concern and: likelihood to change their actions based on CC ($P=.0004$) (Figure 2A), belief that CC impacts child health ($P=.0001$) (Figure 2B) and belief that individual action can contribute to CC ($P=.0013$) (Figure 2C).

Seventy-three percent of respondents report that individual action can contribute to CC ("driving" or "flying" were listed as significant actions, 6% listed food) (Supplemental Figure 1).

Respondents "with chronic disease" reported higher levels of: CC concerns and beliefs that CC impacts child health compared to respondents "without chronic disease." Additionally, 74% of respondents "with child with chronic disease" reported a likelihood of changing their behavior as 5 or above versus 55% of those "without child with chronic disease" (Supplemental Figure 1).

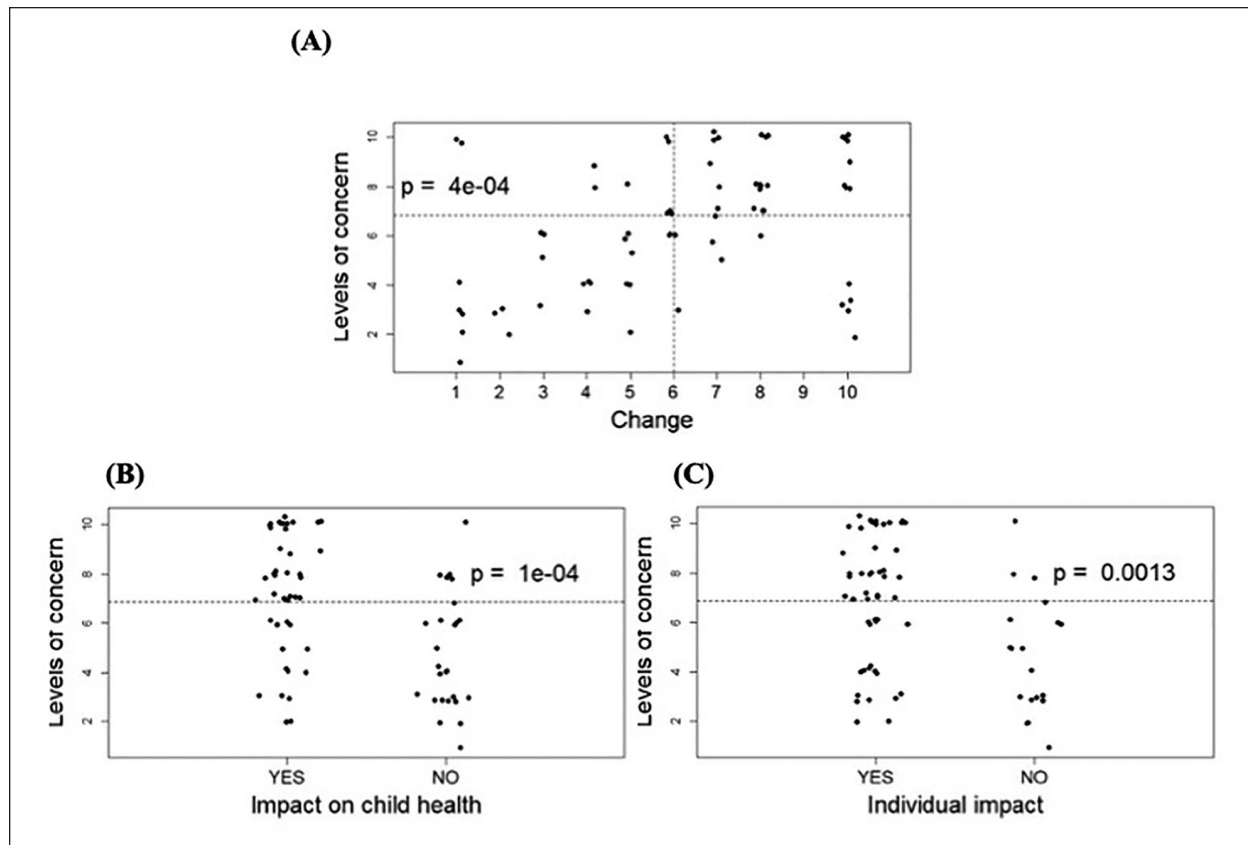


Figure 2. (A) Level of concern for climate change plotted against likelihood of respondent changing their actions based on climate change. Rating is between 1 (low) and 10 (high). $N=70$. $P=p$ value for null hypothesis that Spearman Correlation = 0. Dotted lines denote medians. (B) Level of concern for climate change as a function of the respondent's belief that climate change affect's child health. (C) Level of concern for climate change as a function of the respondent's belief that individual action can contribute to climate change. Y-axis denotes level of concern between 1 (low) and 10 (high). $N=70$. Dotted lines denote medians.

Seventy-three percent of respondents were open to receiving more information about CC, with the majority listing community event, email or leaflet as their preferred method (Supplemental Figure 1).

Discussion and Conclusion

The range of responses were broad, and despite a median of 5, 1/3 of respondents do not rate their level of CC concern as “high.” The COVID-19 pandemic has overall increased the level of CC concern; however, a majority still report no change or less concern.

A particularly striking finding is that only 6% of respondents list food as a CC contributor, despite “agriculture” contributing 25% of global emissions. Similarly, only 2 respondents listed healthcare workers as sources of CC-information which is disappointing as healthcare professionals are in a strong position to deliver education.

We note that 73% of respondents were open to follow up and education which informs this study's plan to implement a program of education

There is a trend for Latinx respondents to be less concerned and less likely to change their actions than white respondents however, further data is required to corroborate this finding.

This study is limited by the number of participants (reducing the overall power of the study), the results being from a single center (we hope this study stimulates other institutions to undertake similar surveys) and the inherent limitation of the life stressors/of the respondent.

Following this survey, we aim to implement a program of CC education in the community (including developing educational materials and distributing them via community engagement). CC is the biggest global health risk of the 21st century.¹ This is not a

future concern but a present danger. We anticipate that our educational program will have a positive result on our communities' knowledge of CC, however, this study indicates that national climate education is urgently needed!

Acknowledgments

Thanks to Dr P Thomas M.D., Dr P Sheffield M.D. and Mr. C Chain, M.S. for their assistance in conceptualizing this survey and reviewing/formatting this manuscript. Thanks to AAP NJ and in particular the Committee on Environmental Health and Climate Change for assistance with the CATCH project. Thanks to Luz Quezada-Mejia for assistance with translation for this project. Thanks to the participants of this survey.

Author Contributions

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study is supported by funds awarded to F Pelliccia and G Chain from the American Academy of Pediatrics (AAP) 2020 Community Access To Child Health (CATCH) grant. RES2020—0000000285.

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Supplemental Material

Supplemental material for this article is available online.

References

1. The 2020 report of the Lancet countdown on health and climate change: responding to converging crises. Watts N, Amann M, Arnell N, et al. *Lancet*. 2021;397(10269):129-170. doi:10.1016/S0140-6736(20)32290-X
2. Agriculture's contribution to climate change and role in mitigation is distinct from predominantly fossil CO₂-emitting sectors. Lynch J, Cain M, Frame D, Pierrehumbert R. *Frontiers in Sustainable Food Systems*. 2021; Feb 3; 4: 518039. doi:10.3389/fsufs.2020.518039
3. Fossil Fuels & Plastic. Center for International Environmental Law. 2017. Accessed October 6, 2021. <https://www.ciel.org/issue/fossil-fuels-plastic/>
4. Global Greenhouse Gas Emissions Data | US EPA. IPCC. 2014. Accessed October 12, 2021. <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data>
5. Global climate change and children's health. Ahdoot S, Pacheco SE; Council on Environmental Health. *Pediatrics*. 2015;136(5):e1468-e1484. doi:10.1542/peds.2015-3233
6. Environmental Protection Agency United States. *Climate change and Social Vulnerability in the United States a Focus on Six Impacts 2 Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts Front Matter Acknowledgments*. Accessed October 6, 2021. www.epa.gov/cira/technical-appendices-and-data.
7. Leiserowitz A, Maibach E, Rosenthal S, et al. *Climate Change in the American Mind: December 2018*. Yale Program on Climate Change Communication; 2019. Accessed October 6, 2021. <https://climatecommunication.yale.edu/publications/climate-change-in-the-american-mind-december-2018/2/>
8. Berger N, Lindemann AK, Böhl GF. [Public perception of climate change and implications for risk communication]. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz*. 2019;62(5):612-619. doi:10.1007/s00103-019-02930-0
9. Momentive | Agile Experience Management Solutions. Accessed October 12, 2021. <https://www.momentive.ai/en/>
10. R programming language. R Core Team. Published online 2013. Accessed July 8, 2017. <http://cran.r-project.org>