

Climate Change, Health Impacts and Adaptation: Perspectives of Guyanese Healthcare and Agriculture Professionals (2025)

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ABSTRACT

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Climate change impacts vary significantly across sectors and geographical contexts. This study examined the multifaceted impacts of climate change on human health and the current adaptation strategies established in Guyana. This study critically analyzed climate change and its designation as one of the greatest public health challenges of the 21st century. An Explanatory Sequential Mixed-Methods design was implemented. The data was obtained from both primary and secondary sources and were triangulated. A total of 120 participants formed the sample of the study. Respondents (99%) indicated that there is a link between climate change and health. Direct impacts of climate change on health results in dehydration (80%), heat exhaustion (70%), heat stroke (65%), respiratory diseases (40%), and cardiovascular diseases (25%). Indirect impacts of climate change on health, results in dengue (60%), psychological distress (55%), malaria (35%), and malnutrition (25%). The categories of people most at risk of having health related issues as a result of the impact of climate change are people with pre-existing medical conditions (40%), older adults (35%), and children (25%). The Final Themes which emanated from analysis of the qualitative data were; Increased Health Risk, Ecosystem Imbalance, Reduced Immunity, Comorbidity, Chronic Illness and Resource Degradation. The existing adaptation measures in Guyana are: - National Climate Change Policies and Frameworks - Guyana's Low Carbon Development Strategy (LCDs) 2030, strengthening coastal and flood management systems, climate-resilient agriculture initiatives, health system preparedness and surveillance Guyana, renewable energy and low-carbon development, community-based adaptation and disaster risk reduction and international partnerships and funding.

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INTRODUCTION

The impact of climate change on health has far-reaching consequences on the biodiversity that are long term and irreversible (1). Climate change is a resultant effect of the indiscriminate use of harmful substances that disrupts the homeostasis of the earth's atmosphere (2). Climate change has been a consistent public health challenge due to direct and indirect impacts on human health. Direct health effects of climate change include (but are not limited to) heat exhaustion, heatstroke, dehydration, respiratory and cardiovascular diseases. Meanwhile, the indirect effects of climate change include (but are not limited to) vector-borne diseases, malnutrition, and mental health predispositions (5). By 2030, the World Health Organization (WHO) projects that health-related costs could accrue US\$2-4 billion per year and from 2030- 2050, climate change may lead to approximately 250,000 annual deaths due to factors such as under-nutrition, malaria, and diarrhoea (5). Climate change can alter disease ecology and food systems,

which are reflected in the agriculture and healthcare sectors. Globally, the consequences of climate change have resulted in heat stress, poor air quality and food insecurity which exacerbates health related issues.

Moreover, heat stress is one of the most direct and widely documented health impacts of climate change. Countries such as India, Pakistan, and Bangladesh have experienced record-breaking heat waves in 2023–2024, with temperatures reaching 49°C in New Delhi and exceeding 50°C in Pakistan, resulting in thousands of heat-related hospitalizations and increased cases of heat exhaustion, heatstroke, and dehydration (3, 6). In Europe, more than 60,000 heat-related deaths were recorded during the 2023 summer season, with Spain and Italy reporting the highest mortality among older adults and individuals with pre-existing medical conditions (3, 7). These outcomes correspond directly to the healthcare survey's list of direct impacts. Air quality deterioration is also evident globally. In Canada, the 2023 wildfire season burned over 18 million hectares, producing particulate matter (PM_{2.5}) concentrations that exceeded WHO guidelines by 10–20 times in major cities, leading to spikes in asthma and COPD-related emergency visits (7,11). Similar patterns were observed in Australia and the United States, where wildfire smoke worsened respiratory and cardiovascular outcomes. In China, heat-driven stagnant air masses contributed to severe PM_{2.5} episodes in Beijing, exacerbating ischemic heart disease and stroke risks. Food insecurity is another major global consequence. In East Africa, prolonged droughts in Ethiopia, Kenya, and Somalia left over 23 million people facing acute food insecurity in 2023–2024 (6). In Vietnam, salinization of the Mekong Delta (produces half of the country's rice) has reduced yields by up to 15% in high-salinity years. These global patterns directly support the agriculture survey's focus on food insecurity, water insecurity, and nutritional quality.

To add, the Caribbean remains a climate “hotspot,” with countries such as Barbados, Trinidad and Tobago, Jamaica, and The Bahamas experiencing intensified heat, storms, and sea-level rise (10). In 2023, Trinidad and Tobago recorded temperatures above 34°C for 45 consecutive days, leading to increased reports of heat exhaustion and dehydration. Jamaica experienced a significant dengue outbreak in 2023 with over 5,000 suspected cases, linked to rainfall variability and warmer temperatures (12). These patterns reflect the healthcare survey's emphasis on heat-related illness, respiratory disease, and vector-borne disease. Extreme weather continues to disrupt health systems. The Bahamas, still recovering from Hurricane Dorian, experienced repeated flooding in 2023–2024, increasing mold-related respiratory illness. Dominica and Puerto Rico continue to report elevated asthma and respiratory infections following storm seasons (11). These disruptions align with the survey's focus on vulnerable populations such as children, pregnant women, older adults, and individuals with chronic illnesses. Agriculture across the Caribbean is equally vulnerable. In Guyana, saline intrusion in Regions 2 and 3 has reduced rice yields by up to 20% in affected areas (13). Belize reported a 30% decline in corn production in 2023 due to drought, while Jamaica experienced a 40% reduction in vegetable yields during the 2023 dry season, contributing to rising food prices and nutritional insecurity (14). These regional patterns directly support the agriculture survey's emphasis on food insecurity, water insecurity, and nutritional quality. Healthcare professionals across the region highlight the dual burden of climate-sensitive infectious diseases and chronic conditions. Rising temperatures have worsened hypertension and stroke incidence in Barbados and Trinidad, while poor air quality exacerbates asthma in Jamaica and Antigua. Agriculture professionals in Guyana, Belize, and St. Lucia emphasize declining dietary diversity and reduced protein availability, which directly affect population health.

In Guyana, agriculture contributes about 8% of GDP, employs 15.44% of the workforce and receives around 10–11% of national expenditure (13,14) while healthcare contributes about 7–8% of GDP, employs approximately 7–8% of the workforce, and accounts for 10.49% of GDP expenditure (9,15). These agriculture and healthcare sectoral professionals are positioned at the frontline of mitigating climate change impacts. Healthcare professionals often aim to treat climate-sensitive disease cases (such as dengue and malaria outbreaks), heat-related illnesses, cardiovascular and respiratory complications (1, 6). Meanwhile, agricultural professionals often encounter reduced yield, saline intrusion, water insecurity, and pest outbreaks that undermine food security and contribute to malnutrition (8). To understand how climate change patterns manifest locally, it is therefore pivotal to analyze the insights of sectoral professionals; whose expertise informs the translation of climate change impacts into health outcomes for vulnerable populations and supports the identification of adaptation strategies that require reinforcement or new approaches.

Further, Guyana's geography and socioeconomic structure make it particularly vulnerable to the health and livelihood impacts of climate change. The country's low-lying coastal plain (home to over 90% of the population) faces recurrent flooding, saline intrusion, and extreme heat events that directly influence disease patterns and food security. Healthcare professionals in Guyana report increasing cases of heat exhaustion, dehydration, and heatstroke, especially during the 2023–2024 heat periods when temperatures in coastal regions frequently exceeded 33–34°C. Hospitals in Regions 3, 4, and 6 noted higher admissions for cardiovascular complications, including arrhythmias and hypertensive crises consistent with global evidence linking extreme heat to cardiovascular strain (4, 15). Respiratory illnesses also rise following major flood events, as damp housing and mold exposure increase asthma attacks and acute respiratory infections. Indirect health impacts are also becoming more pronounced. Flooding and prolonged rainfall have contributed to surges in malaria and dengue, particularly in Regions 1, 7, 8, and 9 (12, 15). Healthcare workers report that children, pregnant women, older adults, and individuals with chronic illnesses are disproportionately affected; precisely the vulnerable groups listed in the survey. Mental health concerns, including anxiety and stress related to displacement and crop losses, have also been observed.

Agriculture remains a cornerstone of Guyana's economy, contributing 16.85% of GDP and employing 15.44% of the workforce (13, 14). Farmers along the Essequibo Coast, Berbice, and the Pomeroon River report increasingly unpredictable rainfall, saline intrusion, and pest outbreaks as major threats to crop yields (16). In 2023–2024, saline intrusion in Regions 2 and 3 reduced rice yields by up to 20% in affected areas, while drought conditions in Region 9 disrupted cassava and peanut production. These agricultural losses translate directly into food insecurity, reduced dietary diversity, and malnutrition, especially among low-income households and children. Farmers have adopted a range of adaptive practices, including altering planting dates, using raised beds, improving drainage, and experimenting with climate-resilient crop varieties (16). However, barriers such as limited financing, weak extension services, and inconsistent access to climate information continue to constrain resilience (14). Overall, the Guyanese context illustrates a clear and growing intersection between climate change, health outcomes, and agricultural stability.

General Objective

To examine the multifaceted impacts of climate change on human health, assess current adaptation strategies in Guyana, and critically analyze its designation as one of the greatest public health challenges of the 21st century.

Specific Objectives

- To examine and evaluate the direct and indirect impacts of climate change on human health outcomes.
- To examine whether respondents' perceptions substantiate a measurable linkage between climate change and health impacts.
- To evaluate whether reported impacts differ significantly across Regions 4, 5, and 6.
- To identify and assess the adaptation strategies and practices currently implemented in Guyana to manage climate-related health risks.

Research Questions

- What are the direct and indirect impacts of climate change on health?
- Do respondents' perception indicate a statistically significant link between climate change and health impacts?
- Do climate change impacts differ significantly across Regions 4, 5, and 6?
- What are the current adaptation strategies and practices implemented to manage climate-related health risks in Guyana?

Research Hypotheses

H₀₁: The proportion of respondents perceiving a link between climate change and health impacts = 0.5 (no majority perception; responses are due to chance).

H_{a1}: The proportion of respondents perceiving a link between climate change and health impacts > 0.5 (majority perception exists).

H₀₂: There are no statistically significant differences in reported impacts across Regions 4, 5, and 6.

H_{a2}: There are statistically significant differences in reported impacts across Regions 4, 5, and 6.

MATERIALS AND METHODS

This research was conducted using a mixed-methods approach. An Explanatory Sequential Mixed-Methods Design was implemented. This explanatory sequential design involved a quantitative phase followed by qualitative triangulation, ensuring that statistical results were substantiated by thematic analysis. The data were obtained from both primary and secondary sources. Primary data were collected through digital structured questionnaires from two data sources (healthcare and agriculture professionals). Sampling was purposive, with 120 participants (60 healthcare professionals and 60 agriculture professionals) selected from Regions 4, 5, and 6. Secondary qualitative data were collected, interpreted and analyzed from existing literature and open-ended responses to substantiate and explain the findings that emanated from the quantitative phase through data triangulation, source triangulation and methodological triangulation. Statistical analyses included the Exact Binomial Test to assess whether perceptions of climate-health links were significantly greater than chance, and the Pearson Chi-Square Test of Independence to evaluate regional differences in reported impacts. All analyses were conducted at a 95% confidence level, with significance threshold set at $p < 0.05$.

Ethical Considerations

Participants were contacted to obtain informed consent. The ethical principles of confidentiality, anonymity and safety guided the overall construction of this study. The works of all authors from all secondary open access sources that were reviewed as part of this qualitative phase of the research were acknowledged through citations. All the information garnered reflects accurate representations of the online publications, reports and journals articles that were published by the authors. The data collected served to answer the research questions.

Sample of Participants

Table 1: Sample of Participants of Healthcare and Agriculture Professionals from Regions 4, 5 and 6 who participated in the Study

Participants	Total	Regions		
		4	5	6
Healthcare Professionals	60	22	30	8
Agriculture Professionals	60	15	34	11
TOTAL	120	37	64	19

The total number of participants was 120. There were 60 healthcare professionals and 60 agriculture professionals from Regions 4, 5 and 6. The highest number of participants in total emanated from Region 5 with 64, followed by Region 4 with 37 and Region 6 with 19 participants.

RESULTS

The healthcare professionals provided feedback on the health issues that are directly and indirectly influenced by climate change and the categories of people that are most at risk as a result of the impact of climate change on health. The agriculture professionals provided data on the impact of climate change on environmental factors and mitigation strategies implemented to address the impact of climate change in agriculture. Both healthcare professionals and agriculture professionals provided data as to why climate change is regarded as one of the greatest public health challenges of the 21st century.

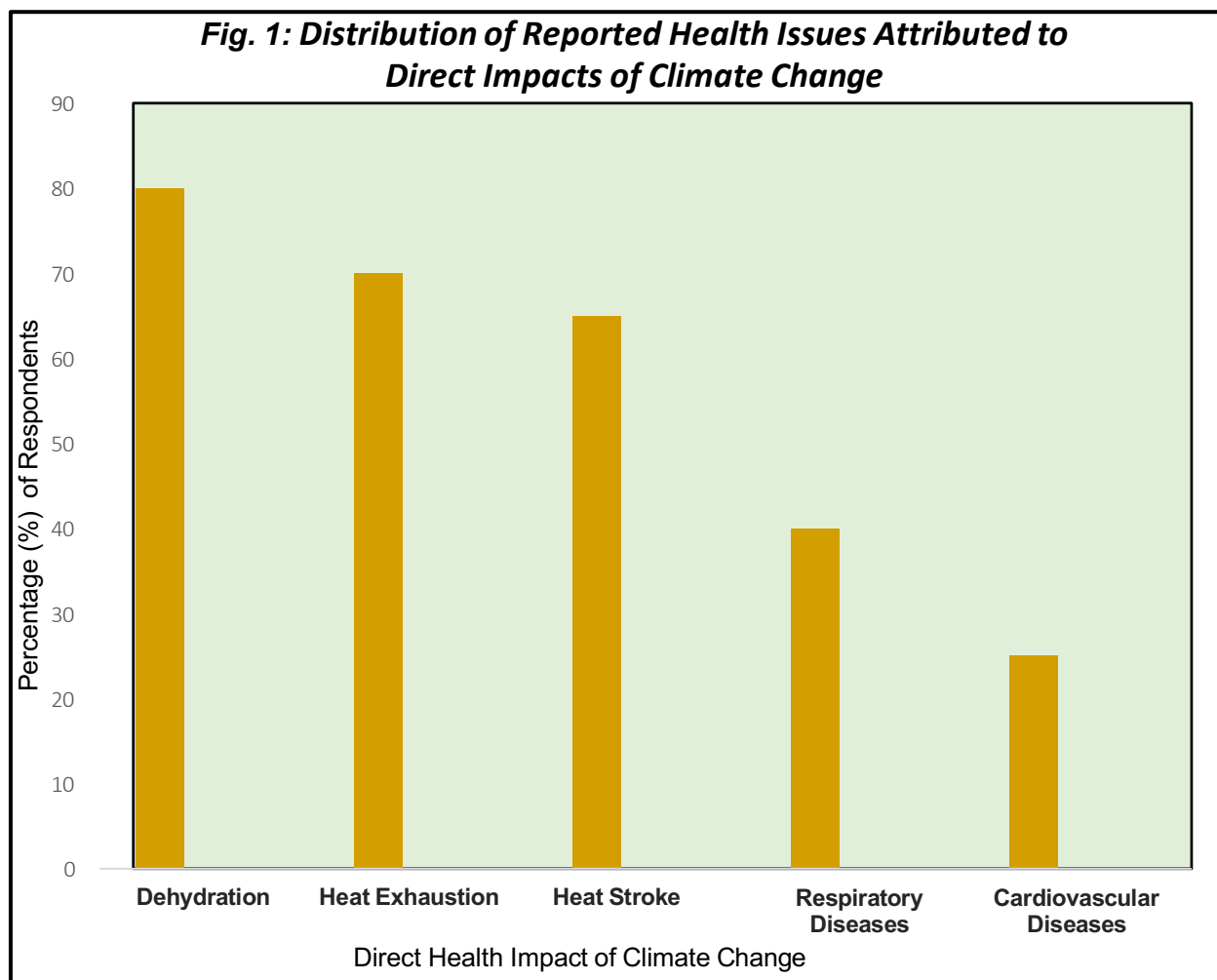


Figure. 1: Distribution of Reported Health Issues Attributed to Direct Impacts of Climate Change

Figure 1 highlights the percentage of healthcare respondents who attributed health issues directly impacted by climate change from their experiences. Respondents were allowed to select more than one option.

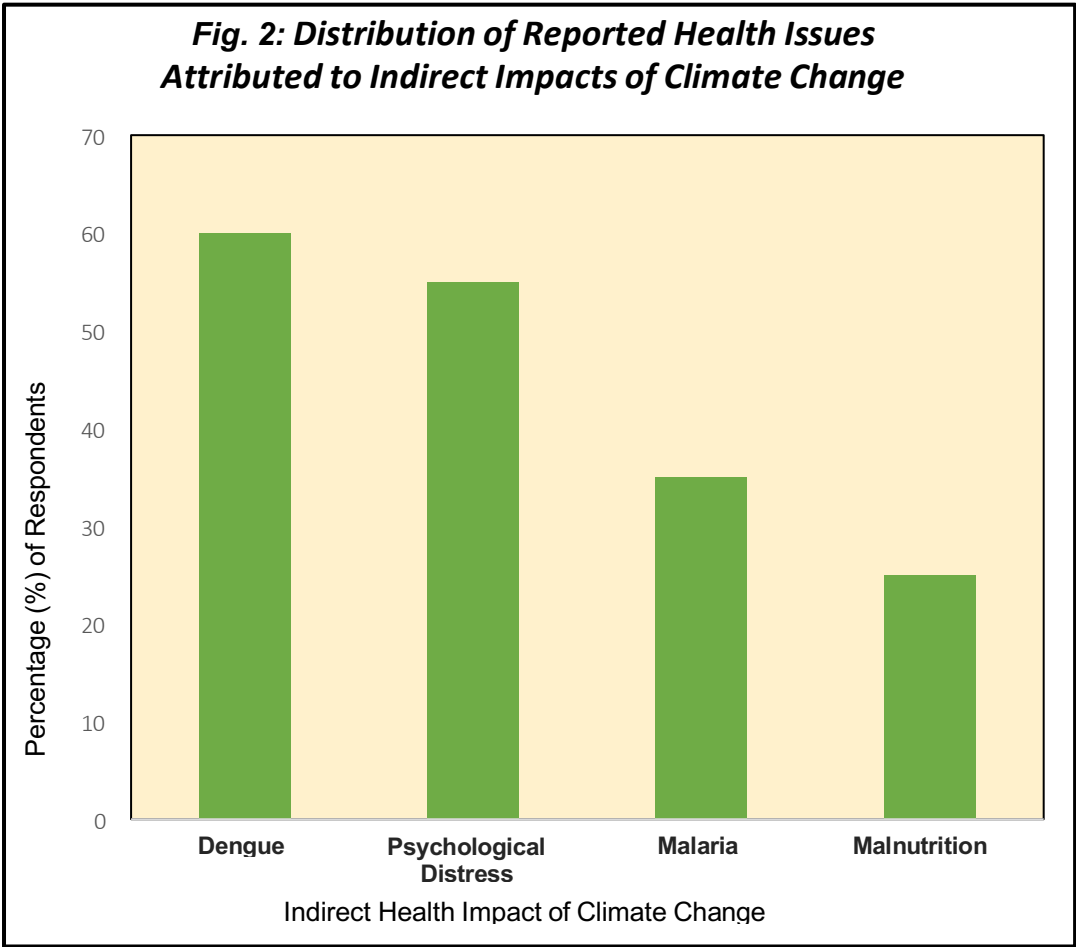


Figure. 2: Distribution of Reported Health Issues Attributed to Indirect Impacts of Climate Change

Figure 2 highlights the percentage of healthcare respondents who attributed health issues indirectly impacted by climate change from their experiences. Respondents were allowed to select more than one option.

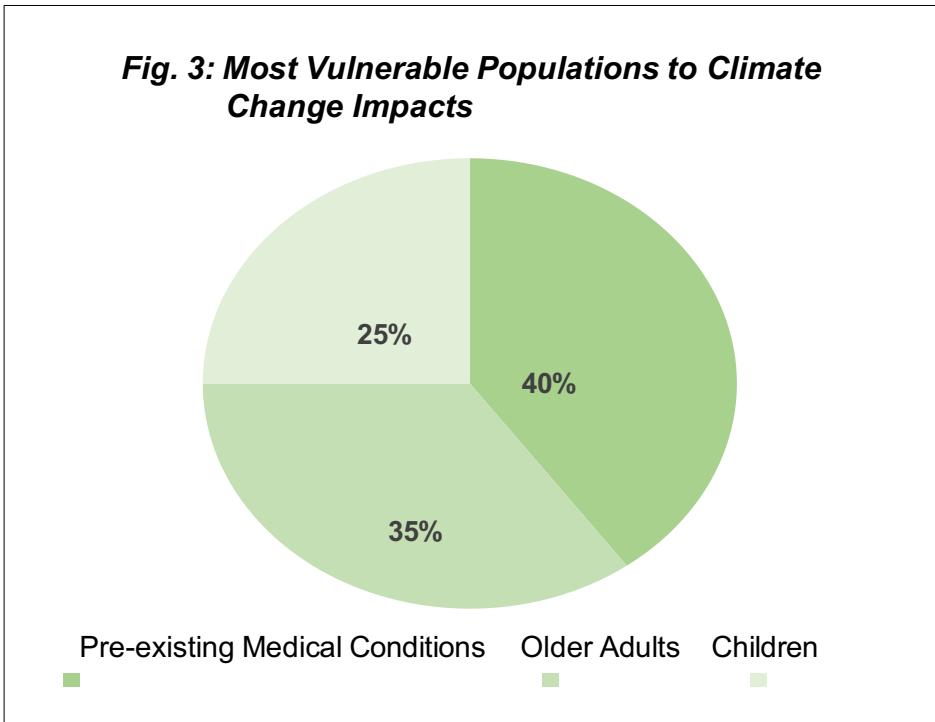


Figure. 3: Most Vulnerable Populations to Climate Change Impacts

Figure 3 highlights the percentage of respondents who attributed the most vulnerable populations to climate change.

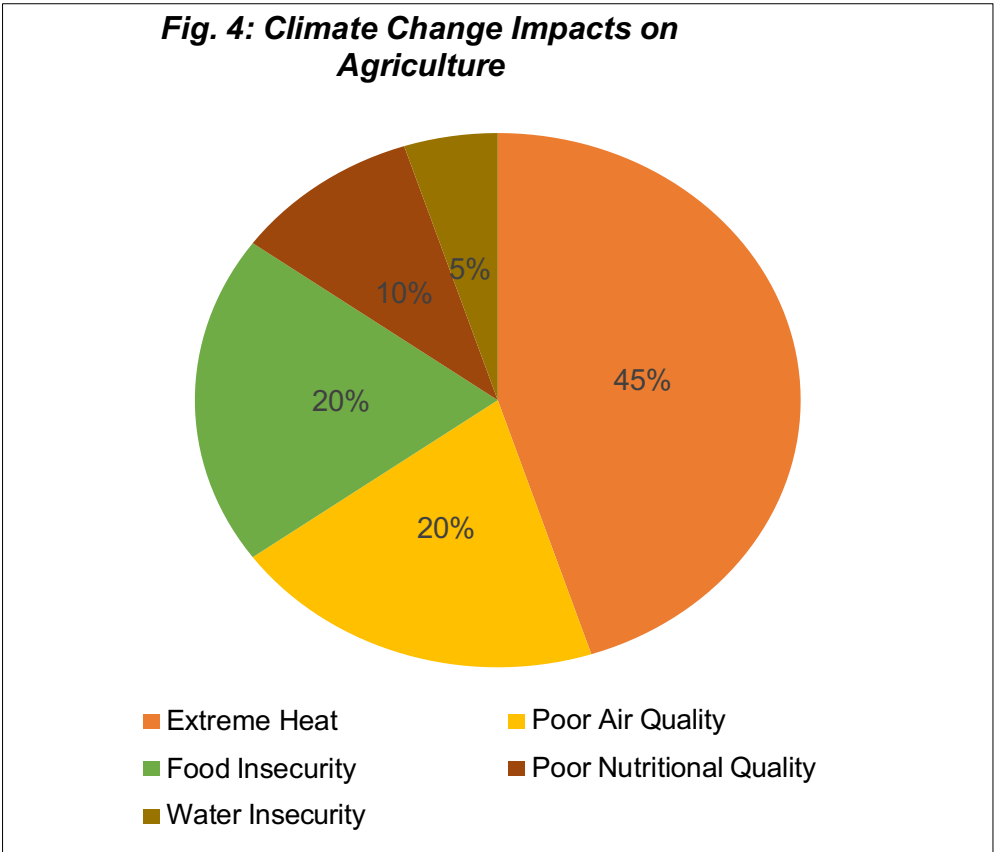


Figure 4: Climate Change Impacts on Agriculture

Figure 4 highlights climate change impacts on agriculture namely; extreme heat, food insecurity, water insecurity, poor air quality, and poor nutritional quality of produce.

Table 2: Analysis of Proportional Responses on Climate Change–Health Linkages via Binomial Testing

Response	Count (N)	Observed Proportion	Test Proportion	p-value
Yes	119	0.99	0.50	p < 0.001
No	1	0.01	0.50	
Total	120	1.00	-	-

Table 3: Chi-Square Evaluation of Regional Consistency in Reported Climate Change Impacts Across Regions 4,5 and 6

Respondent Impact	χ ² Value	df	p-value	Interpretation
Agriculture (Direct)	4.416	4	0.353	No Statistically Significant Difference in Responses Across the Regions
Agriculture (Indirect)	0.147	4	0.997	
Healthcare (Direct)	0.285	8	1.000	
Healthcare (Indirect)	3.276	6	0.773	

Observed responses were 99% “Yes” and 1% “No”, compared to the null expectation of 50% each. The Binomial Test result ($p < 0.05$ at 95% CI) shows this deviation is statistically significant with majority of respondents who perceive a link between climate change and health impacts. Findings from the Chi-Square Test of Independence indicate that perceptions of climate change impacts were consistent across Regions 4, 5, and 6, with no statistically significant heterogeneity detected ($p > 0.05$, 95% CI). After the thematic analysis, the final themes from participants’ responses included: Increased Health Risk, Ecosystem Imbalance, Reduced Immunity, Co-morbidity, Chronic Illness and Large-Scale Impact.

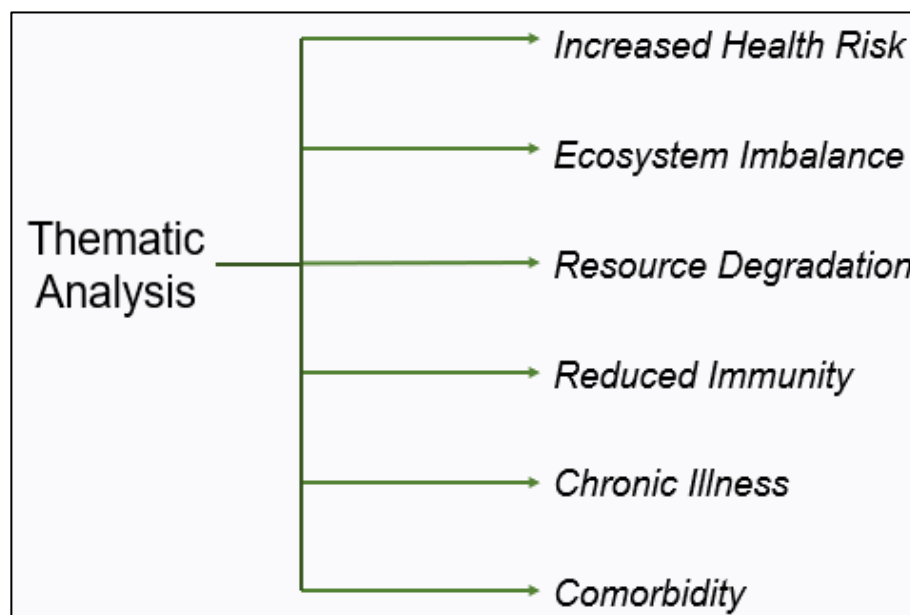


Figure 5: Conceptual Map Showing Final Themes

DISCUSSION

A total of 120 participants formed the sample of the study. Participants (99%) indicated that there is a link between climate change and health. Healthcare and agriculture professionals agreed that climate change has direct and indirect impacts on health. The statistical evidence reinforces that nearly all respondents perceive climate change impacts as being linked to health, and the perceived impacts are consistent across regions. The use of both Binomial and Chi-Square tests strengthens the validity of the findings by demonstrating significance at the 95% confidence level. Dehydration (80%) and heat exhaustion (70%) were notable direct impacts of climate change while dengue (60%) and psychological distress (55%) were prominent indirect impacts of climate change on health. The category of people most vulnerable to health issues impacted by climate change was people with pre-existing medical conditions (40%), followed by older adults (35%) and children (25%). Extreme heat (45%) was considered as the most extreme environmental impact of climate change. Final themes were generated from participants' responses to why climate change is regarded as one of the greatest public health challenges of the 21st century. There are existing adaptation measures to mitigate climate change in Guyana. Final Themes: Increased Health Risk, Ecosystem Imbalance, Reduced Immunity, Comorbidity, Chronic Illness and Resource Degradation. Existing adaptation measures in Guyana: - National Climate Change Policies and Frameworks - Guyana's Low Carbon Development Strategy (LCDs) 2030, strengthening coastal and flood management systems, climate-resilient agriculture initiatives, health system preparedness and surveillance Guyana, renewable energy and low-carbon development, community-based adaptation and disaster risk reduction and international partnerships and funding.

Policy Implications

- Reinforce climate-resilient health infrastructure.
- Develop integrated surveillance systems for vector-borne and heat-related illnesses.
- Improve cross-sector governance between health and agriculture.
- Prioritize equity-focused adaptation for vulnerable populations.
- Expand workforce training and capacity building.
- Align national strategies with Guyana's LCDS 2030 and international partnerships.

CONCLUSION

The study confirms a statistically significant perception among professionals that climate change is linked to health impacts. Reported impacts were consistent across Regions 4, 5 and 6. Guyana has implemented several initiatives to address the health and agricultural impacts of climate change, though gaps remain in coordination, financing, and long-term resilience. Overall, the findings reinforce climate change as a major public health challenge in Guyana, consistent with regional and global evidence.

LIMITATIONS

- Findings were limited to three regions (4,5 and 6) of Guyana.
- Findings cannot be generalized to all ten regions of Guyana.

Future Studies

- Include a larger study population to facilitate the study of all regions across Guyana.
- Conduct longitudinal studies to track evolving impacts.
- Conduct framework replication in other Caribbean countries.

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Conflicts of Interest: The authors declare no conflict of interest.

REFERENCES

1. Alestra C, Cette G, Chouard V, Lecat R. Long-Term Growth Impact Of Climate Change And Policies: The Advanced Climate Change Long-Term (ACCL) Scenario Building Model. SSRN Electronic Journal. 2020; doi:10.2139/ssrn.3569499
2. Hyland E. Earth's climate change history. 2022 Jan 15; doi:10.52750/891769
3. Watts N, Amann M, Arnell N, et al. The 2020 Report Of The Lancet Countdown On Health And Climate Change. *Lancet*. 2021; 397(10269):129–170. Available from: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)32290-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)32290-X/fulltext)
4. CDC. Effects Of Climate Change On Health. Centers for Disease Control and Prevention; 2023. Available from: <https://www.cdc.gov/climate-health/php/effects/index.html>
5. WHO. Climate Change And Health Fact Sheet. World Health Organization; 2025. Available from: <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>
6. Kjellstrom T, Freyberg C, Lemke B, Otto M, Briggs D. Estimating Population Heat Exposure And Impacts On Working People In Conjunction With Climate Change. *Int J Biometeorol*. 2020; 64(2):381–391. Available from: <https://link.springer.com/article/10.1007/s00484-019-01759-9>
7. US EPA. Climate Change And Air Quality: Impacts On Ozone And PM2.5. United States Environmental Protection Agency; 2023. Available from: <https://www.epa.gov/climate-change-science/impacts-climate-change-air-quality>
8. Wheeler T, von Braun J. Climate Change Impacts On Global Food Security. *Science*. 2013; 341(6145):508–513. Available from: <https://www.science.org/doi/10.1126/science.1239404>
9. WHO. Guyana Country Overview. World Health Organization; 2025. Available from: <https://www.who.int/countries/guyana/>
10. Taylor MA, Stephenson TS, Chen AA, Stephenson KA. Climate change and the Caribbean: Review and Response. *Caribbean J Earth Sci*. 2018; 49:1–20. Available from: <https://www.researchgate.net/publication/327891728>
11. PAHO. Climate Change And Health In The Americas: Risks, Responses, And Opportunities. Pan American Health Organization; 2017. Available from: <https://iris.paho.org/handle/10665.2/34493>
12. Rawlins S.C, Chen A, Amarakoon D, Stennett R. Climate Change And Vector-Borne Diseases In The Caribbean. *Rev Panam Salud Publica*. 2005; 17(6):432–441. Available from: <https://www.scielo.org/article/rpsp/2005.v17n6/432-441/>
13. ECLAC. The Impact of Climate Change on Agriculture in Guyana. LC/CAR/L.323. Port of Spain: Economic Commission for Latin America and the Caribbean; 2011. Available from: <https://repositorio.cepal.org/handle/11362/38580>
14. FAO. A mid-term perspective on agricultural diversification in Guyana. Food and Agriculture Organization; 2020. Available from: <https://www.fao.org/documents/card/en/c/ca6992en/>
15. MOH. Climate Change and Health Country Profile: Guyana. Georgetown: Ministry of Public Health 2015. Available from: <https://www.who.int/publications/m/item/climate-change-and-health-country-profile-2015-guyana>
16. Lakenarine R, Seecharan D, Ram M. Impacts of Climate Change on Farmers and their Adaptive Strategies along the Essequibo Coast, Guyana. *Int J Sci Res Publ*. 2020; 10(2):438–445. Available from: <https://www.ijrsr.org/research-paper-0220.php?rp=P979013>