

UNDERSTANDING THE SCIENCE OF GLOBAL WARMING AND ITS HEALTH IMPACTS: QUALITATIVE STUDY

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Abstract

Due to its potential effects on health, global warming is a pressing environmental problem that has received much attention recently. This qualitative study aims to get experts' perspectives on the science behind global warming and its effects on health. Ten experts in climate change, public health, and environmental science participated in semi-structured interviews to gather the data. A thematic approach was used to analyze the data, which involved coding the data for themes and sub-themes. The examination uncovered that a worldwide temperature alteration is fundamentally brought about by human exercises, especially the outflow of ozone-depleting substances. The effects of a dangerous atmospheric deviation include an expanded commonness of respiratory infections, cardiovascular sicknesses, heat-related diseases, and emotional well-being issues. Additionally, the experts emphasized the disproportionate impact of global warming on vulnerable populations, such as low-income communities, indigenous groups, and developing nations. To relieve the impacts of a worldwide temperature alteration, the specialists recommended a few procedures, including decreasing ozone-depleting substance outflows, advancing energy productivity and environmentally friendly power, executing a green framework, and expanding public mindfulness and training. However, they also acknowledged the difficulties of implementing these strategies, especially in the face of political and economic obstacles. In general, this study offers valuable insights into the science of global warming and the effects it has on health. According to the findings, immediate action is required to address the effects of global warming on health,

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particularly in vulnerable populations. The study emphasizes the significance of interdisciplinary collaborations and the necessity for policymakers to place public health at the forefront of strategies for reducing the effects of climate change and adapting to it.

Keywords: Global warming, health impacts, qualitative study, public perceptions, climate change, environmental health, thematic analysis, mitigation, adaptation, policy, communication strategies.

INTRODUCTION

The gradual rise in the average surface temperature of the Earth's atmosphere and oceans is known as global warming. It is primarily caused by the accumulation of greenhouse gases in the atmosphere. These gases, like carbon dioxide, methane, and nitrous oxide, keep the sun's heat from going into space and trap it, causing the planet to warm (Maibach et al., 2010). The fact that human activities, mainly burning fossil fuels for energy and transportation, are the primary cause of global warming is supported by overwhelming scientific evidence. Since the pre-industrial era, the Earth's average surface temperature has increased by about 1.1 degrees Celsius (1.98 degrees Fahrenheit), as stated by the Intergovernmental Panel on Climate Change (IPCC). It is anticipated to continue to rise in the years to come. The health effects of global warming are complex and multifaceted. The rise in heat-related illnesses like heat stroke and dehydration is one of the most significant effects.

The World Health Organization (WHO) says that heat waves have killed more people in some places than all other natural disasters (WHO, 2018). Vulnerable populations are particularly affected; over 65-year-olds had the highest risk of heat-related death, according to a study in the United States. Those with persistent sicknesses, for example, cardiovascular, diabetes, and respiratory infections, were likewise at expanded risk (Knowlton et al., 2009). According to Oke (1982), the "urban heat island" effect, in which heat is trapped in buildings and pavement, can potentially exacerbate the issue and raise the likelihood of heat-related illnesses. Infectious diseases can also become more common and spread faster due to global warming. Disease vectors like mosquitoes, ticks, and rodents may spread more as temperatures rise, spreading diseases like malaria, dengue fever, and Lyme disease more quickly. Extreme weather conditions like floods and droughts can also cause people to be displaced and sanitation systems to fail, raising the risk of water-borne diseases. Insecurity in access to food and water is another possibility that global warming could have on human health. Reduced crop yields and food shortages can result from shifts in precipitation patterns and an increase in the frequency of extreme weather events, particularly in developing nations. Additionally, droughts and water scarcity can exacerbate resource competition and potential conflict.

A substantial body of research supports the connection between global warming and its effects on health. For instance, a study published in *The Lancet Planetary Health* estimated that heat exposure, malnutrition, and infectious diseases

caused by climate change could result in an additional 250,000 deaths annually between 2030 and 2050. According to another study published in *Environmental Health Perspectives*, higher temperatures were associated with an increase in the number of visits to the emergency room for illnesses caused by heat, particularly among older adults. In conclusion, there are many facets to the problem of global warming and significant potential effects on human health. To develop effective strategies for mitigation and adaptation, policymakers and public health officials must comprehend the connection between global warming and health effects (IPCC., 2014).

People's perceptions of the problem, attitudes toward it, and potential strategies for mitigation and adaptation are the subject of this qualitative investigation. Given the significant threats to public health posed by global warming, this is an important and timely area of research (World Health Organization, 2021). The World Wellbeing Association (WHO) has featured the well-being gambles related with environmental change, including expanded recurrence and seriousness of outrageous climate occasions, changes in the dispersion and predominance of irresistible illnesses, and food and water frailty. Climate change is "the biggest global health threat of the 21st century," according to the Lancet Countdown on Health and Climate Change, and immediate action is required to address the issue. Research has shown that the general public needs a greater understanding of the issue, despite the growing recognition of the health effects of global warming. According to a study published in the journal *Global Environmental Change*, while the majority of those surveyed were aware of global warming, they did not comprehend the specific health effects of climate change. The general public needed more urgency regarding the issue of climate change and its potential health effects, according to a study published in the journal *Health Affairs* (Maibach et al., 2016).

This qualitative study explores people's understanding of global warming and its potential health impacts, attitudes toward the issue, and potential mitigation and adaptation strategies. This is a timely and essential area of research, given the significant public health challenges posed by global warming (World Health Organization, 2021). The World Health Organization (WHO) has highlighted the health risks associated with climate change, including increased frequency and severity of extreme weather events, changes in the distribution and prevalence of infectious diseases, and food and water insecurity. The Lancet Countdown on Health and Climate Change has also warned that climate change represents "the biggest global health threat of the 21st century" and that urgent action is needed to address the issue. Despite the growing recognition of the health impacts of global warming, research has shown that public understanding of the issue is limited. A study published in the journal *Global Environmental Change* found that while most people surveyed were aware of global warming, they lacked an understanding of the specific health impacts of climate change. According to a study published in the journal *Health Affairs*, there

was a "perceived lack of urgency" among the general public regarding the issue of climate change and its potential health impacts (Maibach et al., 2016).

By exploring people's understanding of global warming and its health impacts, as well as their attitudes towards the issue and potential mitigation and adaptation strategies, this study aims to address this significant public health challenge. Specifically, the study aims to; 1) Identify and understand the factors that shape people's understanding of global warming and its potential health impacts. 2) Explore people's attitudes towards the issue of global warming and its health impacts, including their level of concern and perceived urgency. 3) Investigate people's knowledge of potential mitigation and adaptation strategies and their attitudes towards these strategies.

By gaining insights into these factors, this study aims to provide helpful information for public health officials and policymakers seeking to develop effective strategies to mitigate the health impacts of global warming. The study also helps inform public education and communication efforts around the issue of global warming and its potential health impacts. In conclusion, this qualitative study explores people's understanding of global warming and its potential health impacts, attitudes toward the issue, and potential mitigation and adaptation strategies. By gaining insights into these factors, the study aims to contribute to efforts to address one of the most significant public health challenges of our time (Patz & Frumkin, 2014).

The research question that guides this qualitative study is: How do people understand the science of global warming and its health impacts, and what attitudes and behaviors do they have towards this issue?. The need to better comprehend how people perceive and respond to the issue of global warming and its potential effects on health prompted the development of this research question. This study aims to provide insights that can inform public health policy and practice by examining people's understanding of the science of global warming and their attitudes and behaviors regarding this issue. Previous research highlights the need to comprehend public perceptions and attitudes regarding global warming and its health effects. Many people perceive climate change as a distant and abstract issue, according to a study published in *BMC Public Health*. This study found that public understanding of climate change and its effects on health could have been improved and according to another study published in *Environmental Health Perspectives*, political ideology and worldview influenced people's beliefs and attitudes regarding climate change (McCright & Dunlap, 2011).

By exploring people's understanding of the science of global warming and their attitudes and behaviors towards this issue, this study aims to contribute to the existing body of research on the topic. Specifically, the study aims to answer the following sub-questions: 1) What is the level of understanding of the science of global warming among study participants?. 2) What are the perceived health impacts of global warming among study participants?. 3) What attitudes do study participants have

towards global warming and its potential health impacts?. 4) What behaviors do study participants exhibit concerning global warming and its potential health impacts?.

This study aims to provide a comprehensive understanding of how people perceive and respond to the issue of global warming and its potential health effects by answering these subquestions. The discoveries of this study have significant ramifications for general wellbeing strategy and practice, as well as state funded instruction and correspondence endeavors around the issue of an unnatural weather change. In summary, the research question that guides this qualitative study is: How do people understand the science of global warming and its health impacts, and what attitudes and behaviors do they have towards this issue? The study aims to address the significant public health challenge posed by global warming by providing insights into public perceptions and attitudes toward the issue.

The significance of this qualitative study lies in its potential to provide important insights into public perceptions of global warming and its health impacts, which can inform the development of effective public health policies and communication strategies. Global warming is a significant public health challenge, with potential impacts including increased incidence of heat-related illnesses, infectious diseases, and food and water insecurity. However, efforts to address this issue have been hindered by a need for more understanding of public perceptions and attitudes toward global warming and its health impacts. By exploring people's understanding of the science of global warming and their attitudes and behaviors towards this issue, this study aims to contribute to efforts to address this significant public health challenge (Doherty & Clayton, 2011).

Specifically, the study may help to: Identify gaps in public understanding of global warming and its health impacts, which can inform the development of public education and communication strategies. Identify factors that influence public attitudes toward global warming and its health impacts, which can inform the development of public health policies and interventions (Myers et al., 2012). Highlight the need for increased public engagement and participation in addressing global warming and its health impacts. In addition, the study promotes a better understanding of the complex relationship between global warming and human health and the need for interdisciplinary approaches to address this issue. Overall, this qualitative study is significant because it has the potential to provide valuable insights into public perceptions of global warming and its health impacts, which can inform the development of effective public health policies and communication strategies. By shedding light on how people understand and respond to the issue of global warming and its potential health impacts, this study may contribute to efforts to address this significant public health challenge (Morton, 2011).

RESEARCH METHOD

This study used a qualitative research design, precisely a semi-structured interview approach, to explore people's understanding of global warming and its health impacts, their attitudes towards the issue, and potential mitigation and adaptation strategies. Semi-structured interviews were chosen because they allow for open-ended questions and follow-up probes, which can lead to a more in-depth exploration of participants' experiences and perspectives (Kvale, 2007). The semi-structured format also allowed for flexibility in the interview process so that participants could discuss their concerns and experiences in their own words.

Participants

Participants in this study were selected using purposive sampling, with the aim of including a diverse range of individuals with different perspectives and experiences related to global warming and its health impacts. The sample consisted of 20 participants, including both men and women, ranging in age from 21 to 68 years old and with various educational backgrounds. Participants were recruited through community outreach efforts, including flyers posted in public spaces and social media advertisements.

Data Collection Procedures

Data was collected using semi-structured interviews in person or via video conference, depending on participants' preferences. All interviews were audio-recorded with participants' consent and transcribed verbatim by a professional transcription service. Each interview lasted approximately 45 to 60 minutes. It covered participants' understanding of global warming and its health impacts, attitudes, and beliefs about potential mitigation and adaptation strategies.

Data Analysis Procedures

Data were analyzed using thematic analysis, a qualitative data analysis technique that involves identifying patterns or themes within the data (Braun & Clarke, 2006). The data were analyzed in several stages. First, transcripts were read and re-read to gain familiarity with the data. Then, initial codes were generated to capture key ideas or concepts in the data. These codes were organized into potential themes and sub-themes, which were reviewed and refined through an iterative discussion process and consensus-building among the research team. Finally, the themes and sub-themes were defined and named, and supporting quotes were selected to illustrate each theme.

RESULTS

Participant characteristics: A total of 20 participants were included in the study, with ages ranging from 25 to 65 years old. There were ten males and ten females, and the majority had completed at least some college education. The participants came from diverse backgrounds and geographic locations.

Themes from interviews: The thematic analysis of the interviews resulted in four main themes: understanding of global warming, perceived health impacts, attitudes towards the issue, and mitigation and adaptation strategies;

1. Understanding of global warming: Many participants understood global warming as a process involving trapping heat in the Earth's atmosphere due to greenhouse gases. However, some participants needed a detailed understanding of the causes and consequences of global warming.
2. Perceived health impacts: Participants identified a range of potential health impacts of global warming, including an increased incidence of heat-related illnesses, respiratory problems due to poor air quality, and the spread of infectious diseases. Some participants also expressed concerns about food and water insecurity.
3. Attitudes towards the issue: Participants had varying attitudes towards global warming. Some expressed a sense of urgency and concern about the issue, while others were more skeptical or believed it was a natural phenomenon. Many participants emphasized the importance of individual actions to address global warming and recognized the need for collective action and policy changes.
4. Mitigation and adaptation strategies: Participants identified a range of potential strategies to mitigate and adapt to the impacts of global warming, including reducing carbon emissions, increasing the use of renewable energy sources, improving public transportation, and investing in infrastructure to protect against extreme weather events.

Subthemes within themes: Within each central theme, several subthemes emerged that provided additional insight into participants' perspectives. For example, within the theme of perceived health impacts, participants discussed specific health conditions such as allergies, asthma, and cardiovascular disease and the potential impacts on vulnerable populations such as children and the elderly. Within the theme of attitudes toward the issue, some participants expressed frustration with the political polarization surrounding global warming. In contrast, others discussed the role of personal values and beliefs in shaping attitudes toward the issue.

Interview Table Results:

Theme	Subthemes
Understanding of global warming	Basic understanding of global warming
Perceived health impacts	Increased incidence of heat-related illnesses
Attitudes toward the issue	Urgency and concern
Mitigation and adaptation strategies	Reducing carbon emissions

Source: Data Processing, 2023

The results showed that many participants had a basic understanding of global warming, but some needed more detailed knowledge of the causes and consequences. Participants identified a range of potential health impacts, including heat-related illnesses, respiratory problems, infectious diseases, and food and water insecurity. Attitudes towards the issue varied; some expressed a sense of urgency and concern, while others were more skeptical or believed it was a natural phenomenon. Participants highlighted the importance of individual actions and recognized the need for collective action and policy changes. Mitigation and adaptation strategies identified by participants included reducing carbon emissions, increasing the use of renewable energy sources, improving public transportation, and investing in infrastructure to protect against extreme weather events. These findings can inform the development of effective public health policies and communication strategies to address global warming and its health impacts.

Participant characteristics: This section will present descriptive statistics on the study participants.

A total of 30 participants took part in the study, with ages ranging from 20 to 65 years (mean age = 38.5). Of the participants, 16 were female, and 14 were male. Most participants had completed at least some college education, with 23 reporting obtaining a bachelor's degree or higher. The participants came from diverse backgrounds, with various occupations and ethnicities represented. Arrange a sample table.

Figure 2. Table to present the participant characteristics:

Characteristic	Number	Percentage
Gender		
- Female	16	53.3%
- Male	14	46.7%
Age		
- 20-29 years	7	23.3%
- 30-39 years	11	36.7%
- 40-49 years	7	23.3%
- 50-65 years	5	16.7%
Education		
- High school	1	3.3%
- Some college	6	20.0%
- Bachelor's	12	40.0%
- Master's	11	36.7%
Ethnicity		
- White	16	53.3%

Characteristic	Number	Percentage
- Black	4	13.3%
- Asian	6	20.0%
- Hispanic	4	13.3%

Source: Data Processing, 2023

Note: These numbers are hypothetical and are provided only as an example.

Themes from interviews:

During the interviews, several main themes emerged related to participants' understanding of global warming, perceived health impacts, attitudes toward the issue, and mitigation and adaptation strategies. These themes are described below:

1. Understanding of global warming: Many participants understood global warming as a process involving trapping heat in the Earth's atmosphere due to greenhouse gases. However, some participants needed a detailed understanding of the causes and consequences of global warming.
2. Perceived health impacts: Participants identified a range of potential health impacts of global warming, including an increased incidence of heat-related illnesses, respiratory problems due to poor air quality, and the spread of infectious diseases. Some participants also expressed concerns about food and water insecurity.
3. Attitudes towards the issue: Participants had varying attitudes towards global warming. Some expressed a sense of urgency and concern about the issue, while others were more skeptical or believed it was a natural phenomenon. Many participants emphasized the importance of individual actions to address global warming and recognized the need for collective action and policy changes.
4. Mitigation and adaptation strategies: Participants identified a range of potential strategies to mitigate and adapt to the impacts of global warming, including reducing carbon emissions, increasing the use of renewable energy sources, improving public transportation, and investing in infrastructure to protect against extreme weather events.

Table 3: Main themes from interviews

Theme	Description
Understanding of global warming	Participants understood global warming as a process involving trapping heat in the Earth's atmosphere.
Perceived health impacts	Participants identified a range of potential health impacts of global warming, including heat-related illnesses and food insecurity.
Attitudes toward the issue	Participants had varying attitudes towards global warming; some expressed a sense of urgency and concern, while others were skeptical.

Theme	Description
Mitigation and adaptation strategies	Participants identified a range of potential strategies to mitigate and adapt to the impacts of global warming.

Source: Data Processing, 2023

Subthemes within themes: This section will present subthemes that emerged within each central theme.

Subthemes within each central theme:

Central Theme: Understanding Global Warming	Subthemes
Basic understanding of global warming	The process involving greenhouse gases
Lack of detailed understanding of the causes and consequences of global warming	
Awareness of the role of human activities in contributing to global warming	
Confusion between global warming and climate change	
Central Theme: Perceived Health Impacts	Subthemes
Increased incidence of heat-related illnesses	Heat stroke and dehydration
Respiratory problems due to poor air quality and allergens	
The spread of infectious diseases	Malaria and dengue fever
Food and water insecurity due to changes in weather patterns and crop yields	
Central Theme: Attitudes Towards the Issue	Subthemes
Sense of urgency and concern about the issue	
Skepticism or belief that global warming is a natural phenomenon	
Importance of individual actions to address global warming	
Need for collective action and policy changes.	
Frustration with the government and corporations for not doing enough to address the issue	
Central Theme: Mitigation and Adaptation Strategies	Subthemes
Reducing carbon emissions through individual actions and policy changes	
Increasing the use of renewable energy sources	Solar and wind power
Improving public transportation to reduce reliance on cars	
Investing in infrastructure to protect against extreme weather events	

Central Theme: Mitigation and Adaptation Strategies	Subthemes
Changing consumption habits	Eating less meat and using less plastic

Source: Data Processing, 2023

Discussion

According to previous studies (Leiserowitz et al., 2010), many public members have a basic understanding of global warming but require a more in-depth understanding of its causes and consequences (Maibach and others, 2010). Similar to previous research (McMichael et al., 2005), our study found that participants identified a variety of potential health impacts of global warming, including respiratory problems, food, and water insecurity, and the spread of infectious diseases (Patz et al., 2005). This study's findings have significant repercussions for public health practice and policy. Our outcomes propose a need to foster successful correspondence methodologies and mediations to address public confusion about an Earth-wide temperature boost and its well-being influences. These kinds of interventions ought to concentrate on providing individuals and communities with practical strategies for mitigating and adapting to the health effects of global warming as well as clear and accurate information regarding the causes and consequences of global warming. Additionally, our findings emphasize the significance of addressing social determinants of health like poverty and inequality, which can exacerbate the harmful effects of global warming on health (Haines et al., 2006). In order to promote health equity and resilience in the face of global warming, public health policies and interventions aim to address these underlying factors.

Limitations of the study

Several limitations to this study should be acknowledged. Firstly, the small sample size and convenience sampling method may limit the generalizability of our findings. Additionally, self-reported data may have introduced bias in our results. Finally, our study did not explore the perspectives of individuals who deny the existence of global warming or its health impacts, which may be an important area for future research.

Future research directions:

There are several avenues for future research on public perceptions of global warming and its health impacts. One potential direction is to explore the effectiveness of different communication strategies and interventions in addressing public misconceptions about global warming and its health impacts. This could involve developing and testing targeted interventions for different populations, such as low-income or marginalized communities.

Another potential area for future research is to explore the perspectives of individuals who deny the existence of global warming or its health impacts and better understand the underlying factors that shape these beliefs. Finally, there is a need for further research on the social determinants of health and how they interact with global warming to impact health outcomes. Research could inform the development of more effective public health policies and interventions that address the underlying drivers of health inequities in the context of global warming. Overall, the findings of this study highlight the need for continued research and action to address the health impacts of global warming and promote health equity in the face of this global challenge.

CONCLUSION

The current study explored the perceptions and experiences of 30 participants regarding global warming and its health impacts. The findings revealed that while many participants had a basic understanding of global warming, there needed to be more clarity about the causes and consequences of the phenomenon. Participants identified a range of potential health impacts of global warming, including heat-related illnesses, respiratory problems, and food and water insecurity. Attitudes towards the issue varied; some expressed urgency and concern, while others were skeptical or believed global warming to be a natural phenomenon. Finally, participants identified a range of potential strategies to mitigate and adapt to the impacts of global warming, such as reducing carbon emissions, increasing the use of renewable energy sources, and investing in infrastructure to protect against extreme weather events.

The findings of this study have significant implications for public health policy and practice. The study highlights the need for effective communication strategies and interventions to address public misconceptions about global warming and its health impacts. This includes efforts to improve public understanding of the causes and consequences of global warming, as well as the potential health impacts. Additionally, the study emphasizes the importance of individual and collective action and policy changes to address the issue of global warming and its health impacts. To build upon the findings of this study, future research could explore the effectiveness of different communication strategies and interventions in improving public understanding of global warming and its health impacts.

Additionally, the research could further investigate the potential health impacts of global warming, particularly in vulnerable populations such as low-income communities and communities of color. Finally, the research could explore the potential impacts of different mitigation and adaptation strategies on public health outcomes. Therefore, this study provides valuable insights into public perceptions of global warming and its health impacts. By addressing misconceptions and improving public understanding of the issue, we can work towards practical solutions to mitigate and adapt to the impacts of global warming on public health.

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