

The Impacts of Climate Change on the Empowerment of Women and Girls

The Study, Team B

Meliora

Lila Fischer, Isabella Gualtieri, Jacqueline Hayes-Babczak, Sarah Hunt, Elaine Wang

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Table of Contents

1. Table of Figures & Diagrams	3
2. Acknowledgements	4
3. Introduction	5
4. Method	5
5. Results	5
6. Solution	14
7. Project Implementation Plan	18
8. Conclusion	20
9. References	22

1. Table of Figures & Diagrams

1. Atmospheric CO2 concentration for the past 2000 years.....	7
2. Global Temperature, 1880 to 2017	7
3. The Wage Gap for Indigenous Women	11
4. Meliora: Preview of the App	17

2. Acknowledgements

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We thank everyone who made this competition possible. The Voices of Olympia is an unforgettable experience that has taught us so many valuable life lessons that we may carry with us in the future

3. Introduction

This research paper aims to delve deeper into the effects of climate change on natural disasters including floods, fires, and extreme temperatures and how it disproportionately affects women. This research paper aims to demonstrate how our solution, Meliora, an app that organises and digitises donations and facilitates their distribution, can aid women affected by these natural disasters in the aftermath so they can rebuild their lives. This paper also explores how the research and brainstorming conducted before coming to our solution.

4. Method

To enhance our knowledge on the issue that we are addressing, we researched by reading articles and research papers, watching TED talks related to the topic, and interviewing specialists from various backgrounds who are knowledgeable on the matter.

5. Results

5. a. Overview of Climate Change

Climate change has always existed. From the cycles of the Ice Ages all the way to the 21st century, the Earth's climate has changed tremendously. Most of the major environmental events throughout history have been a result of small variations in the Earth's orbit, changing the amount of sun the planet receives as well as warming and cooling different regions around the world (Climate Change: How Do We Know?, n.d.). However, over the past century, the planet has dramatically gotten warmer. The drastic and alarming shifts in the climate can only be the result of one thing: human activity.

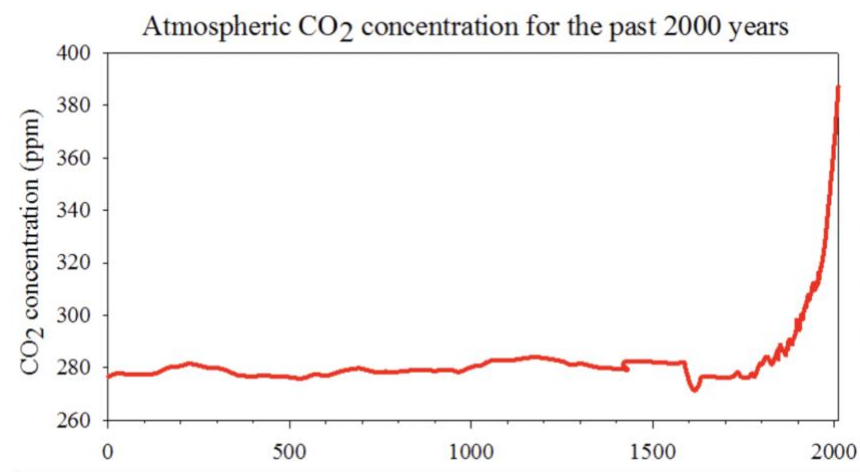
5. b. Historical Background of Climate Change

With the start of the Industrial Revolution in 1760, new technology began to surface; steam power in 1698, steamboats in 1807, and automobiles in 1885. Since, humans have been burning coal and fossil fuels, releasing greenhouse gases into the atmosphere, triggering a very unnatural and drastic increase in the global average temperature.

Carbon dioxide (CO₂), for instance, is essential in keeping our planet hospitable, as it traps heat in our atmosphere. However, the abundance in carbon dioxide concentrations continues to be one of the main sources causing the average global temperature to augment.

The Mauna Loa Volcanic Observatory, an observatory under the Earth System Research Laboratory and part of the National Oceanic and Atmospheric Administration, found that, during the Ice Ages, the average global concentration of carbon dioxide recorded was 180 parts per million (ppm). Roughly 800,000 years later, before the beginning of the industrial revolution in the 1700s, the concentration of carbon dioxide present in the atmosphere globally was roughly 280 ppm. As the use of fossil fuels skyrocketed, the global atmospheric carbon dioxide concentration was found to be 315 ppm in 1958. Today, the concentration has climbed up to around 412 ppm and is still on the rise. Today's rate of increase is 100 times faster than the rate of increase from the Ice Ages to the Industrial Revolution. ("CO₂ at NOAA's Mauna Loa Observatory reaches new milestone: Tops 400 ppm", 2013).

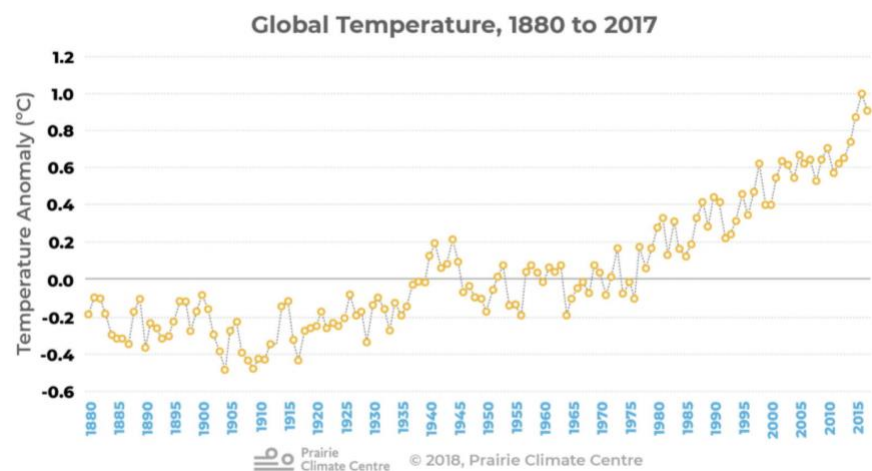
1. Atmospheric CO₂ concentration for the past 2000 years



(Science NASA)

Since the pre-industrial era, there has been approximately a 1° Celsius increase in the global average temperature (“Global Temperature”, n.d.). While this number may seem insignificant, given the massive size of the Earth and the heat capacity of its oceans, it takes an incredible amount of heat to increase the average global temperature. This demonstrates the massive increase in Earth’s accumulated heat.

2. Global Temperature, 1880 to 2017



5. c. Canada's Average Temperature

In Canada, the average temperature is increasing at a rate that is twice as fast as the planet's overall temperature ("Canada warming twice as fast as the rest of the world, report says", 2019). This is due to the loss of snow and ice in the sea. Because of their light colour, snow and ice reflect more sunlight than the ground or water. A reduction in snow and ice coverage allows for more solar energy to be absorbed by the planet, causing larger surface warming than other regions. The average temperature has already increased by 1.7° Celsius (Zhang et al., n.d.) surpassing the suggested temperature increase established in the Paris Agreement of 2015 of 1.5° Celsius. Unfortunately, the Intergovernmental Panel on Climate Change predicted a temperature rise of 2.5° to 10° Fahrenheit, which is a 4° Celsius increase, over the next century.

5. d. The Impacts of Climate Change on Weather Related Phenomena

Climate change and global warming are responsible for the recent increase in the quantity and intensity of weather related natural disasters and extreme temperatures. Changes in natural phenomena, such as changes in precipitation patterns, prolongations of wildfire seasons, and augmentations in extreme temperatures related damages, injuries, and deaths show the impacts of global warming.

5. d. i. *The Impacts of Climate Change on Precipitation Patterns*

Precipitation patterns, including rainfall, snowfall, and the melting of snow, all affect the amount of water available for drinking, irrigation, and industry. They also influence floods and the biodiversity of specific ecosystems. Changes in precipitation patterns disrupt many natural processes, especially when these changes occur so rapidly. The average temperature of the Earth is speedily rising, leading to more evaporation, and further resulting in overall precipitation

increase in certain regions. In other regions, shifts in air and ocean currents may have an adverse effect, leaving droughts in its wake.

In Canada, a study conducted by researchers at Environment and Climate Change Canada found that climate change and these changes in precipitation patterns have resulted in significantly more extreme rainfall and more frequent storms. According to the Insurance Bureau of Canada, from 2009 to 2019, the average sum of money paid for damage claims caused by floods was \$598 million, whereas the average from 1983 to 2007 was merely \$153 million. Rising flood insurance claims continue to show the increase in intensity and frequency of water related damages caused by climate change over the decades.

5. d. ii. *The Impacts of Climate Change on Extreme Temperatures*

With the increase of the average global temperature, regions around the world have been experiencing longer periods of extreme temperatures. In recent years, regions across Canada have been experiencing record-breaking temperatures. In 2021, parts of British Columbia hit over 46° Celsius, breaking all-time Canadian temperature records. According to the Canadian Monthly Data Report from 1990, the highest temperature recorded 20 years ago in British Columbia was not nearly as high – merely 30° Celsius. This sudden increase in heat caused numerous deaths and injuries. British Columbia’s chief coroner found that in the summer of 2021, 570 of 815 deaths were caused by extreme heat temperatures (“70% of sudden deaths recorded during B.C. heat wave were due to extreme temperatures, coroner confirms”, 2021).

5. d. iii. *The Impacts of Climate Change on Wildfires*

With the average global temperature on the rise come periods of longer-lasting, and increasingly frequent and dangerous wildfires. The change in climate causes air to be dryer,

generating more wind, and leaving certain regions at high risk of fires. These occurrences mixed with periods of intense heat waves stretch out the length of a typical wildfire season. In 1950, regions would be more prone to wildfires for around five months during the summer and early autumn. Now, a wildfire season lasts on average an extra two months, spanning over seven months (“When is Wildfire Season?”, n.d.).

5. e. The Effects of Natural Disasters on Women

The climate changes our planet has been experiencing since the industrial revolution has bore extensive effects on Earth’s ecosystems. Our research has found that, due to climate change, a noticeable increase in natural disasters has caused the lives of millions of vulnerable women around the globe to be completely destroyed. The need for these women to uproot their families after the loss of their possessions and property causes a serious disruption in the flow of society. After experiencing life changing disasters such as floods, fires and extreme weathers, these women are expected to find a quick and potentially long term solution to their inhabitable situations.

5. e. i. *The Effects of Natural Disasters on Women’s Ability to Procure Resources*

The lack of accessibility to resources is one of the ways that women are more affected by natural disasters. Many women don’t have the tools they need to adequately prepare, protect, and respond to these natural disasters. According to the Canadian Women's Foundation, 1.9 million women live on low income with 1.5 million living in poverty.

5. e. i. 1. A Brief Summary of the Wage Gap in Canada

One of the main contributors to the issue of women living in poverty is the wage gap. Globally, women only make on average 68% of what men make for the same work (McCarthy, 2021) and in Canada, according to the Canadian Women’s Foundation, a woman makes 87 cents

for every dollar that a man makes. For racialized, foreign, or disabled women, this gap is even larger. Disabled women who work full time reported 37 070\$ of personal income, which is almost 3000\$ less than a woman without disabilities (Burlock, 2017). An Indigenous woman in Canada only makes 65 cents for every dollar a non-Indigenous man makes (“The Gender Pay Gap”, n.d.).

3. The Wage Gap for Indigenous Women



(Annual Report to Parliament 2020)

5. e. i. 2. The Importance of Proper Housing, Shelter, and Equipment in the Event of a Natural Disaster

In the event of a natural disaster, it is crucial to have proper housing or shelter for protection and safety. For women who are living in financial difficulty, it is more difficult to acquire items of good quality that will last. A house with a poor quality build will not be able to sustain itself and protect its residents.

For Indigenous women, the problem of improper housing is especially severe. In Indigenous communities, according to The Assembly of First Nations, 44% of existing houses need major repairs and 15% of them are beyond repair. The wage gap for Indigenous women and the state of the homes in Indigenous communities make these women even more vulnerable to natural disasters.

In addition to proper housing, adequate protection equipment such as fire extinguishers, first aid kits, and protective clothing also play a major role in preventing injuries and fatalities which also add to the already-mounting cost.

5. e. i. 3. The Financial Strain on Women When Having to Repurchase Damaged Goods or Objects After a Natural Disaster

In the aftermath of a natural disaster, a large sum of money is needed to repair the damages and to buy basic amenities including food, clothes, water, and hygiene products. For the 1.5 million women living in poverty in Canada, these repairs are devastating for their financial state.

In Canada, getting resources to remote Indigenous communities is time consuming, costly, and difficult, and as a result, raises their prices. James Morris, founder of Mikinakoos, a charity created to address poverty in remote Indigenous communities, stated that the cost of food is 1.5 times more expensive in these communities.

Once again, it is more difficult for Indigenous women, for example, to afford repurchasing damaged goods because of the low wages and the high cost of resources.

5. e. i. 4. The Financial Strain on Mothers After a Natural Disaster

For mothers, the cost to recuperate after a natural disaster is even higher. They not only have to take care of themselves, but they also have to take care of their children. Global News

found in a study that it costs around 342 000\$ to raise a child in Canada for the first 18 years of a child's life. After a natural disaster occurs and items such as baby products are damaged, mothers will have to repurchase the damaged items, which will increase the cost of raising a child significantly and be more of a burden. In particular, families with single mothers face harsher financial strain after a natural disaster. As single moms are the only breadwinners for their family, the effects that these disasters have on their financial lives could affect them for many years after the disaster.

5. e. ii. *The Effect of Natural Disasters on Women's Mental Health*

According to the World Health Organisation, women are more susceptible to depression than men. This means that these vulnerable women who are affected by natural disasters experience depression on a regular basis in addition to the added stress, uncertainty and anxiety of the impacts of these catastrophes, and may have a hard time adjusting to their circumstances and getting their lives back on the right track.

Natural disasters that inflict immense loads of stress on women can put them at risk of heart diseases. Premenopausal women have higher levels of estrogen that help their blood vessels react to this unnatural load of stress, but on the other hand, postmenopausal women don't have the hormones to protect their cardiovascular system ("Estrogen & Hormones", n.d.). If these women are expected to juggle their jobs, families and other chores in addition to this build up of stress, there is no possible explanation for why they shouldn't receive help. These women affected by catastrophes are extremely vulnerable to symptoms of fatigue which prohibits them from attentively attending to the aftermath that the disaster has caused. All of these effects that natural disasters have on various women, can last for years after the incident and if it is a recurring event, can be detrimental to their physical and mental health.

6. Solution

6. a. Overview of Solution

To reduce the financial and emotional stress women undergo before, during, and after a natural disaster, we have created Meliora. Meliora is an app designed to aid women in the aftermath of natural disasters that have damaged their homes and their belongings. This app includes a registry that connects people impacted by natural disasters and those willing to assist. It aims to promote community and cooperation, to educate people on natural disasters and to support those in need.

6. b. Feature 1: Registry

Half of Meliora contains a registry that simplifies goods to be donated from one person to another. Users willing to donate can create an account on the app and upload objects – with the details concerning them – that they would like to donate. Users in need of the donations can also create an account and request items that have been previously uploaded. The donor of the object then receives an email about the request and can accept it.

The distribution of the donations can be done in two ways: meetups or through a third party to ensure privacy. If both parties feel comfortable enough, they may choose to set a time and location to meet to exchange the object. If not, they may choose to go through a public facility, namely donation centres or community centres that have agreed to help out. The donor can then leave the object at the public facility for the recipient to pick up at a later time that day.

Our team has begun the process of contacting and partnering with organisations in areas who have hands-on experience with these increasingly harmful issues and consequences so as to ensure our product is as helpful as it can be and that the right products reach the right people.

6. c. Feature 2: Information

The other half of Meliora offers information on what to do prior to and following specific natural disasters like floods, fires, and extreme weather conditions. This side of the app has been created to be accessed offline, making it quick to find in case of emergency.

In the future, we plan to have a list of resources, including shelters, food banks, or community organisations based on location to offer users different options to seek help.

Though everyone is welcome to access this registry, our product is specifically tailored to women and mothers' needs. The registry will have sections dedicated to feminine hygiene products (i.e. pads and tampons) and baby products (i.e. cribs, diapers, and toys).

Our solution is targeted for women and mothers in communities who have been affected by natural disasters. In particular, those who need specific equipment and furniture to handle these challenges before and after the fact. For instance, if a fire causes damage to a person's house and all their child's clothes inside it have been burned to ash, our solution will be there to help out with new baby clothes. Another example is that, during a heat wave, users could use our app to find a fan which would drastically improve their living situation. As well, if a natural disaster has caused damage to furniture, our app can be used for those who cannot replace their furniture. Such as, if during a flood, a user's furniture was damaged, they could replace it using our app. Moreover, our solution also targets people in a position to help out those affected by these natural disasters that are willing to lend out a helping hand and donate some of their possessions.

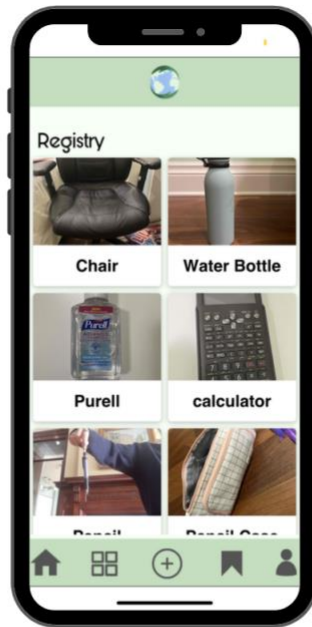
6. d. Meliora

To download the prototype of Meliora, click [here](#).

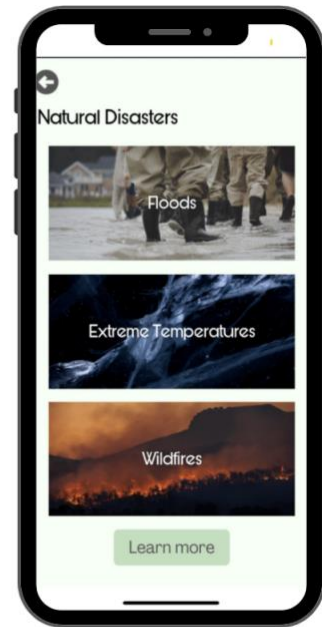
4. Meliora: Preview of the App



Home Page



Registry



Information

6. e. Business Type

Meliora is a not-for-profit solution. We plan to render this solution a non-profit organisation and to make our app and website accessible in as many places we can that are in need of this technology. To achieve this goal, we have and will continue to form partnerships with organisations located in various communities. With their help, we can continue to learn and adapt our solution to the needs of individual communities using this app.

6. f. A Brief Summary on the Evolution of Meliora

Our project has evolved significantly since the beginning of the Voices of Olympia Canada School Competition Edition 2021-2022. At the start of the competition, we decided right away to focus on the impacts of natural disasters as they create so much damage and will only continue to

increase in frequency and intensity over the next few years due to climate change. We've seen firsthand the consequences of floods, for instance, on the edges of the island of Montreal, leaving us only to imagine how much more devastating they can be in other areas across Quebec, Canada, and the rest of the world. We always had the idea to have a tech related aspect to our solution. We also had interviews with several professionals, such as Mike Robson who has been associated with The Food and Agriculture Organisation (FAO) of the United Nations for the past 23 years. They gave us helpful feedback, and, after more brainstorming and a few other ideas, we fell upon the idea of Meliora and having a registry. We then went to Ms. Liogas and Mr. Somma, two of our mentors and they have helped us get in contact with several organisations, such as the Freedom from Poverty Foundation and the Community Rural Health Project.

7. Project Implementation Plan

7. a. Partnerships

Over the course of this project, we have had the pleasure of having mentors and forming partnerships that have helped create, shape, and expand our project. Firstly, for this project, we went to the IT director of our school, Amalia Liogas, for help. Ms. Liogas is experienced in the technology field and is involved in several projects that support women's education. In particular, she leads the partnership between The Study and our sister school in Diria, Nicaragua, where The Study supports girls' education at the Diria Institute. Ms. Liogas gave us the suggestion to make an app as well as a website since an app will be more accessible to people in lower- and middle-income countries. She has helped us prepare for this competition as well as put us in contact with the right people.

Thanks to Ms. Liogas, we were able to connect with Alexander Somma and Benjamin Douek, co-founders of Robot in a Can, who helped guide us through the programming and business aspects of our product. Mr. Somma then got in contact with a non-profit foundation in India called the Freedom from Poverty foundation. This foundation's mission is to "break the cycle of poverty of families through surgical, educational and community-based missions". Every dollar raised aims to help the population in the region they are offering aid to become independent in the short and long term and improve their quality of life. For over thirty years, this foundation has treated patients, helped build a primary and secondary school, provide equipment, and raise funds in villages like Jamkhed and Barhiya. After Mr. Somma pitched our solution idea to the head of the chapter in Montreal, they brought it to the Freedom from Poverty Foundation's Vice President, Vinod Dargan. They were intrigued by our idea and agreed to meet with us and to introduce our project to two organisations they are partnered with, the Comprehensive Rural Health Project and another organisation in Lucknow. The Comprehensive Rural Health Project collaborates with the FFPPF in aiding rural communities and bringing healthcare. For over forty-five years, their mission has been to "eliminate injustices which deny all people access to healthcare".

In the near future, we will reach out to similar community organisations in various locations with the goal of expanding the reach of our app, both in Montreal, Canada and internationally.

We will incorporate the lessons and resources we have gathered from this competition into all aspects of our solution. The Voices of Olympia Canada School Competition Edition 2021-2022 has provided a strong foundation for our project and we hope to stay in contact a continue to build strong connections with this competition and its partners.

7. b. Accessibility

The farther we advance in our project, the more accessible our app will become. First of all, we currently have a website under construction which will allow anyone who has access to a computer, or access to a library or other location with computers, to have access to the registry and the information available on our app. Since our app is a web app (RECHECK THIS), on our website, users will have access to the same app as users who have downloaded it on their phone. Secondly, the information part of the app is accessible even without internet access once it has been downloaded on a user's phone. Thirdly, if users lack access to a computer or phone, community non-profits and community organisations could request donations on behalf of the community member.

7. c. Technology

Our app is programmed in Thunkables. This is a low code platform that works in block code. We used this because it was the easiest way to create a functional app. In its current version, our app can be used as a registry. Users can upload photos to the registry, request items, receive a request email from the app and confirm a request. In short, our app is usable and can be applied as of now in real world situations. After the competition, we will move the code into a larger scale coding platform so that even more people can use our app.

8. Conclusion

Through our research, we have found concrete evidence that women are disproportionately impacted by natural disasters due to existing inequalities. As well, climate change will cause natural disasters to continue to increase in frequency and intensity. Women often have to take on more responsibility when it comes to taking care of others and in tasks to rebuild their lives. Women are often less protected and have less resources to support them after a natural disaster

occurs. To help women, we have created Meliora, an app that digitises the distribution of donations to support women all over the world impacted by natural disasters.

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