Zero Degree Lab
Health Documentation

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Resources:

https://www.nature.com/articles/s41558-022-01426-1.pdf

https://www.climateforesight.eu/future-earth/the-ipccs-sixth-assessment-report-all-the-science-knows-about-past-actual-and-future-climate-change/

https://t.e2ma.net/message/3xcvwf/r4tzgxv

https://today.ucsd.edu/story/air-pollution-can-amplify-negative-effects-of-climate-change-new-study-finds

https://ucsdgreennewdeal.net/

https://universityofcalifornia.edu/sites/default/files/Bending_the_Curve_F5_spreads.pdf

https://www.unicef.org/press-releases/one-billion-children-extremely-high-risk-impacts-climate-crisis-unicef

https://www.washingtonpost.com/climate-solutions/2022/05/16/climate-change-air-pollution-saved-lives/

https://thehill.com/policy/equilibrium-sustainability/3524948-children-at-particular-risk-of-climate-change-air-pollution-effects-analysis/

https://www.concern.net/news/countries-most-affected-by-climate-change

Questions Going into our Research:

1) How are children affected by CO2 emissions? How will this affect their health issues currently or in the future?
2) Climate change will continue to become a bigger problem as the years progress. What other negative impacts will younger people face which aren't really being talked about?
3) What health issues do you see in your clinic caused by climate change?
    - Respiratory and Cardiovascular disease
4) What diseases are caused by emissions?
5) What is the correlation between carbon dioxide in the atmosphere and diseases (asthma, lung cancer, etc.)?
6) What is the correlation between carbon dioxide in the atmosphere and other environmental effects (floods, fires, etc.)?
7) Which areas are impacted the most by the environmental changes?
8) How many people are affected by environmental changes?
9) What diseases are caused by emissions?
10) What is the correlation between carbon dioxide in the atmosphere and diseases (asthma, lung cancer, etc.)?
11) What is the correlation between carbon dioxide in the atmosphere and other environmental effects (floods, fires, etc.)?
12) Which areas are impacted the most by the environmental changes?
13) How many people are affected by environmental changes?

Questions/Answers:

Questions & Cite	Research for question
How are children affected by CO2 emissions? How will this affect their health issues currently or in the future? https://www.unicef.org/press-releases/one-billion-children-extremely-high-risk-impacts-climate-crisis-unicef	• Young people living in the Central African Republic, Chad, Nigeria, Guinea, and Guinea-Bissau are the most at risk of the impacts of climate change, threatening their health, education, and protection, and exposing them to deadly diseases • Approximately 1 billion children – nearly half the world's 2.2 billion children – live in one of the 33 countries classified as “extremely high-risk” • Climate and environmental shocks are undermining the complete spectrum of children’s rights, from access to clean air, food and safe water; to education, housing, freedom from exploitation, and even their right to survive • Improving children’s access to essential services, such as water and sanitation, health, and education, can significantly increase their ability to survive these climate hazards • Rising temperatures and decreased air quality affect kids by increasing asthma attacks and allergies, worsening pregnancy outcomes, creating food insecurity, increasing mental health problems, developmental delays, and changes in their genetic makeup. • A child's body may not be able to break down and get rid of harmful contaminants that enter their body. Health problems from environmental exposure can take years to develop. Because they are young, children have more time to develop health conditions and diseases than adults who are exposed later in their life.
What diseases are caused by emissions? https://www.nature.com/articles/s41558-022-01426-1.pdf	• The main diseases of concern are asthma, rhinosinusitis, chronic obstructive pulmonary disease (COPD) and respiratory tract infections. • warming, heatwaves, droughts, wildfires, extreme precipitation, floods, sea level rise and so on • We found 3,213 empirical case examples in which climatic hazards were implicated in pathogenic diseases. • All empirical case examples were related to 286 unique pathogenic diseases, of which 277 were aggravated by at least one climatic hazard. • Although 63 diseases were diminished by some climatic hazards, 54 of them were at times also aggravated by other climatic hazards; only nine pathogenic diseases were exclusively diminished by climatic hazards. • Hereafter, we report diseases that were aggravated by climatic hazards, unless otherwise indicated. The compilation of pathogenic diseases aggravated by climatic hazards represent 58% of all infectious diseases reported to have impacted humanity worldwide • Warming25 and precipitation changes25, for instance, were associated with range expansion of vectors such as mosquitoes25, ticks26, fleas27, birds28 and several mammals29

Which areas are impacted the most by the environmental changes? https://www.concern.net/news/countries-most-affected-by-climate-change	implicated in outbreaks by viruses25, bacteria25, animals25 and protozoans25, including dengue25, chikungunya25, plague29, Lyme disease25, West Nile virus28, Zika25, trypanosomiasis30, echinococcosis31 and malaria25 to name a few. ● Climate-driven expansions were also observed in aquatic systems, including cases of Vibrio species (for example, cholera32), anisakiasis33 and envenomations by jellyfish34. Warming at higher latitudes allowed vectors and pathogens to survive winter, aggravating outbreaks by several viruses (for example, Zika, dengue) ● These may include headaches, dizziness, restlessness, a tingling or pins or needles feeling, difficulty breathing, sweating, tiredness, increased heart rate, elevated blood pressure, coma, asphyxia, and convulsions. The levels of CO2 in the air and potential health problems are: 400 ppm: average outdoor air level. ● **Afghanistan.** ○ Between 1950 and 2010, the temperatures in Afghanistan increased by 1.8ºC, and an optimistic view of the climate crisis in the country still shows a minimum increase of 1.4°C by 2050 ○ the worst case scenario would see a 6ºC increase by the end of this century ○ Rains have decreased by 40% in the country, and the World Food Programme classifies both rainfall-related drought and snowmelt-related drought (owing to the same warming conditions in the Hindu Kush mountains affecting Pakistan to the same effect) as current threats. ○ The WFP also points to flooding in other areas (and sometimes the same areas affected by drought), due to both heavy spring rainfalls and riverine floods caused by increasing snowmelt. ● **Bangladesh** ○ In this time, the country experienced 185 extreme weather events that cost a combined total of $3.72 billion ○ According to a 2018 USAID report, 89% of Bangladeshis (approximately 143 million) live in “high” or “very high climate exposure areas". ○ With 75% of Bangladesh technically underwater, it’s estimated to lose 11% of its land by 2050 due to rising sea levels. This could cause one out of every seven people in Bangladesh to be displaced from their homes. ● **Chad** ○ Chad currently ranks last on Notre Dame’s Global Adaptation Initiative index, which also categorizes it as the fourth most-vulnerable country to climate change and the second least-prepared country for its effects. ○ Over the last 50 years, increasing temperatures, droughts and use has caused 90% of the country’s largest lake—Lake Chad—to disappear, rendering it a dustbowl. ○ he Lake Chad basin has become further eroded by heavy rains (another weather extreme linked to climate change)

	● **Haiti** ○ The World Bank estimates that Haiti has lost 98% of its forests, making the country even more vulnerable to complex emergencies when they strike. ○ Over 96% of Haitians are at risk when a disaster strikes, and the damages sustained in the wake of these emergencies carry a heavy financial burden. ○ The World Bank also estimates that 2016's Hurricane Matthew caused damages equal to nearly one-third of the country's GDP. The 2010 earthquake that killed approximately 250,000 people cost 120% of the country's GDP. ● **Kenya** ○ This area of Kenya is being hit hard as part of a larger drought in the Horn of Africa — the area's worst in 40 years ○ For this reason, as well as the losses that have come with that drought (in 2019 alone, drought was estimated to cost Kenya more than $708 million (€678m), Germanwatch ranked it among the top countries most affected by climate change in its 2020 Climate Risk Index. ○ While it contributes less than 0.1% of the global greenhouse gas emissions, it has also pledged to cut these emissions by 32% by 2030. ● **Malawi** ○ Malawi, along with Mozambique and Zimbabwe, was at the epicenter of 2019's Cyclone Idai, the costliest and deadliest tropical cyclone in the region's history ○ United Nations Secretary General António Guterres called it "one of the worst weather-related catastrophes in the history of Africa," and overall Idai affected 3 million people, killed over 1,000, and caused $2.2 billion (€2.1bn) in damages. ○ However, that was just one of the most recent events in a series of climate variability that dates back to 1961. Increasing weather extremes have contributed to the country's poverty and hunger rates ○ While Idai's flood waters destroyed crops for many, unpredictable rainfalls and droughts pose greater threats to the country's agricultural industry, which is how nearly 80% of the working population earns a living. ● **Niger** ○ Over 80% of Nigeriens rely on agriculture for their livelihoods, a prospect that has become increasingly risky as the country faces temperatures increasing at 1.5 times the speed as the rest of the world ○ By the end of this century, climate experts predict an increase of 3º to 6º C, which will have devastating impacts on the Sahel region. Already vulnerable to hunger, water scarcity, and violence, Niger could face even further stress and crisis if the current climate crisis continues at pace. ○ Since 1968, the country has faced multi-year droughts, which affected nearly a third of the country's population at

	the beginning of this century ○ This has had a direct impact on agriculture in Niger, with the World Bank reporting a decline in harvest size and quality since the 1970s. ○ Conversely, floods are also a recurring hazard, especially in the south. Both of these risks are projected to intensify in the near future, with Niger's most vulnerable farmers paying the ultimate price. ● **Pakistan** ○ Just below Bangladesh on the CRI for cumulative risk is Pakistan, which Germanwatch ranks as the eighth most climate-vulnerable country in the world. ○ Last July, temperatures in the Sindh Province city of Jacobabad (which *New York Times* author Fatima Bhutto called the hottest city in Asia, if not the world) exceeded 126º F, "too severe for human tolerance." The World Bank calls Karachi, another city in Sindh, a "climate hot spot," estimating an increase in climate events and their impact on the city's 14.9 million residents. ○ Much of this, as Bhutto notes, is due to the rapid deforestation of Pakistan which, upon the country's founding in 1947, was 33% forest. ○ Glaciers in the Hindu Kush, Himalayas, and Karakoram mountains have melted, leading to massive drought. (Pakistan already has one of the highest rates of water stress and scarcity in the world.) All of this could increase, having the greatest impact on the most vulnerable Pakistanis, especially those who rely on agriculture and pastoralism for their survival.
What is the correlation between carbon dioxide in the atmosphere and other environmental effects (floods, fires, etc.)?	● Carbon dioxide is Earth's most important greenhouse gas: a gas that absorbs and radiates heat. Unlike oxygen or nitrogen (which make up most of our atmosphere), greenhouse gasses absorb heat radiating from the Earth's surface and re-release it in all directions—including back toward Earth's surface ● Carbon dioxide in the atmosphere warms the planet, causing climate change. Human activities have raised the atmosphere's carbon dioxide content by 50% in less than 200 years. ● When fossil fuels are burned, they release large amounts of carbon dioxide, a greenhouse gas, into the air. Greenhouse gasses trap heat in our atmosphere, causing global warming. ● The ocean absorbs about 30% of the carbon dioxide (CO_2) that is released in the atmosphere. As levels of atmospheric CO_2 increase from human activity such as burning fossil fuels (e.g., car emissions) and changing land use (e.g deforestation), the amount of carbon dioxide absorbed by the ocean also increases. ● Carbon dioxide increases temperatures, extending the growing season and increasing humidity. Both factors have led to some additional plant growth. However, warmer temperatures also stress plants. With a longer, warmer growing season, plants need more water to survive ● While carbon dioxide (CO2) is essential for plant and animal survival, too much concentration in the atmosphere can have devastating consequences. CO2 has proven to be a significant

	contributor to air pollution, taking a substantial role in the greenhouse effect. ● Abstract. A direct consequence of rising CO_2 is increasingly devastating flooding, because deciduous plants deploy fewer stomata each year as the atmospheric CO_2 supplies more carbon for photosynthesis. When plants transpire less, more water runs off in streams and floods. ● Increased global emissions lead to higher temperatures, which then create drier, more fire-prone conditions.

General Research:

Source: Unicef Report

A. General Stats/Info about Climate Change Impact on Children

- Africa = most at risk area due to impacts of climate change
    - As a result = more prone to deadly diseases
- *'The Climate Crisis Is a Child Rights Crisis: Introducing the Children's Climate Risk Index'* → ranks countries based on the vulnerability of children to ecological shocks (heatwaves, etc.)
- According to statistics, 1 billion out of the 2.2 billion children in the world live in the 33 countries noted as extremely high risk
    - these children face environmental shocks frequently
    - Get inadequate services/help
- The Children's Climate Risk Index (CCRI) reveals:
    - 240 million children are highly exposed to coastal flooding;
    - 330 million children are highly exposed to riverine flooding;
    - 400 million children are highly exposed to cyclones;
    - 600 million children are highly exposed to vector borne diseases;
    - 815 million children are highly exposed to lead pollution;
    - 820 million children are highly exposed to heatwaves;
    - 920 million children are highly exposed to water scarcity;
    - 1 billion children are are highly exposed to exceedingly high levels of air pollution[1]
- Every child in the world is at risk for at least one of these climate hazards

B. Greenhouse Gas Emissions and their Impact

- "The 33 'extremely high-risk' countries collectively emit just 9 per cent of global CO2 emissions. Conversely, the 10 highest emitting countries collectively account for nearly 70 per cent of global emissions. Only one of these countries is ranked as 'extremely high-risk' in the index." - UNICEF Report
- Unicef's plan to solve this issue is to…
    - Provide financial aid
    - Provide supplies (water, food, etc.)
    - Partner with businesses to support and fund these climate movements

C. Unicef's Plan to Action:

- For businesses: Increase investment in climate adaptation and resilience in key services for children.
- For businesses: Reduce greenhouse gas emissions.
- For the government. : Provide children with climate education and greens skills, critical for their adaptation to and preparation for the effects of climate change.
- For the government. : Include young people in all national, regional and international climate negotiations and decisions, including at COP26
- For the government. : ensure the recovery from the COVID-19 pandemic is green, low-carbon and inclusive.

Source: UC Bending the Curve Report

A. General Stats
    - Since 1750, we have emitted 2 trillion metric tons of carbon dioxide (CO2) and other greenhouse gasses.
    - Emission in 2011 = 50 billion tons → this is growing at a 2.2% rate
    - If this 2.2% rate increases then by 2051 world will warm up by 2 degrees
B. Bending the Curve and What We Need to Do for That to Happen
    - Bending the Curve = flattering the upward increase of human-influenced warming trends
    - Solutions:
        - Reduce Co2 emissions by 80% by 2050
        - World reduce overall warming by 1.5 degrees
C. Common Pollutants
    - Short Lived Climate Pollutants (SLCPs)
        - methane (CH4), black carbon, hydrofluorocarbons (HFCs, which are used in refrigerants) and tropospheric ozone.
        - If we reduce our SLCPs then by 2030 we could reduce warming by 0.6 degrees
D. Scalable Solutions
    1. Bend the warming curve immediately by reducing short-lived climate pollutants (SLCPs) and using carbon neutral technology.
    2. Foster a global culture of climate action through education and awareness.

3. Deepen a global culture where everyone, regardless of profession and age, can converge together to brainstorm actions to mitigate climate change.
4. Scale up subnational models of governance and collaboration around the world to embolden and energize national and international action.
    - California make policies to regulate and increase renewable energies
5. Adopt market-based instruments to create efficient incentives for businesses and individuals to reduce CO emissions.
6. Narrowly target direct regulatory measures — such as rebates and efficiency and renewable energy portfolio standards — at high emissions sectors not covered by market-based policies.
7. Promote immediate widespread use of mature technologies such as photovoltaics, wind turbines, battery and hydrogen fuel cell electric light-duty vehicles, and more efficient end-use devices, especially in lighting, air conditioning, appliances and industrial processes.
8. Aggressively support and promote innovations to accelerate the complete electrification of energy and transportation systems and improve building efficiency.
9. Immediately make maximum use of available technologies combined with regulations to reduce methane emissions by 50 percent and black carbon emissions by 90 percent.
10. Regenerate damaged natural ecosystems and restore soil organic carbon to improve natural sinks for carbon (through afforestation, reducing deforestation and restoration of soil organic carbon).

Conversions

Conversion Spreadsheet:
https://docs.google.com/spreadsheets/d/1tpV8WLKxfiY6dvnr-AjI9OjUYN9qY9ENjn3ey4IINkM/edit#gid=0