

HUMAN HEALTH SECTOR REPORT

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INTRODUCTION

The Human Health breakout group included participants from academia (researchers from public health, meteorology and geography); government environmental agencies (i.e., the U.S. Environmental Protection Agency and Environment Canada); and the Sierra Club).

The discussion group was expected to interpret the four questions broadly in an effort to reduce the chance that significant issues would be overlooked. Because this was an initial effort, failing to include potentially critical issues was considered a greater mistake than including issues that, upon further study, turn out to be relatively unimportant. The participants were not asked to make quantitative assessments of the impacts that they discussed.

The level(s) of confidence that the group had in these decisions were used to identify areas where more information or research is needed. Lastly, the group suggested strategies for coping with climate change and variability, which included both mitigation and adaptation strategies.

THE 4 QUESTIONS ADDRESSED

1. What are the current concerns?

Participants grouped current stresses on human health into the three main categories of public health: healthcare, environment, and lifestyle. The stresses for each of these categories were first suggested and then considered implicitly regarding their importance with respect to the Upper Great Lakes region. Participants then

discussed and decided whether climate change/variability would exacerbate or ameliorate each of the current stresses.

Health care system

The most important stresses that were identified for the health care system were:

- **Limited access to health care.** A large segment of the population, including the unemployed and those in jobs without many health benefits have no or insufficient health insurance. This limitation results in a segment of the population requiring costly treatments instead of more cost-effective preventative care.
- **Rationed health care.** Besides there existing a segment of the population that is uninsured and underinsured, doctors, hospitals and other health care facilities make decisions on how to treat people based on skyrocketing costs of procedures, surgeries, medications, and reduced resources.
- **Aging population.** This segment of the population has been growing because of many factors including better health habits and better health care. This segment therefore has required increased health care, particularly for treatment of “geriatric” diseases. Because this segment usually consists of retired people who are on fixed incomes, their insurance coverage is limited.

Environment

Environmental factors that were identified as current stresses to human health included:

- **Severe weather events.** Severe thunderstorms, tornado outbreaks, and lake effect snowstorms can cause instantaneous injury and death. Also, extended heat waves, particularly in urban areas (e.g., Chicago during the summer of 1995), can contribute to deaths of elderly people who are unable to get relief from the heat.

- **Reduced air quality.** High ozone and particulate matter levels in the ambient air from industrial emissions, motor vehicles, and residences cause breathing discomfort. Several segments of the population that are at risk include people who exercise outdoors, bicyclists (commuters), the elderly, and people who suffer from asthma and other respiratory ailments.
- **Reduced water quality.** Pollution from industrial sources, people with a disregard for the environment, and increased outdoor recreational activity have all contributed to reduced water quality. Infectious agents, such as cryptosporidium, have also contributed to reduced water quality. A large segment of the population, especially that which relies on the Great Lakes for recreation of one form or another, is at risk.
- **Exotic species.** International trade practices result in reduced environmental diversity (e.g., the impact of zebra mussels in the Great Lakes) and provide opportunities for disease transmission across national borders.

Lifestyle

A number of lifestyle issues were identified as current stresses on human health, including:

- **Poor diet.** Lack of nutrition is known to contribute to certain diseases.
- **Lack of exercise.** Lack of exercise is known to contribute to reduced heart and lung function and to increase the risk of disease and potentially death (e.g., cardiac disease).
- **Smoking.** There is a well established link between smoking and deaths from both lung cancer and cardiac disease. Of particular concern is the increase in teenage smoking (more than 60% in the last 10 years) which will translate into future health problems.

- **Substance abuse.** Alcohol and drug abuse continue to be an issue of concern with regard to human health.
- **Stress.** The demands of family life and careers can contribute to stress-related illnesses.

2. How may climate change impact our lives?

Climate change was determined to have both direct and indirect impacts on the stresses that already exist for human health. Impacts were classified as direct if it was thought that human health would be directly affected by the climate change, and as indirect when human health effects would be a secondary result of climate change. Many of the impacts that were identified could exacerbate the current stresses on human health in the region.

Direct impacts

- **Severe weather.** Possible increases in the frequency of and/or a change in the timing or the location of severe weather events (e.g., tornadoes, lightning, and flash floods) could lead to increased injury and mortality. The tornado outbreak that occurred across southern lower Michigan during the summer of 1997 was suggested as a scenario that might occur more frequently.
- **Heat waves.** Over 500 people died from the heat wave in Chicago during the summer of 1995. This event was suggested as a scenario that might occur more frequently in the region due to climate change. Urban areas in the midwest do not necessarily have the infrastructure to deal with extended heat waves.
- **Lake-effect snow.** Possible changes in lake-effect snowstorms due to climate change were discussed, but it was not clear to the participants how climate change would impact lake-effect storms. If fewer lake-effect snowstorms occurred due to higher temperatures, then the

impact on human health would be reduced. However, only slightly warmer conditions may lead to increased lake-effect ice-storms, which could pose a serious health hazard from the standpoint of more traffic fatalities and extended power outages.

- **Fog.** Although the impact of climate change on meteorological phenomena such as fog formation are unknown, small increases in the mean temperature or changes in flow patterns could have significant impacts on the specific humidity and hence on fog formation. Increased fog formation could pose a serious health hazard from the standpoint of more traffic fatalities.
- **Cloudiness.** Possible increases in cloudiness downwind of the Great Lakes (e.g., over Michigan), especially during late fall and winter, could lead to increased incidence of seasonal-affective disorder (SAD).
- **Atmospheric pressure.** Possible increases in atmospheric pressure (gradients) may aggravate certain maladies such as migraines and arthritis.

Indirect impacts

- **Air quality.** Possible increases in the duration of heat/cold waves may result in higher levels of air pollutants (e.g., ozone, particulate matter) particularly if air stagnation episodes occur with these weather conditions. Increased energy production during these extended heat/cold waves could also contribute to elevated levels of air pollutants. Increased air pollutant concentrations could lead to increased morbidity and mortality.
- **Water quality.** Possible changes in the frequency and the intensity of heavy rains and flooding could lead to reduced water quality (e.g., cryptosporidium) and increased morbidity and mortality.

- **Health care.** Possible changes in the frequency and the intensity of severe weather events (as well as other aspects of the weather as mentioned above) could place an increased demand on the health care system. For example, increases in heat stress could exacerbate an existing stress on health care access, leading to further rationing of health care.
- **Vector-borne diseases.** A possible increase in the mean winter temperature and precipitation could lead to an increased survival of vector-borne pathogens and to increased Lyme disease, for example.
- **Pest infestations.** Possible increases in insect and pest infestations as a result of regional climate change could result in greater use of pesticides, which could lead to higher levels of toxins in food and water, and increased morbidity and mortality.
- **Exotic species.** Possible changes in regional climate could lead to increased survival of exotic species that enter the region from international trade practices and to greater transmission of diseases from other areas of the world.
- **Accidents.** Possible decreased participation in winter sports due to climate change may ameliorate some recreation-related accidents. However, increases in warmer weather (outdoor) activities may exacerbate other recreation-related accidents.
- **Allergies.** Possible reductions in seasonality (the differences in weather conditions between seasons) could lead to increased levels of allergens (e.g., pollen, spores) and longer allergy seasons.

3. What additional information do we need?

The level(s) of confidence that the group had in these decisions were used to identify areas where more information or research is needed.

- **High resolution models.** Better regional or nested general circulation models are needed to evaluate the regional-scale implications of climate change/variability (e.g., for the Upper Great Lakes region). For example, it is necessary to know how climate change and variability will (do) impact heat wave frequency and intensity, storm (e.g., rain/snow) frequency and intensity, and water levels and water quality.
- **Risk assessment.** High risk areas, sensitive populations, and important socioeconomic factors need to be identified so that public health methods can be developed and implemented to prevent or reduce the health impacts of climate change.
- **Warnings.** Location-specific extreme weather warnings need to be developed to prevent or reduce the health impacts of severe weather events (e.g., a heat-index based on health indicators).
- **Impacts assessments.** Information on the potential impacts of climate change/variability on the health care system is needed. To this end, an evaluation of the impacts of the Chicago heat wave and tornado outbreaks on the health care infrastructure could be performed.
- **Water quality modeling.** The effect of precipitation variability and severe storms (flooding) on water quality needs to be investigated. The group was uncertain as to whether potential deterioration of water quality would occur and whether it would significantly impact human health in the region.
- **Socioeconomic projections.** The potential for population and demographic changes to become additional factors that exacerbate health impacts needs to be studied.

4. How do we cope with climate change?

Strategies for coping with or mitigating climate change impacts were divided among mecha-

nisms for the health care system, public health objectives, and government responses.

Public health strategies

- **Integrate warnings.** Indices that quantify health related weather hazards could alert people more clearly and more convincingly about risks on any given day. Such indices could complement existing indices like the UV and the Heat Indices.
- **Preventative measures.** Vaccinations, pest control, and behavioral/lifestyle changes could all reduce the number of people that require more costly acute and chronic treatments.
- **Risk communication.** The education of the general public, health care professionals, and government officials about potential impacts of climate change on human health should help reduce impacts.
- **Data collection.** Improved surveillance and monitoring systems to identify indirect health impacts should help reduce impacts and should help increase lead times for preparedness.

Strategies for the health care system

- **Preparation.** Response procedures should be developed to prepare for extreme weather events.
- **Education.** Health care providers should be educated to be able to identify health impacts of climate change/variability.

Government/regulatory responses

- **Relocation.** People should be removed from high-risk areas such as flood plains. Possible strategies that were mentioned included imposing tax disincentives in flood prone areas.
- **Reduce emissions.** Emissions of criteria air pollutants should be lowered to counter the growing number of respiratory illnesses that are being reported.