Testimony before the

SELECT COMMITTEE ON ENERGY INDEPENDENCE

AND GLOBAL WARMING

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Good morning Mr. Chairman, Representative Markey, and other distinguished members of the Committee. Thank you for the opportunity to appear before your committee for this hearing, "Healthy Planet, Healthy People: Global Warming and Public Health," a topic that I have studied for over 14 years. I served as Co-chair for the Health Expert Panel of the US National Assessment on Climate Variability and Change and have been a Principle Lead Author on five reports of the UN Intergovernmental Panel on Climate Change (IPCC) since 1995. I am a Full Professor at the University of Wisconsin at Madison, and have active research and teaching in the field of environmental public health, specifically addressing global climate change.

I will now address the five specific questions contained in your invitation letter.

1) Is there scientific consensus that climate change poses a threat to public health?

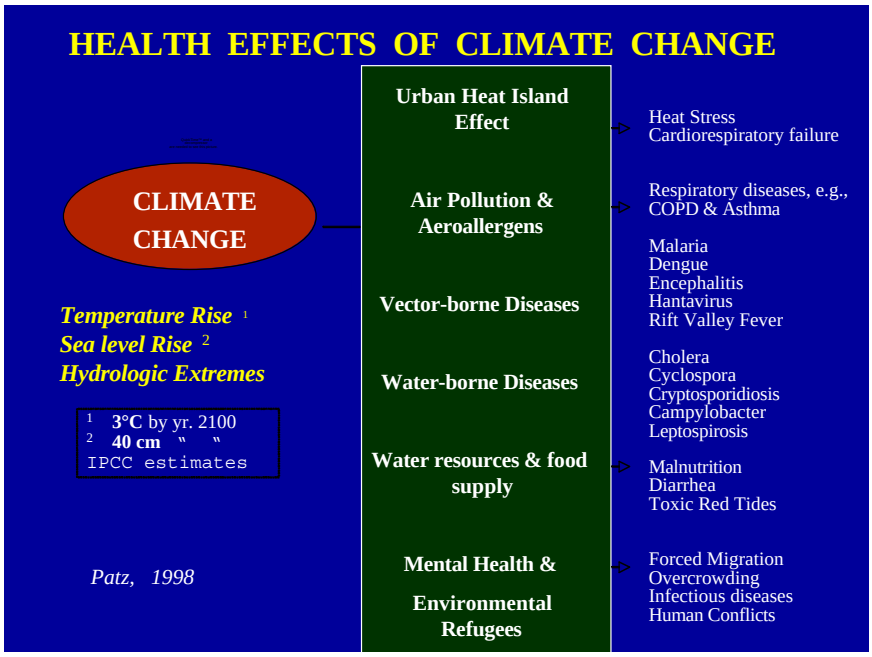
From direct involvement with the IPCC and the US National Assessment, I can say with confidence that the conclusions across assessments have been consistent finding that, on balance, the health risks of climate change outweigh the benefits. Global warming is unlike many other health threats with which we have confronted because unlike 'single agent' toxins or microbes, climate change affects multiple pathways of harmful exposures to our health. Climate change can affect human health either from direct heatwaves and severe storms to ground level smog /ozone pollution and airborne allergens, as well as many climate-sensitive infectious diseases.

Disease risks originating outside the US must also be considered because we live in a very globalized world. Many poor nations of the world are expected to suffer even more health consequences due to climate change compared to the U.S. With global trade and transport, however, disease flare-ups in any part of the world can potentially reach the U.S. Additionally, climate extremes, e.g. droughts and storms, can further stress environmental resources by destabilizing economies and potentially creating security risks both internally and to other nations.

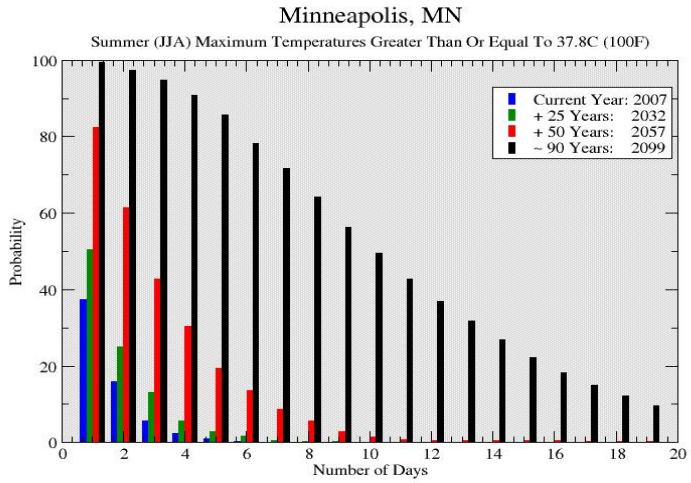
Finally, while climate change is a long term environmental threat, health ramifications are already occurring. The World Health Organization finds that warming in just the past 30 years may already be adversely affecting the global burden of disease. And while single climate events can not be attributed to climate change, 70,000 deaths in the 2003 European heatwave remind us of the risk of extreme weather events (a study in Nature concluded that global warming over the recent decades doubled the 'probability' of the occurrence of such an extreme heat wave).

1) What are some of the potential impacts of climate change on health in the United States? Will any of these impacts disproportionately affect the poor or other vulnerable communities?

Climate-related disease risks occur throughout the US, and many are expected to be exacerbated by climate change. Some health benefits could result, including reduced cold-related mortality and Rocky Mountain Spotted Fever in the Southeastern U.S. However, the net health effects have been assessed to be adverse. Our country has experienced deadly heatwaves (e.g, the 1995



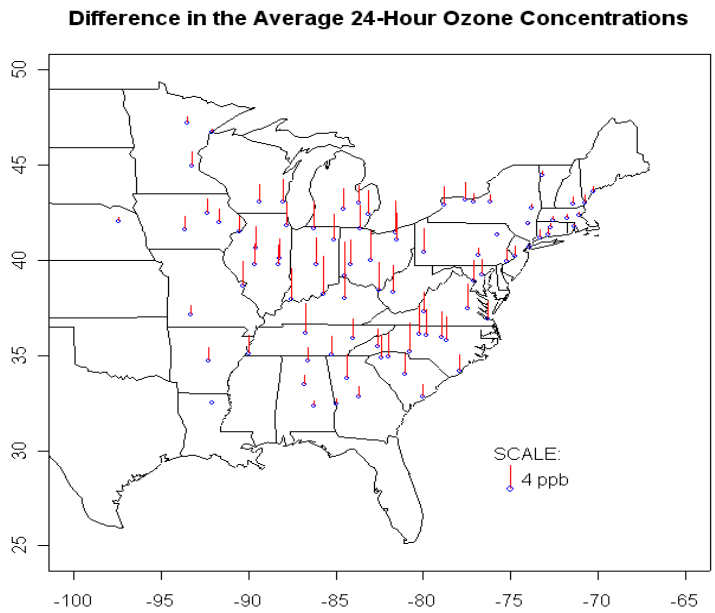
heatwave killed >700 persons in Chicago alone), and according to climate models, heatwaves will become more frequent and intense. For example, a study of Los Angeles projected a 3-fold increase in heatwaves by the end of this century. Major portions of the U.S. are expected to have a higher number of extremely hot days (the figure below shows the changing probability for days >100°F in Minneapolis).



Peterson *et al.*, 2007a

Preliminary analysis from our own research finds that the frequency of extreme heatwaves in Wisconsin will increase disproportionately compared to a smaller decline in the frequency of extremely cold temperatures. Poor and elderly populations are especially at risk of dying in heatwaves.

Air pollution accompanies heat waves, due in part to the temperature sensitivity of the chemical reaction that forms ozone smog pollution. A recent study of the 50 largest cities in the Eastern US finds that by mid-century, 'Red Ozone Alert Days' could increase by 68% due to projected regional warming alone. But the projected increase in stagnant air masses for the Midwest and Northeast, according to the IPCC, may exacerbate this problem further. Ozone is especially dangerous to children with asthma. Recall the findings during the 1996 Atlanta Olympics when traffic restrictions resulted in a 28% decrease in ground-level ozone, and subsequent 42% decline in asthma admissions to emergency rooms.



Pollen, another air contaminant, may increase with elevated temperature and CO_2. For instance, a doubling of the atmospheric CO_2 concentration stimulated ragweed-pollen production by over 50%.

Many infectious diseases are sensitive to climate fluctuations. For example, 67% of reported water-borne disease outbreaks in the U.S. (between 1948-1994)

were preceded by very heavy rainfall; projections are for increases in extreme rainfall and runoff, placing more risk on already deteriorating water systems in many cities. Combined sewage overflows (CSOs) will likely become a more frequent problem. West Nile virus (WNV) emerged for the first time in North America during the record hot July, 1999. While international transport likely explained its entry, this particular strain of WNV requires warmer temperatures than other strains around the globe. The greatest WNV transmissions during the epidemic summers of 2002-2004 in the U.S. were linked to above-average temperatures.

3) If climate change continues unabated, will the United States reach the limits of our adaptive capacity to manage the impacts of climate change on health?

Relying on adaptation alone is a dangerous strategy. Building adaptive capacity takes time and it is unlikely to be reliable for climatic changes that might be more rapid or more extreme than expected. In addition, according to an energy policy expert at SAGE (Dr. Greg Nemet) a majority of greenhouse gas emissions in the future will come from developing countries. Therefore, by relying on adaptation to deal with climate change, the U.S. provides no basis for leadership or persuasion to enlist developing countries in reducing their emissions – in the end, we may have to adapt even more. Dr. Nemet further notes that global greenhouse gas emissions have been accelerating over the past decade and outside the upper end of scenarios predicted a decade ago.

4) Is reducing our nation's greenhouse gas emissions and preventing global warming important for protecting the health of the United States citizens from climate change? Are there co-benefits to reducing greenhouse gas emissions that also improve public health simultaneously?

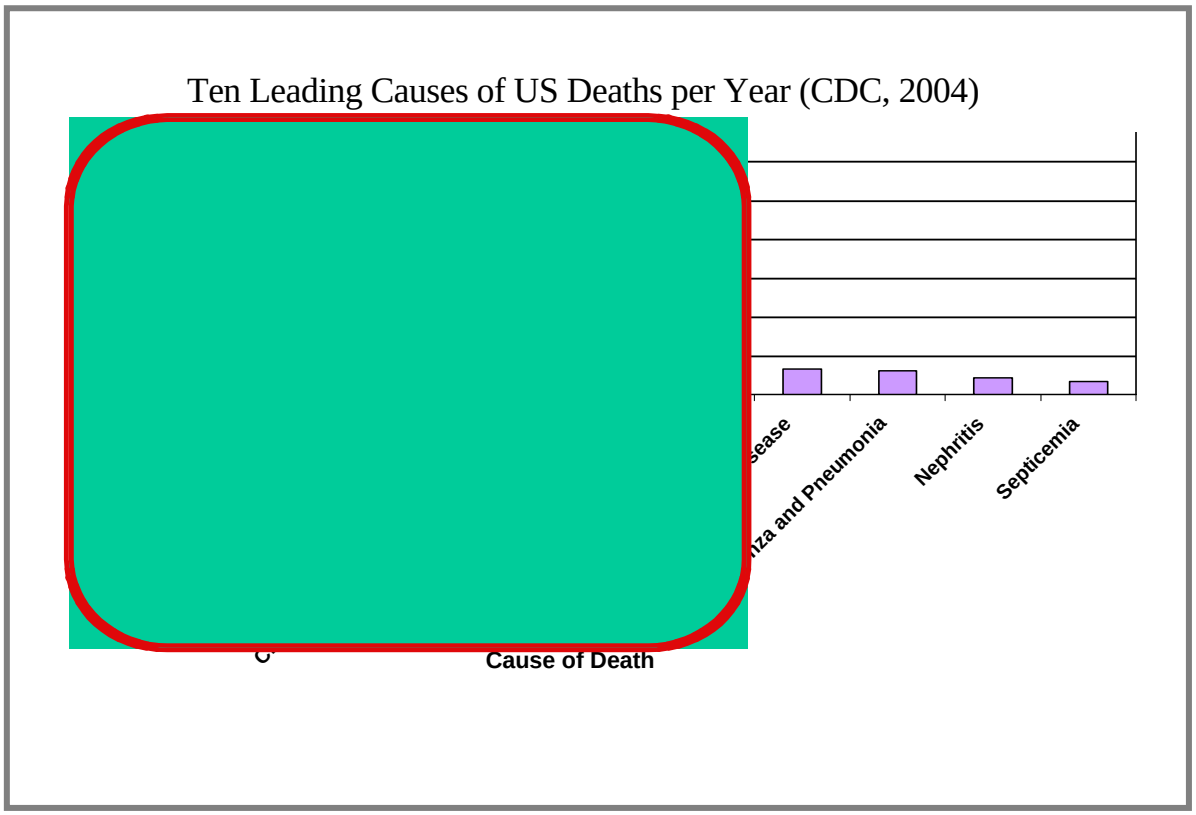
Considering the multiple health outcomes and potential for adverse synergies between global warming, urban sprawl, and land degradation, climate change poses a major threat to the health of the US population. The policy changes needed to address this problem are going to be very large if we are serious about protecting the public from the adverse health effects of climate change. Adopting a modest emissions reductions policy, which may be riddled with loopholes, in the interest of pushing the US to finally adopt a climate policy seems a like a risky approach. With such large ramifications at stake and so many potential health co-benefits to be gained by reducing greenhouse gas emissions, major policy measures to mitigate climate change seem like an obvious component to protecting our health.

Scientific assessments caution that climate change will have dangerous synergies with other environmental public health risks and so must not be viewed as an isolated health risk. Dangerous synergies will include, for example: the 'urban heat island' effect over sprawling cities with asphalt highways; destruction of storm-buffering coastal wetland, e.g, near New Orleans; and increased allergens in the air along with a lengthening ozone pollution season.

Yet, these dangerous synergies also point to potential co-benefits of mitigating greenhouse warming. There are potentially large opportunities and co-benefits in addressing the health risks of global warming. Certainly, our public health infrastructure must be strengthened, e.g, fortify

water supply systems, heat and storm early warning and response programs, and enhance disease modeling and surveillance. However, energy policy now becomes one and the same as public health policy. Reducing fossil fuel burning will: (a) further reduce air pollution – all reductions of fossil fuel burning will reduce NOx and CO emissions, as well as SO2, PM2.5, Hg, VOC and/or air toxic emissions as well (depending on the sectors, fuels, and technologies affected); (b) improve our fitness – only 40% of the US population meets the minimum daily recommended level of exercise (60% of Americans are overweight), and if urban transportation planning allows for more Americans to travel by foot or bike and public transportation rather than by car, these percentages would inevitably improve); and (c) lessen potential greenhouse gas emissions and subsequent global warming. Note from the figure below that most of the ten leading causes of death in the US are linked either to sedentary lifestyles, air pollution, or motor vehicle crashes.

In short, the challenges posed by climate change urgently demand improving public health infrastructure AND energy conservation / urban planning policies – as such, climate change can present both enormous health risks and opportunities quite directly via improved fitness, reduced obesity (with its multitude of associated diseases), and improved air quality.



5) *What actions are the EPA taking to protect children's health from climate change? Although EPA has refused to legally conclude that greenhouse gases are a threat to public health, are EPA's actions in line with such a conclusion?*

According to the World Health Organization, children represent 88% of the vulnerable population most at risk to climate change. Here in the U.S., the EPA's Office of Children's Health Protection has established a special Climate Change Task Force to address this children's health threat. The initiative is a recent development and I have been asked to co-chair the task force. The group will be meeting in Washington in two weeks from today (April 23-24).

The scientific rationale for regulating CO_2 is absolutely clear when considering the health risks described above. The legal nuances, however, are beyond my expertise. My colleague and energy policy expert, Dr. Greg Nemet, shared with me his concern that if CO_2 is regulated by the EPA, then CO_2 regulation will be subject to a cost/benefit risk assessment analysis – he is skeptical that the EPA would justify strong regulatory action on that basis alone. The dilemma is that since many of the impacts of climate change will be only weakly captured in that type of analysis: (1) most impacts of US emissions will be outside the US; (2) impact assessments are focused on likely ranges, and ignore tails (or extremes) of distributions; and (3) impacts will be mostly in the future, so will be discounted heavily. Thus, a worrisome outcome is that EPA could end up regulating CO_2, but set only modest reduction targets which do not adequately protect the health of Americans. From my standpoint as a public health scientist, I view the health threats of climate change as extremely large in magnitude, and therefore requiring equivalently significant policy change –both in areas of public health preparedness and in greenhouse gas mitigation to avert this threat by whatever the best policy interventions are required.

Dr. Tracey Holloway, a climate-air pollution expert at SAGE, pointed out to me that policy analyses for Europe have quantified the economic and physical interactions between climate change and air quality, and they find that integrated policies to address both issues simultaneously could reduce total costs by well over 1 billion Euro/yr by 2020 (vs. the cost of considering air quality and climate separately). http://www.iiasa.ac.at/rains/gains-presentations.html?sb=12

Conclusions and Recommendations

The broad and interconnected exposures stemming from climate change will require a well-coordinated, cross-sector and comprehensive disease prevention strategy. In addition to enhancing disease preparedness, this would include proactive energy conservation and transportation policies, and in so doing, will provide substantial health co-benefits.

The Department of Health and Human Services, that includes CDC and NIH, are responsible for protecting the health of the American public. To the extent that extremes of climate can have broad population-wide impacts, neither the CDC nor NIH have directed adequate resources to

address climate change, and to date, funding has been minimal compared to the size of the health threat. Coordinated efforts on climate change & health also will need to cut across agencies – EPA, NASA, NSF, and NOAA have already been engaged on the issue, though funding historically has been insufficient in the health impacts area.

Strategic planning should take place across federal, state, and local government, academia, and the private sector to look for co-benefits of solutions in combating climate change.
The multimodal transportation scenario (reducing obesity and associated diseases while also reducing greenhouse gas emissions and improving local air quality) is a clear example. Such cases of co-benefits bring me to the conclusion that policies towards sustained mitigation of the threat of global warming could, in the end, represent one of the largest public health opportunities that we've had in over a century.