



Global Health Institute
UNIVERSITY OF WISCONSIN-MADISON

The Potential Health and Environmental Benefits of Cycling in the U.S.

The Initiative for Health-Oriented Transportation
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Among the challenges we face today, two colliding crises pose an especially grave threat to human health: one is the rapid rise in the prevalence of chronic disease worldwide and the second is the global climate crisis. Increasing the extent to which populations engage in health-oriented transportation, such as walking and cycling, could help to slow or reverse the advance of these crises by increasing overall physical fitness and decreasing vehicle emissions which contribute to air pollution and climate change. Research conducted by the Global Health Institute's Initiative for Health-Oriented Transportation (HOT) at the University of Wisconsin-Madison demonstrates that walking and cycling in lieu of routine driving is one of the most effective ways to improve human health and can help mitigate climate change.

The climate crisis is a human health crisis. Numerous climate-sensitive health risks are scientifically established, including mortality caused by heatwaves, respiratory illness from smog ozone and allergenic pollen, mental and physical effects of wildfires, infectious diseases like West Nile Virus, injuries from flooding, and malnutrition from reduced crop yields [1]. The Intergovernmental Panel on Climate Change (IPCC) has determined that without substantial and rapid actions –specifically 45% greenhouse gas emissions reduction by 2030 and reaching net zero emissions by 2050 –the world will exceed 1.5°C (2.7°F) heating above pre-industrial levels. Above these temperatures we enter “dangerous” climate disruption that may adversely affect natural ecosystems and mankind, according to impact assessments of climate change [2]. **Further, ambient particulate matter and ozone pollution from tailpipe emissions are responsible for an estimated 385,000 deaths around the world each year** [3].

Obesity-related diseases have ranked as our nation's number one public health challenge over the last several decades. The prevalence of obesity in the U.S. has climbed from 30.5 percent in 2000 to 42.4 percent in 2018, while severe obesity has increased from 4.7 percent to 9.2 percent [4]. **Physical inactivity is a leading risk factor for obesity and many chronic diseases and was estimated to have been responsible for more than 5 million premature deaths in 2008** [5]. The proportion of deaths due to chronic diseases is increasing globally and much of this increase is due to a decrease in physical activity [5], [6]. Addressing the epidemic of physical inactivity through walking and cycling may represent one of our greatest opportunities to improve public health in the U.S.



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Routine, moderate physical activity provides significant benefits for long-term health. Replacing regular driving with walking and cycling is one of the most effective ways to improve both personal and public health and can be achieved simply by getting out of the car and onto a bike. A study from China showed that commuting by walking or cycling reduced the odds of developing colon cancer by 48 percent in men and 44 percent in women [7]. In Europe, walking and cycling has been shown to reduce cardiovascular disease risk by 11 percent [8].

Less than one percent of trips are taken by bicycle in most metropolitan areas of the United States [9]. In cities outside of the U.S. with well-established cycling traditions, this percentage can reach 40 percent, as in Amsterdam. **We estimate that if the metropolitan areas of the United States were to achieve 40 percent, approximately 70,000 deaths due to chronic disease would be averted each year in the U.S.** Although achieving the Amsterdam standard in the U.S. is unlikely to happen any time soon, HOT's analysis demonstrates that important health gains may be had at lower and more feasible levels of ridership. Figure 1 shows the estimated annual deaths averted in terms of some more moderate cycling percentages. **Approximately 20,000 annual deaths due to chronic disease could be averted if U.S. metropolitan areas increased their cycling percentage to 6 percent of trips, the rate seen in Madison, Wisconsin.**

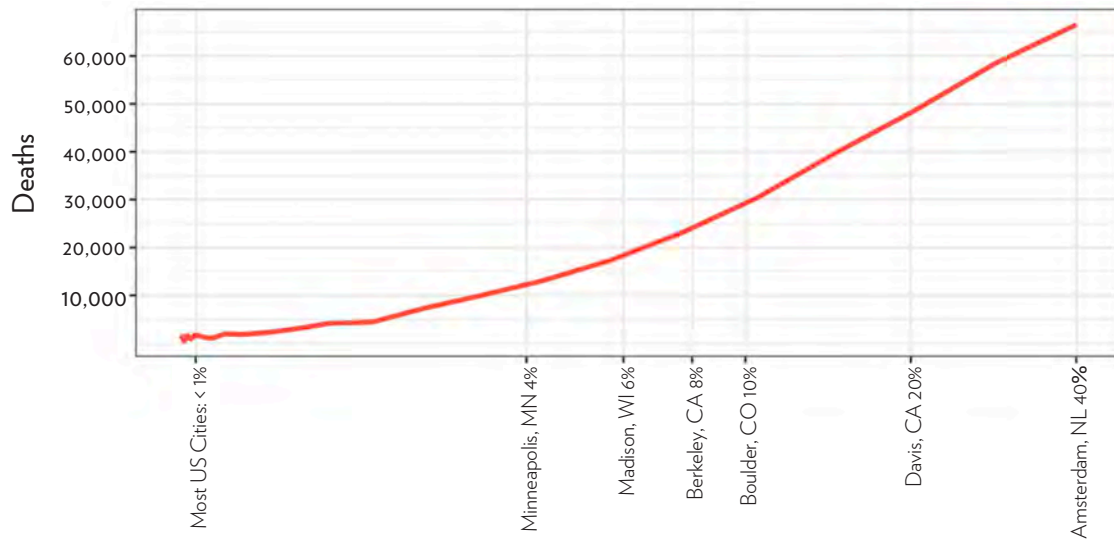


Figure 1: Annual deaths averted versus cycling mode share



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The reduction in cases of cardiovascular disease and diabetes would also be significant, as seen in Figure 2. **Achieving a mode-share of 6 percent of trips taken by bicycle could also lead to approximately 28,000 fewer cases of cardiovascular disease and 22,000 fewer cases of diabetes per year.** If U.S. cities were able to reach a level of 15 percent of trips taken by bicycle, the estimated 40,000 deaths averted through increased physical activity would roughly equal the number of people who die in automobile and motorcycle accidents in the U.S. each year [10].

Increasing the proportion of trips made by bicycle can also mean reducing the number of trips made by automobile. **We estimate that increasing the cycling mode share to 6 percent will provide approximately \$1.2 billion each year in global benefits due to climate change mitigation if cycling trips were to replace car trips.** The improvement in air quality would also save the U.S. approximately \$780 million a year in health costs and avert approximately 7,000 days of work lost to illness.

Mounting scientific evidence shows that both obesity and diabetes are significant independent risk factors for severe COVID-19 infection and may double or triple the risk of hospitalization due to COVID-19 [11], [12]. Not only does regular physical exercise prevent the development of obesity and diabetes but also helps to reduce risk from infections to those already suffering from obesity-related health problems and diabetes. Moderate routine physical activity has been shown to help prevent severe illness by improving cardiovascular and pulmonary function, reducing inflammation, increasing immune system functioning and response to infection, reducing the duration and severity of infection, and improving immunity resulting from vaccination [13].

It is clear that increasing active transportation, and in particular cycling, will bring about significant health benefits through increased physical activity, reduced air pollution, and increased resistance to communicable disease. Achieving these benefits will require significant investment to improve the extent to which the built environment of U.S. cities fosters physically active forms of transportation over personal car travel. Important socio-cultural barriers must also be addressed, such as concerns about personal safety/security, which disproportionately affect underrepresented groups [14]. Lowering these barriers to cycling and constraints to the built environment in the U.S. will yield the greatest health gains among disenfranchised communities, many of whom bear a disproportionate burden of chronic and infectious disease.

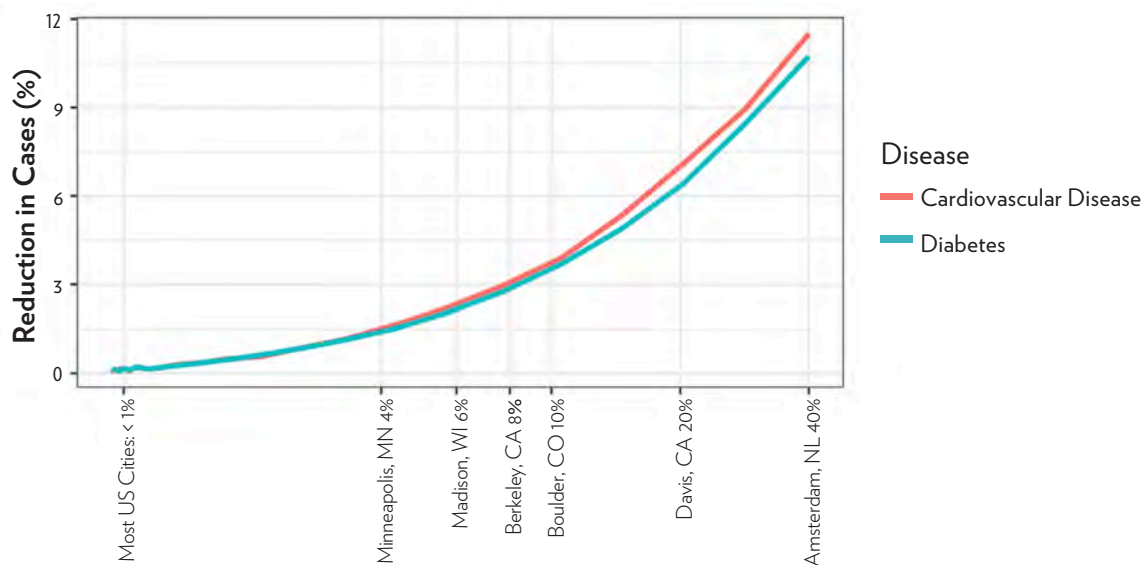


Figure 2: Reduction in chronic disease versus cycling percentage

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Acknowledgements

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