

Sen. Sheldon Whitehouse gave the keynote lecture on health and climate change at Brown's annual Dr. and Mrs. Frederick W. Barnes Jr. Lecture.

## Sen. Whitehouse Sounds Alarm on Climate Change, Health

MARY KORR  
RIMJ MANAGING EDITOR

PROVIDENCE – Brown's Public Health Research Day in April took on a sense of urgency as Sen. Sheldon Whitehouse delivered a sobering lecture on climate change and its effects on public health "in a time of unprecedented carbon release in the air and oceans."

Introduced by Brown President Christina Paxson, Senator Whitehouse delivered the annual Dr. and Mrs. Frederick W. Barnes Jr. Lecture on the interface of medicine, society and public health. He targeted climate-change deniers "who ignore all the scientific evidence," including colleagues in Congress.

He also stated his opposition to the Keystone XL Pipeline. "Keystone would pump tar sands oil – one of the filthiest fuels on earth – a carbon

impact equivalent of adding 5.7 million cars to our roads," he said.

Recently he met with doctors, researchers and people who live near tar sands mining operations, refineries and dumps to discuss the specific health problems they see there: asthma, lung disease, cancer, heart disease. "With the support of the American Public Health Association and the National Association of County and City Health Officials, Sen. Barbara Boxer (CA) and I have asked the State Department to conduct an independent study of the human health effects of tar sands oil and the Keystone pipeline before making a decision on whether it should proceed."

suffer from asthma, higher than the national average, so these bad air days hit home. There are days in summer when "even healthy people are urged to limit their activities."

**'In Rhode Island, about 12% of children and 9% of adults suffer from asthma, higher than the national average, so these bad air days hit home.'** —Sen. Whitehouse

He also noted:

- Climate change prolongs the allergy season; since 1995, ragweed season has increased across the country anywhere from 13-25 days.
- Warming oceans and lakes cause rising algae bloom levels, 'red tides', which can lead to neurotoxic shellfish poisoning.
- Longer summers and shorter winters are predicted to increase exposure to ticks, mosquitoes and the diseases they carry.
- Increased risk of floods, sewage overflow and potential contamination to the water supply, as happened in Warwick several years ago, resulting in the city shutting down the sewage treatment plant.
- Increases the risk for more severe weather, heat waves and droughts.



Sen. Sheldon Whitehouse considers a question from Brown School of Public Health Dean Terrie Fox Wetle during his Public Health Research Day keynote lecture.

### Carbon pollution

In the lecture, Senator Whitehouse also noted the improvements in air quality and health savings (\$30 saved in health costs for every \$1 spent) achieved through the Clean Air Act are being eroded as ground-level ozone (smog), a major pollutant on 'bad air' days, increases.

In Rhode Island, he said, about 12% of children and 9% of adults

**What RI is doing**

Sen. Whitehouse said the R.I. Climate Change and Health Project, part of a national effort supported by a CDC initiative, is helping the state and public prepare for the health effects related to climate change with an emphasis on identifying vulnerable populations. For example, the Rhode Island Dept. of Health is working with the Dept. of Elderly Affairs in this effort.

He also said the Dept. of Health is working with the Dept. of Environmental Management (DEM) and the Dept. of Transportation (DOT) to pilot a Lyme disease prevention program for outdoor workers.

In 2010, he added, Rhode Island created a Climate Change Commission, which has identified climate risk to key infrastructures. He also noted that

for the past four years, the state has been a part of the Regional Greenhouse Gas Initiative (RGGI). "Our region caps carbon emissions and sells emission allowances through auctions, which has created economic incentives for utilities to invest in renewable energy development," he said. "This spurs innovations and creates green jobs."

He ended his talk by stating that "Congress is asleep and Congress needs to wake up."

In the Q&A following the talk, Dr. Richard Besdine, professor of medicine and professor of health services policy & practice, said: "The health consequences of what we've done to the planet are so striking...Public health is out in front of this, but in organized medicine there might be some allies to bring to the battle who can be more

effective in the health argument."

Data-driven evidence is key, Sen. Whitehouse responded, and noted the partnership of Brown's School of Public Health and the Dept. of Health to examine correlations between rising temperatures and hospital admissions.

Another member of the audience expressed concern about possible toxins in the plastic baby bottles she uses. Sen. Whitehouse admitted the road ahead to fight carbon and other pollutants is a tough one, exacerbated by industry lobbyists, but the duty of this generation.

*The research day was sponsored by the Brown School of Public Health, the Environmental Change Initiative, the Rhode Island Department of Health, and the Rhode Island Public Health Association.*

**Residential Proximity to Major Roadways and Incident Hypertension in Post-Menopausal Women: Results from the Women's Health Initiative**



Samantha Kingsley, MPH<sup>1</sup>; Melissa Eliot, PhD<sup>1</sup>; Eric Whitsell, MD, MPH<sup>2</sup>; Karen Margolis, MD<sup>3</sup>; Wen-Chih Wu, MD, MPH<sup>1,4</sup>; Charles Eaton, MD, MS<sup>1,5</sup>; and Gregory Wellenius, ScD<sup>1</sup> for the WHI Investigators

<sup>1</sup>Department of Epidemiology, Brown University School of Public Health, Providence, RI; <sup>2</sup>Department of Epidemiology, University of North Carolina Gillings School of Public Health, Chapel Hill, NC; <sup>3</sup>Department of Internal Medicine, School of Medicine, University of California, Davis, CA; <sup>4</sup>Providence Veterans Affairs Medical Center, Providence, RI; <sup>5</sup>Memorial Hospital of Rhode Island, Pawtucket, RI

**Introduction**

- Cardiovascular disease is the leading cause of morbidity and mortality in the US.
- Living very near a major roadway has been associated with increased risk of cardiovascular morbidity and prognosis.
- Long-term exposure to traffic pollution may increase the risk of cardiovascular events, at least in part, through increased incidence of hypertension.
- Living near major roadways may be associated with increased risk of incident hypertension, but previous studies have found discrepant results, have focused on single geographical areas, or measured prevalent hypertension.

**Objective**

To assess the association between long-term residential exposure to traffic pollution and the risk of incident hypertension among 38,360 participants of the Women's Health Initiative (WHI) Clinical Trials (CT) who were free of hypertension at enrollment

**Methods**

Obtained data from WHI CT cohorts, which enrolled post-menopausal women between 50-79 years of age from 1993-1998. Geocoded baseline address of each woman free of hypertension at baseline and calculated residential distance to the nearest major roadway. Defined major roadways as those with US Census Feature Class Code A1 (primary highway with limited access) or A2 (primary road without limited access). Defined incident hypertension as a systolic blood pressure  $\geq 140$  mmHg, a diastolic blood pressure  $\geq 90$  mmHg, or a first self-report of medication prescribed for hypertension. Used Cox proportional hazard models to estimate incident hypertension for women living  $\leq 50$ ,  $>50-200$ ,  $>200-400$ ,  $>400-1000$  m from a major roadway compared to  $>1000$  m. Adjusted for age at baseline, race, smoking status, alcohol consumption, education, income, employment status, health insurance, high cholesterol, physical activity, diabetes, BMI, region, study arm, median household income, percent high school diploma, percent professional occupation, and median value of owner-occupied housing units.

**Results**

**Table 1:** Baseline characteristics of WHI CT participants free from hypertension at baseline

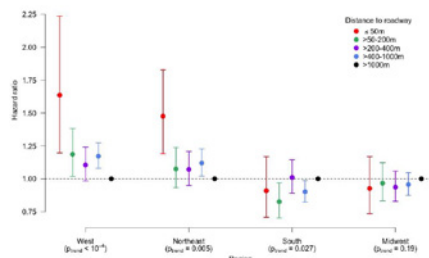
Characteristics	All (N=38,360)	Residential Distance to Major Roadway (m)				
		$\leq 50$ (N=851)	$>50-200$ (N=2593)	$>200-400$ (N=4172)	$>400-1000$ (N=9594)	$>1000$ (N=21150)
Age, years, mean $\pm$ SD	61.6 $\pm$ 6.9	62.1 $\pm$ 7.1	61.6 $\pm$ 7.1	61.5 $\pm$ 6.9	61.6 $\pm$ 6.9	61.5 $\pm$ 6.8
White, %	84.8	86.8	78.2	80.4	82.6	87.4
Body mass index, %						
$\leq 25$	33.7	35.1	32.8	32.6	33.6	34.0
$>25-30$	36.9	30.2	35.8	36.2	37.1	37.3
$\geq 30$	29.9	34.1	30.9	30.8	28.8	28.3
Diabetes ever, %	3.3	4.2	3.3	3.6	3.5	3.0
High cholesterol ever, %	7.6	7.3	9.2	8.6	8.1	7.6

**Table 2:** Hazard ratios (95% confidence intervals) of the association between categories of residential distance to nearest major roadway and incident hypertension among WHI CT participants

Model	Residential Distance to Major Roadway (m)					p-trend
	$\leq 50$	$>50-200$	$>200-400$	$>400-1000$	$>1000$	
1	1.14 (1.01, 1.28)	1.02 (0.94, 1.10)	1.04 (0.98, 1.10)	1.04 (1.00, 1.09)	Ref.	0.034
2	1.13 (1.00, 1.28)	1.03 (0.95, 1.11)	1.05 (0.99, 1.11)	1.05 (1.00, 1.10)	Ref.	0.013
3	1.12 (0.99, 1.26)	1.02 (0.95, 1.10)	1.04 (0.98, 1.11)	1.05 (1.01, 1.10)	Ref.	0.016

Model 1 is a fully adjusted model. Model 2 does not adjust for physical activity, diabetes, and body mass index. Model 3 is model 1 that additionally adjusts for population density.

**Distance to nearest major roadway and incident hypertension, by region**



**Figure 1:** Hazard ratios and 95% confidence intervals of the association between residential distance to nearest major roadway and incident hypertension among WHI CT participants, stratified by region

**Findings**

- Participants living  $\leq 50$  m to major roadways had a 14% (95% CI: 1%, 28%) higher rate of incident hypertension compared to those living more than 1000 m from a major roadway, adjusting for potential confounders.
- The association did not change when excluding possible mediators or when including population density.
- However, the association varied substantially by region, with positive associations observed in the West and Northeast.
- There was evidence of heterogeneity by education ( $p=0.03$ ) and potentially by neighborhood socioeconomic status ( $p=0.07$ ) and level of regular physical activity ( $p=0.10$ ).

**Discussion**

- Among postmenopausal women, residential proximity to major roadways is associated with incident hypertension.
- Regional differences may represent variation in traffic density within each region.
- However, traffic density is highly correlated with population density and our results did not substantially change when we included population density in the model.
- It is unclear whether proximity to a major roadway is associated with incident hypertension because of traffic-related air pollution, noise pollution, or some other factor.

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At the poster session, researchers in the Brown University School of Public Health, the Environmental Health Initiative, the Rhode Island Department of Health, and others displayed and discussed posters describing their research in Rhode Island and around the world. The environmental theme winner was Samantha Kingsley for the poster entitled "Residential Proximity to Major Roadways and Incident Hypertension in Post-Menopausal Women: Results from the Women's Health Initiative."