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Boston University School of Medicine



National Center for Medical  Legal Partnership

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# The Housing Vaccine for Healthier Communities

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# Housing as a Vaccine for a Community

- Housing acts as a vaccine for individual health
  - Quality, Stability, Affordability all are important to health
  - Improving Housing can provide multiple benefits like a vaccine can
- Housing as a vaccine for community health
  - Community level indicators matter to health
  - Housing indicators matter to health of populations
- Discuss how Housing and Healthcare can be bridged to provide the Housing Vaccine

# Evidence on Housing Quality and Children's Health

- Development and Worsening Asthma has been tied specific housing conditions
  - Pests (cockroaches and mice)
  - Molds/Chronic Dampness
  - Tobacco smoke
- Lead exposure tied to long term effects
  - CDC recently lowered the “action level” to 5 ug/dl
- “Heat or eat” ties energy costs and poor health
- Homelessness tied to poor health outcomes

# Unstable Housing, Hunger, Health Linked

**TABLE 2—Variables Associated With Insecure Housing, by Housing Group: Children Younger Than 3 Years, 7 US Cities, 1998–2007**

Variables	Secure Housing (Ref)		Crowding			Multiple Moves		
	Unadjusted No. (%)	AOR (95% CI)	Unadjusted No. (%)	AOR (95% CI)	<i>P</i>	Unadjusted No. (%)	AOR (95% CI)	<i>P</i>
Household food insecurity (n = 22 069)	1052 (9)	1.0	1060 (12)	1.30 (1.18, 1.43)	<.001	166 (16)	1.91 (1.59, 2.28)	<.001
Child food insecurity (n = 22 069)	872 (7)	1.0	1513 (17)	1.47 (1.34, 1.63)	<.001	204 (19)	2.56 (2.13, 3.08)	<.001
Caregiver report of fair/poor child health (n = 22 069)	1313 (11)	1.0	1193 (13)	1.07 (0.98, 1.18)	.14	192 (18)	1.48 (1.25, 1.76)	<.001
Caregiver report of child developmental risk (after 2004, n = 7345)	621 (14)	1.0	355 (14)	1.06 (0.91, 1.23)	.49	96 (22)	1.71 (1.33, 2.21)	<.001

*Note.* AOR = adjusted odds ratio; CI = confidence interval. Analyses are adjusted for site, race/ethnicity, US-born mother, marital status, maternal age, education, mean child's age, mean number of children in the home, household employment, breastfeeding, and low birth weight. Secure housing is the referent group.

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# More than Half of Families in Philadelphia are Housing Insecure

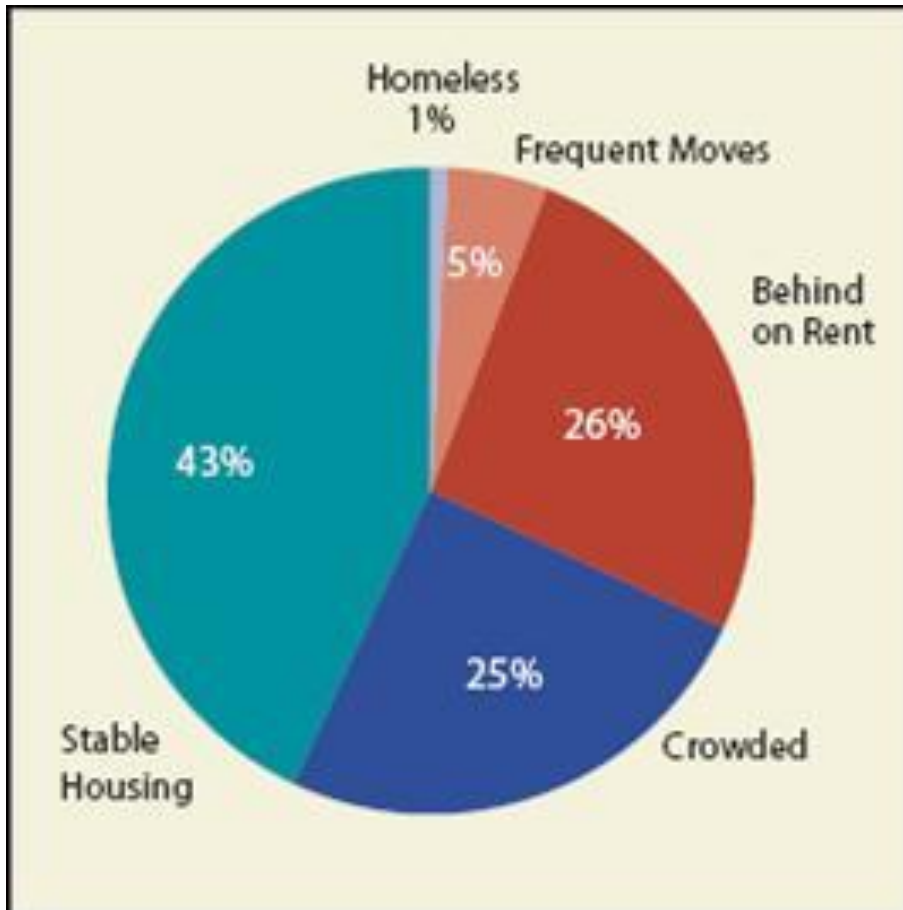


Figure 1: Over half of Children's HealthWatch Philadelphia families experience housing insecurity

- Similar findings in briefs from:
  - Minneapolis
  - Arkansas
  - Massachusetts
  - Baltimore

# If we know Housing matters to Health, Is there a Housing Vaccine?

- What are the properties of vaccines?
  - Provide benefits against multiple threats
  - Why we think of them as good investments
- How can Housing Vaccinate both an Individual and a Community?
  - A community housing influences individuals
  - An individual getting housing vaccine can benefits others

# Subsidized Housing and Children's Nutritional Status

## *Data From a Multisite Surveillance Study*

Alan Meyers, MD, MPH; Diana Cutts, MD; Deborah A. Frank, MD; Suzette Levenson, MEd, MPH; Anne Skalicky, MPH; Timothy Heeren, PhD; John Cook, PhD; Carol Berkowitz, MD; Maureen Black, PhD; Patrick Casey, MD; Nieves Zaldivar, MD

**Background:** A critical shortage of affordable housing for low-income families continues in the United States. Children in households that are food insecure are at high risk for adverse nutritional and health outcomes and thus may be more vulnerable to the economic pressures exerted by high housing costs. Only about one fourth of eligible families receive a federally financed housing subsidy. Few studies have examined the effects of such housing subsidies on the health and nutritional status of low-income children.

**Objective:** To examine the relationship between receiving housing subsidies and nutritional and health status among young children in low-income families, especially those that are food insecure.

**Design:** Cross-sectional observational study.

**Setting and Participants:** From August 1998 to June 2003, the Children's Sentinel Nutrition Assessment Program interviewed caregivers of children younger than 3 years in pediatric clinics and emergency departments in 6 sites (Arkansas, California, Maryland, Massachusetts, Minnesota, and Washington, DC). Interviews included demographics, perceived child health, the US Household Food Security Scale, and public assistance program participation. Children's weight at the time of the visit was documented. The study sample consisted of all renter households identified as low income by their participation in at least 1 means-tested program.

**Main Outcome Measures:** Weight for age, self-reported child health status, and history of hospitalization.

**Results:** Data were available for 11 723 low-income renter families; 27% were receiving a public housing subsidy, and 24% were food insecure. In multivariable analyses, stratified by household food security status and adjusted for potential confounding variables, children of food-insecure families not receiving housing subsidies had lower weight for age (adjusted mean  $z$  score,  $-0.025$  vs  $0.205$ ;  $P < .001$ ) compared with children of food-insecure families receiving housing subsidies. Compared with children in food-insecure, subsidized families, the adjusted odds ratio (95% confidence interval) for weight-for-age  $z$  score more than 2 SDs below the mean was 2.11 (1.34-3.32) for children in food-insecure, non-subsidized families.

**Conclusions:** In a large convenience sentinel sample, the children of low-income renter families who receive public housing subsidies are less likely to have anthropometric indications of undernutrition than those of comparable families not receiving housing subsidies, especially if the family is not only low income but also food insecure.



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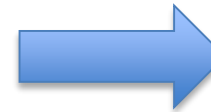
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*Arch Pediatr Adolesc Med.* 2005;159:551-556



Families in subsidized housing who are food insecure were two fold protected against being underweight compared to similar food insecure families on waiting list



# Cost-effectiveness of a Routine Varicella Vaccination Program for US Children

**JAMA** The Journal of the  
American Medical Association

Tracy A. Lieu, MD, MPH; Stephen L. Cochi, MD; Steven B. Black, MD; M. Elizabeth Halloran, MD, DSc;  
Henry R. Shinefield, MD; Sandra J. Holmes, PhD; Melinda Wharton, MD; A. Eugene Washington, MD, MSc

**Objective.**—To evaluate the economic consequences of a routine varicella vaccination program that targets healthy children.

**Methods.**—Decision analysis was used to compare the costs, outcomes, and cost-effectiveness of a routine vaccination program with no intervention. Clinical outcomes were based on a mathematical model of vaccine efficacy that relied on published and unpublished data and on expert opinion. Medical utilization rates and costs were collected from multiple sources, including the Kaiser Permanente Medical Care Program and the California Hospital Discharge Database.

**Results.**—A routine varicella vaccination program for healthy children would prevent 94% of all potential cases of chickenpox, provided the vaccination coverage rate is 97% at school entry. It would cost approximately \$162 million annually if one dose of vaccine per child were recommended at a cost of \$35 per dose. From the societal perspective, which includes work-loss costs as well as medical costs, the program would save more than \$5 for every dollar invested in vaccination. However, from the health care payer's perspective (medical costs only), the program would cost approximately \$2 per chickenpox case prevented, or \$2500 per life-year saved. The medical cost of disease prevention was sensitive to the vaccination coverage rate and vaccine price but was relatively insensitive to assumptions about vaccine efficacy within plausible ranges. An additional program for catch-up vaccination of 12-year-olds would have high incremental costs if the vaccination coverage rate of children of preschool age were 97%, but would result in net savings at a coverage rate of 50%.

**Conclusions.**—A routine varicella vaccination program for healthy children would result in net savings from the societal perspective, which includes work-loss costs as well as medical costs. Compared with other prevention programs, it would also be relatively cost-effective from the health care payer's perspective.

(*JAMA*. 1994;271:375-381)

VARICELLA virus causes an estimated 3.7 million cases of chickenpox and 9000 hospitalizations in the United States annually.<sup>1</sup> A routine varicella vaccination program targeting healthy children could prevent most of this morbidity

and mortality (M.E.H., S.L.C., M.W., and L. Fehrs, MD, unpublished data, 1993), but would it be worth the cost?

A cost-benefit analysis in 1985 suggested that a varicella vaccine that provided lifelong immunity would save \$7 in costs to society for every dollar in-

Policy decisions about new health programs today ideally should be based not only on clinical effectiveness but also on cost-effectiveness. We performed an updated cost-effectiveness analysis of a routine varicella vaccination program for preschool-age children, who are currently being considered by policymakers as the primary target group for vaccination. The present analysis is unique because it takes into account (1) current evidence about vaccine efficacy, (2) the effects of expected changes in the age distribution of disease, and (3) empirical data on the costs of medical utilization and work loss from varicella.

## METHODS

### Decision Analysis Model

We constructed a decision tree (Fig 1) to compare two major options for varicella. Under "No Vaccination," a person's probability of contracting chickenpox reflects the current absence of a vaccination program. Chickenpox may cause no complications, major complications, or death (Fig 2). It also may cause medical utilization including telephone advice, outpatient visits, emergency department visits, and hospitalization.

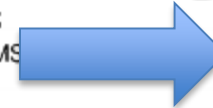
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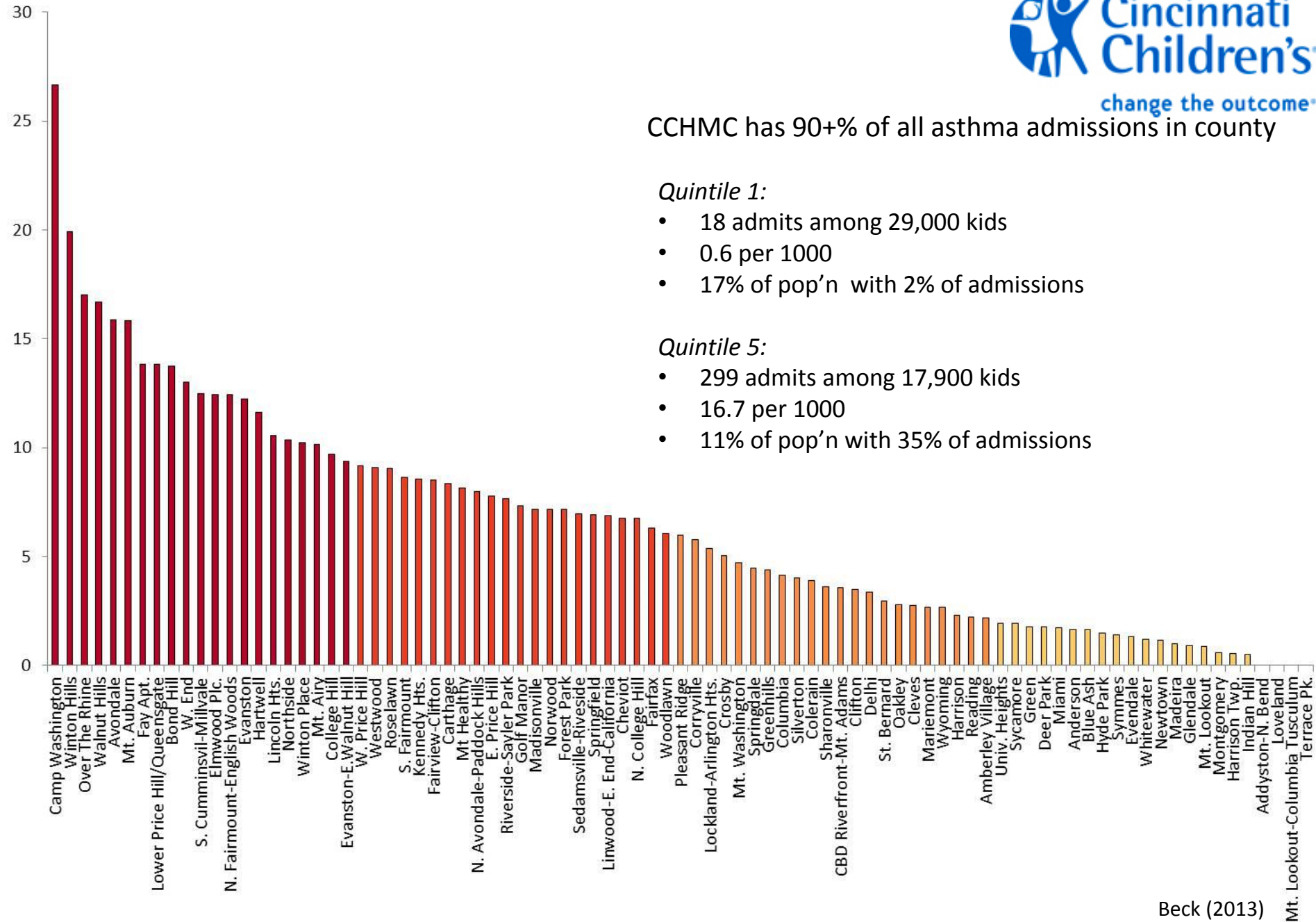
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Routine Chicken pox vaccination only, the health costs are more than saved in healthcare, but when adding in lost work time, it saves \$5 for every \$1 invested

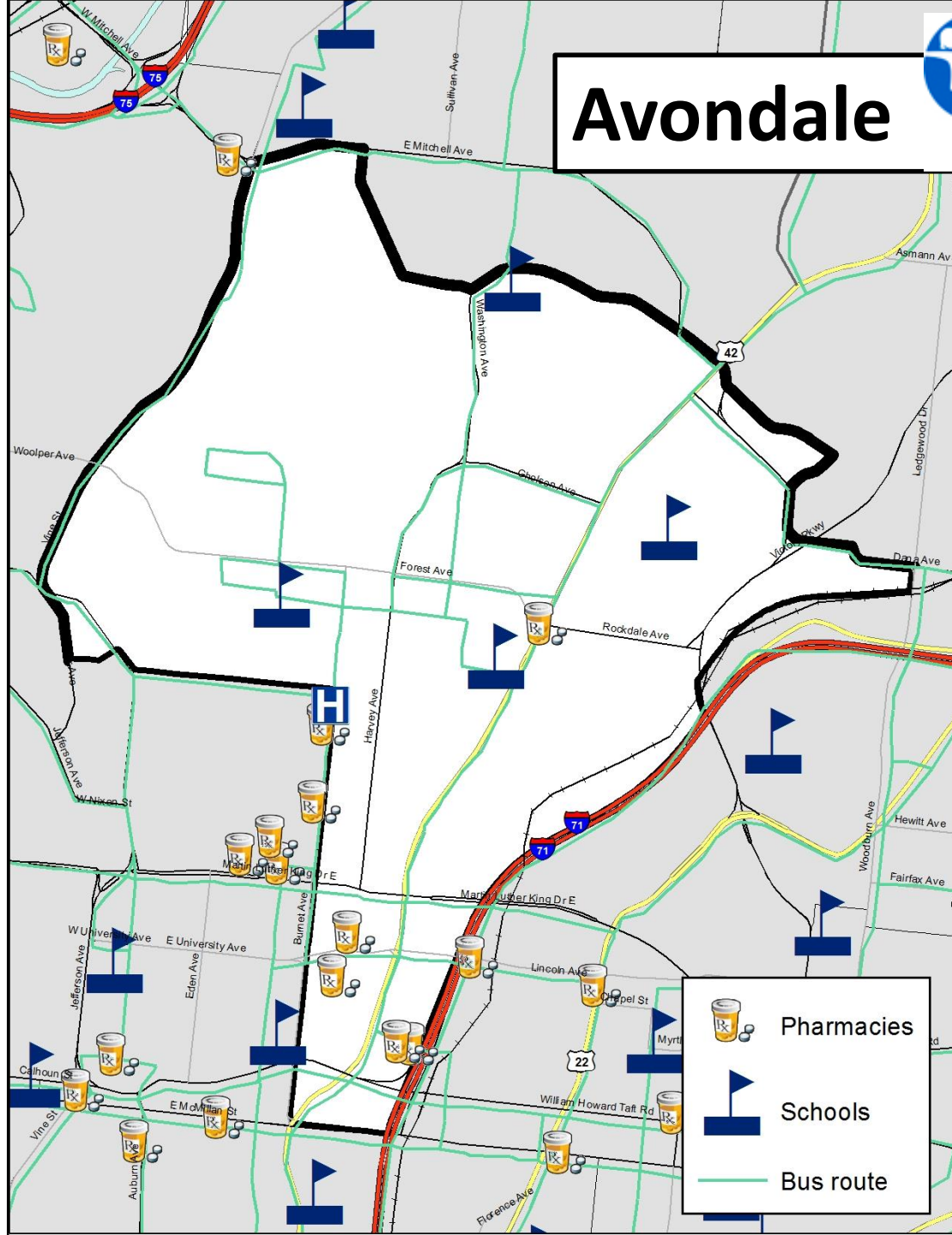
# Asthma admission rate per 1000 children, 3 year average (2010-2012)



CCHMC has 90+% of all asthma admissions in county

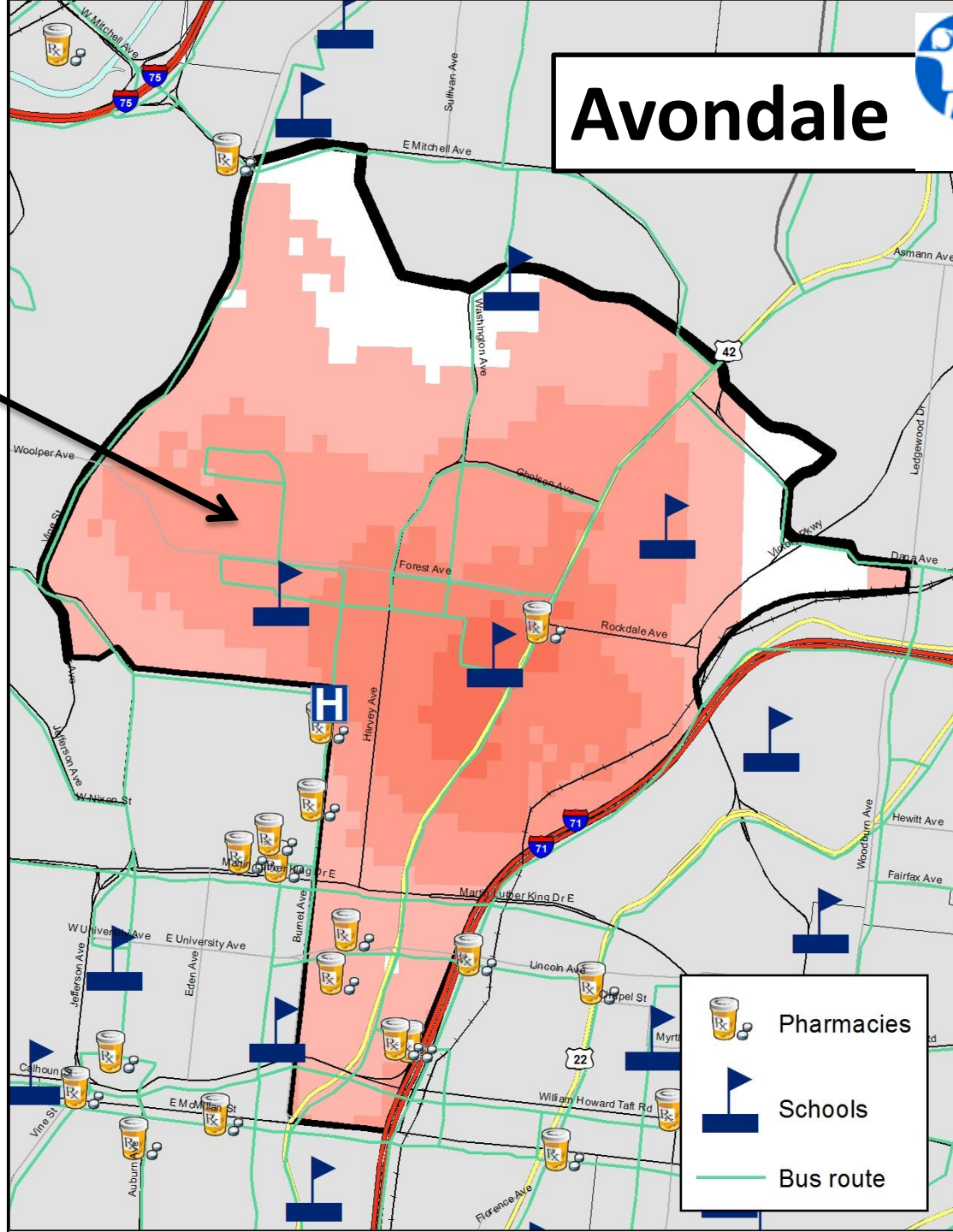


# Avondale



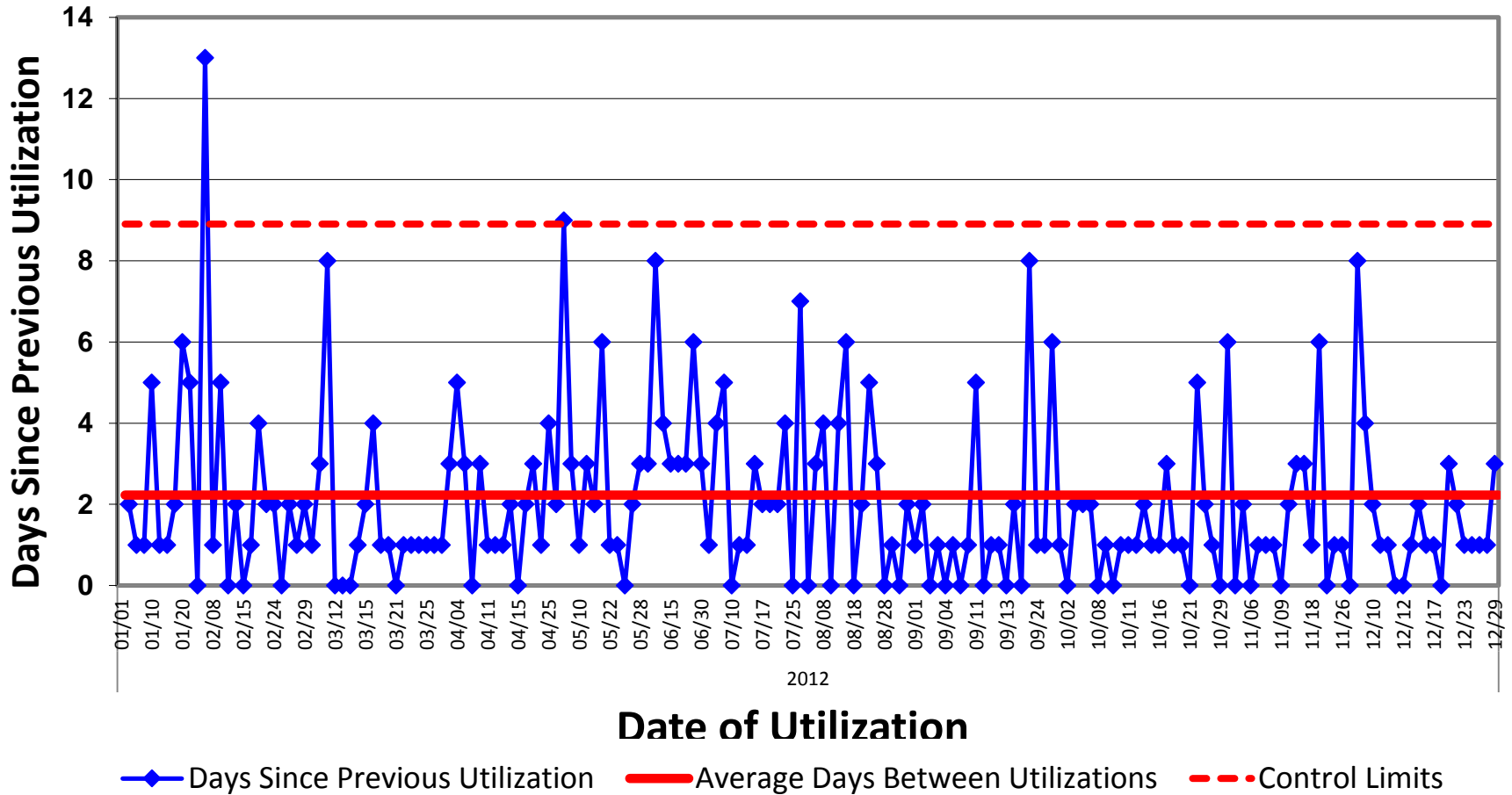
# Avondale

“Heat map” of building code violations



# Avondale and Asthma – Neighborhood approach

181 total utilizations – 130 ED visits, 51 admissions



# Effects of Proximate Foreclosed Properties on Individuals' Weight Gain in Massachusetts, 1987–2008

Mariana Arcaya, SD, MCP, M. Maria Glymour, SD, Prabal Chakrabarti, MS, Nicholas A. Christakis, MD, PhD, Ichiro Kawachi, MD, PhD, and S. V. Subramanian, PhD

More than 6 million mortgages were involved in foreclosure between 2007 and 2010,<sup>1</sup> and more than 1.8 million US homes (1.5% of all housing units) were subject to a foreclosure filing in 2011 alone.<sup>2</sup> Researchers have expressed concerns about the impact of the housing crisis on the public's health,<sup>3–5</sup> identifying housing distress and many of its sequelae as health risk factors.<sup>6–10</sup> However, robust empirical evidence regarding the association between foreclosure and health remains sparse (Table A, available as a supplement to this article at <http://www.ajph.org>).<sup>11–18</sup> Current studies, though useful, are limited by cross-sectional data,<sup>11,12,18</sup> ecologic study designs,<sup>16</sup> retrospective reporting,<sup>15,17</sup> and self-reported measures.<sup>11–15,18</sup> Although it is crucial that living close to foreclosed properties (i.e., homes that have been repossessed by lenders for nonpayment of mortgages) could affect the health of individuals not personally experiencing foreclosure, only 2 existing papers conceptualize foreclosure as a community-level health risk factor.<sup>11,16</sup>

Because they are typically vacant, bank-owned foreclosures can be unsightly or dangerous if poorly maintained or unsecured. They also compete with nearby properties for

*Objectives.* We assessed the extent to which living near foreclosed properties is associated with individuals' subsequent weight gain.

*Methods.* We linked health and address information on 2068 Framingham Offspring Cohort members (7830 assessments) across 5 waves (1987–2008) to records of all Massachusetts foreclosures during that period. We used counts of lender-owned foreclosed properties within 100 meters of participants' homes to predict body mass index (BMI; defined as weight in kilograms divided by the square of height in meters) and the odds of being overweight (BMI  $\geq$  25), adjusted for individual and area-level covariates.

*Results.* Mean BMI increased from 26.6 in 1987–1991 to 28.5 in 2005–2008; overweight prevalence increased from 59.0% to 71.3%. Foreclosures were within 100 meters of 159 (7.8%) participants' homes on 187 occasions (1.8%), in 42 municipalities (21%). For each additional foreclosure, BMI increased by 0.20 units (95% confidence interval [CI] = 0.03, 0.36), and the odds ratio for being overweight associated with proximity to a foreclosure was 1.77 (95% CI = 1.02, 3.05).

*Conclusions.* We found a robust association between living near foreclosures and BMI, suggesting that neighbors' foreclosures may spur weight gain. (*Am J Public Health.* 2013;103:e50–e56. doi:10.2105/AJPH.2013.301460)

that living near foreclosures is a risk factor for higher objectively measured body mass index (BMI; defined as weight in kilograms divided by the square of height in meters) and odds of being overweight.

## METHODS

key covariate information ( $n = 1456$ ; Figure A, available as a supplement to this article at <http://www.ajph.org>). The resulting sample included 7830 observations across 2068 participants, averaging 3.8 observations per individual, geocoded at each wave.<sup>31</sup> Participants were observed in 203 municipalities over the course of the study.

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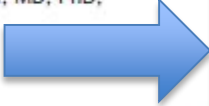
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People living within 100m of foreclosed home were 77% more likely to be overweight and with each added foreclosure their BMI increased by 0.20

# Effects of Proximate Foreclosed Properties on Individuals' Systolic Blood Pressure in Massachusetts, 1987-2008



Mariana Arcaya<sup>1\*</sup>; M. Maria Glymour<sup>2</sup>; Prabal Chakrabarti<sup>3</sup>;  
Nicholas A. Christakis<sup>4</sup>; Ichiro Kawachi<sup>1</sup>; S V Subramanian<sup>1</sup>

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[marcaya@hsph.harvard.edu](mailto:marcaya@hsph.harvard.edu)

## Abstract

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**Background**—No studies have examined the effects of local foreclosure activity on neighbors' blood pressure, despite the fact that spillover effects of nearby foreclosures include many known risk factors for increased blood pressure. We assessed the extent to which living near foreclosed properties is associated with subsequent systolic blood pressure (SBP).


**Methods and Results**—We used geocoded 6,590 observations collected from 1,740 participants in the Framingham Offspring Cohort across five waves (1987–2008) of the Framingham Heart Study to create a longitudinal record of exposure to nearby foreclosure activity. We distinguished between Real Estate Owned foreclosures (REOs), which typically sit vacant, and foreclosures purchased by third party buyers, which are generally put into productive use. Counts of lender-owned foreclosed properties within 100 meters of participants' homes were used to predict measured SBP and odds of being hypertensive. We assessed whether self-reported alcoholic drinks per week and measured BMI helped explain the foreclosure activity–SBP relationship. Each additional REO located within 100 meters of a participant's home was associated with an increase in SBP of 1.71 mm/hg ( $p=.03$ ; 95%CI = 0.18 – 3.24) after adjusting for individual- and area-level confounders, but not with odds of hypertension. The presence of foreclosures purchased by third party buyers was not associated with SBP nor with hypertension. BMI and alcohol consumption attenuated the effect of living near REOs on SBP in fully adjusted models.

**Conclusions**—Real Estate Owned foreclosed properties may put nearby neighbors at risk for increased SBP, with higher alcohol consumption and body mass index partially mediating this relationship.

# Effects of Proximate Foreclosed Properties on Individuals' Systolic Blood Pressure in Massachusetts, 1987-2008

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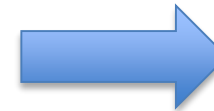
## Abstract

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**Background**—No studies have examined the effects of local foreclosure activity on neighbors' blood pressure, despite the fact that spillover effects of nearby foreclosures include many known risk factors for increased blood pressure. We assessed the extent to which living near foreclosed properties is associated with subsequent systolic blood pressure (SBP).

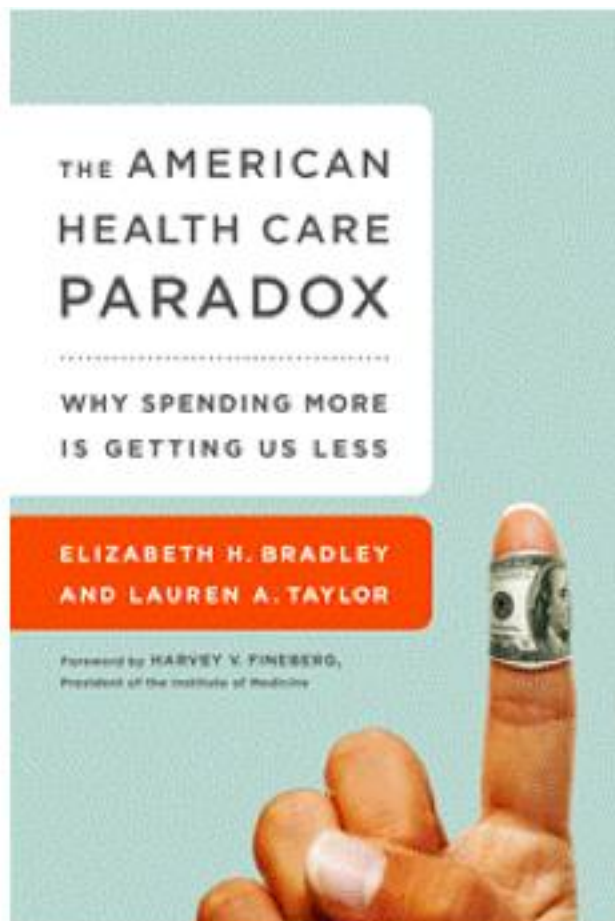
**Methods and Results**—We used geocoded 6,590 observations collected from 1,740 participants in the Framingham Offspring Cohort across five waves (1987–2008) of the Framingham Heart Study to create a longitudinal record of exposure to nearby foreclosure activity. We distinguished between Real Estate Owned foreclosures (REOs), which typically sit vacant, and foreclosures purchased by third party buyers, which are generally put into productive use. Counts of lender-owned foreclosed properties within 100 meters of participants' homes were used to predict measured SBP and odds of being hypertensive. We assessed whether self-reported alcoholic drinks per week and measured BMI helped explain the foreclosure activity–SBP relationship. Each additional REO located within 100 meters of a participant's home was associated with an increase in SBP of 1.71 mm/hg ( $p=.03$ ; 95%CI = 0.18 – 3.24) after adjusting for individual- and area-level confounders, but not with odds of hypertension. The presence of foreclosures purchased by third party buyers was not associated with SBP nor with hypertension. BMI and alcohol consumption attenuated the effect of living near REOs on SBP in fully adjusted models.

**Conclusions**—Real Estate Owned foreclosed properties may put nearby neighbors at risk for increased SBP, with higher alcohol consumption and body mass index partially mediating this relationship.



Each additional foreclosure added 1.71 to systolic blood pressure (BP), foreclosures bought by third party (less likely to be vacant) did not change systolic BP

# Investing in the Housing Vaccine: What is the business case?



The American Health Care Paradox: Why  
Spending More Is Getting Us Less

November 5, 2013  
Public Affairs Books

# Spending on health care



# Health outcomes

## US Ranking out of 34 OECD countries

Maternal Mortality: 25<sup>th</sup>

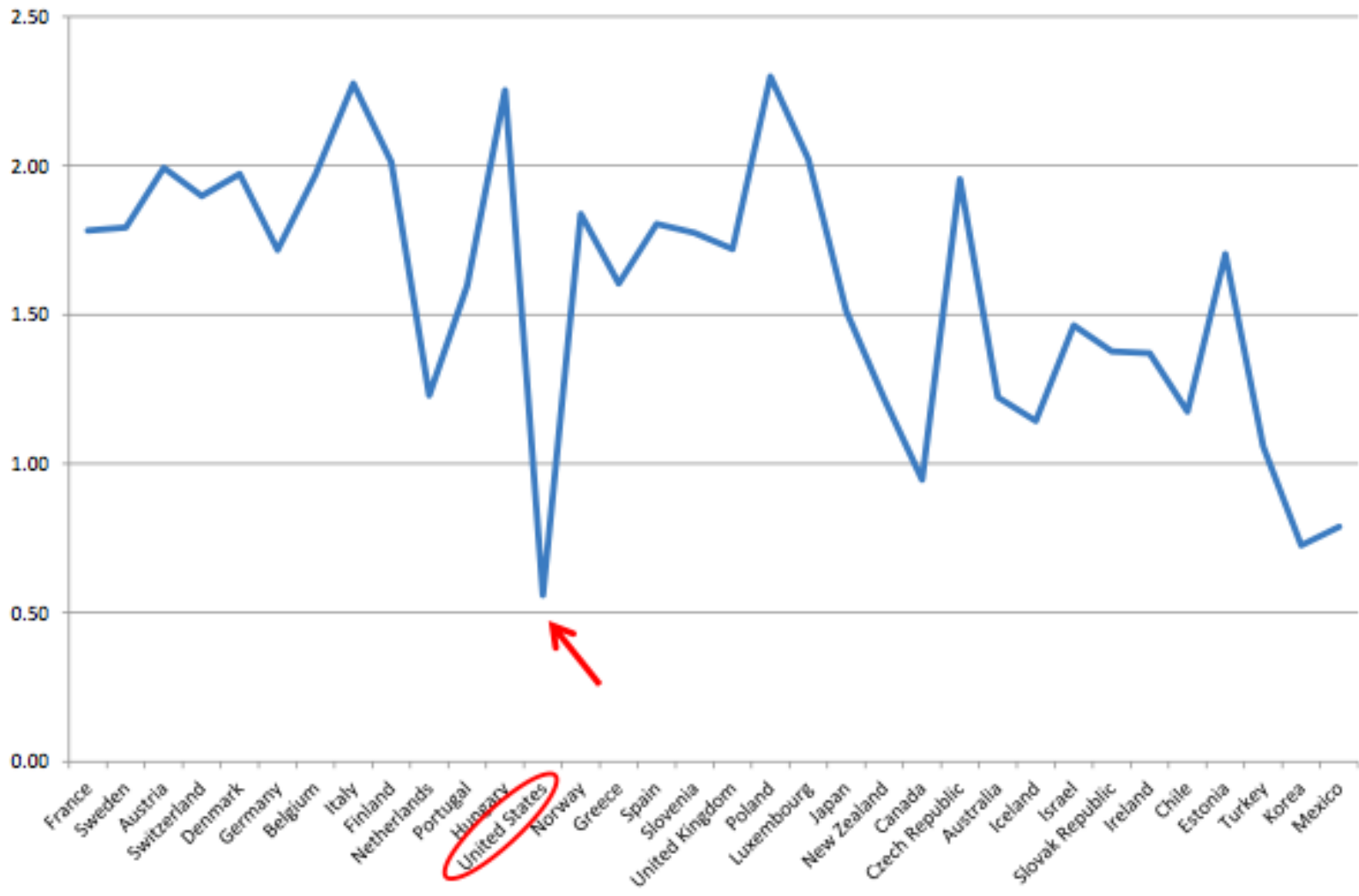
Life expectancy: 26<sup>th</sup>

Low birth weight: 28<sup>th</sup>

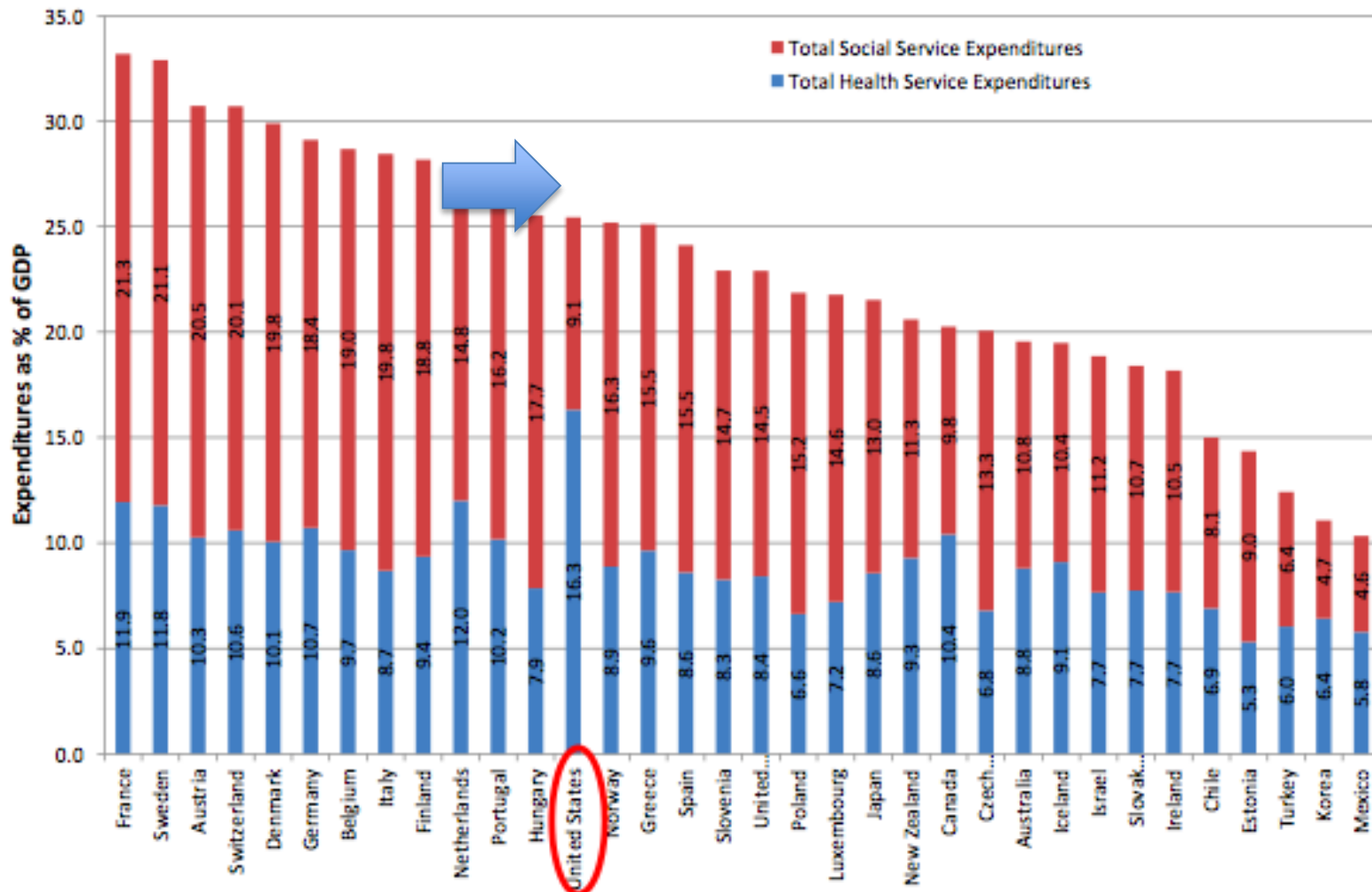
Infant mortality: 31<sup>st</sup>

Source: OECD, *Health at a Glance 2009*: OECD Publishing

# Ratio of social to health spending is different



# Total health care investment in US is *less*



In OECD, for every \$1 spent on health care, about \$2 is spent on social services  
 In the US, for \$1 spent on health care, about 55 cents is spent on social services

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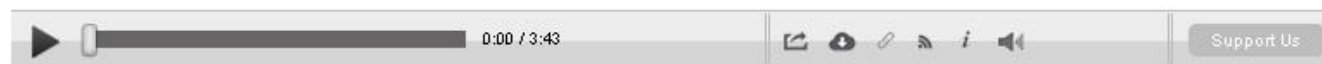


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## Why a health insurance company entered the housing market



Jessie Stamos/Minnesota Public Radio

The Seasons Townhomes development Monday, Feb. 3, 2014 in Ramsey, Minn.



**The New York Medicaid Redesign Team's Supportive-Housing Allocation Plan, Fiscal Year 2012–2013**

<b>Project</b>	<b>Description</b>	<b>Funding dollars</b>
NY/NY III acceleration†	Capital funding to leverage unutilized federal housing tax credits to accelerate funding of NY/NY III units for high-cost Medicaid populations.	25,000,000
Coler–Goldwater project	Funding to construct 171 apartments for current residents of a skilled nursing facility who could instead live safely in a community setting.	7,300,000
Homeless Housing and Assistance Program update	Capital funding to construct new supportive housing units for high-cost Medicaid populations.	14,365,000
Expansion of existing rental or service subsidies	Funding directed to multiple New York State agencies (Supportive Housing Program, Office for People with Developmental Disabilities, Office of Mental Health, Office of Alcoholism and Substance Abuse Services, Department of Health AIDS Institute) to provide services to specific subpopulations who are of high cost to Medicaid and are homeless, at risk for homelessness, or living in institutional settings and able to transition to the community.	25,324,000
Office of Temporary and Disability Assistance subsidies	Funding to pay for ongoing rent subsidies for 300 formerly homeless persons with disabilities facing imminent eviction in New York City.	2,600,000
Other	Funding for supportive and permanent housing initiatives in Long Island (Long Island Housing for Persons with Disabilities) and the Bronx ("The Claremont").	411,000
<b>Total</b>		<b>75,000,000</b>

\* Details on the Supportive Housing Allocation Plan are available at [www.health.ny.gov/health\\_care/medicaid/redesign/affordable\\_housing\\_workgroup.htm](http://www.health.ny.gov/health_care/medicaid/redesign/affordable_housing_workgroup.htm).

† NY/NY III was a joint agreement by New York State and New York City signed in 2005 to provide 9000 supportive-housing units to specific target populations of homeless people in New York City (<http://shnny.org/budget-policy/nyc/ny-ny/ny-ny-iii>).

# Housing as a Vaccine for a Community

- Housing acts as a vaccine for individual health
  - Quality, Stability, Affordability all are important to health
  - Improving Housing can provide multiple benefits like a vaccine can
- Housing as a vaccine for community health
  - Community level indicators matter to health
  - Housing indicators matter to health of populations
- Housing Vaccines need to be on the formulary, through partnership between housing and healthcare