The Housing Vaccine for Healthier Communities

Megan Sandel MD MPH

Principal Investigator, Children’s HealthWatch
Associate Professor, Boston University Schools of Medicine
Medical Director, National Center for Medical-Legal Partnership
Grow Clinic, Boston Medical Center
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 to 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
### TABLE 2—Variables Associated With Insecure Housing, by Housing Group: Children Younger Than 3 Years, 7 US Cities, 1998–2007

<table>
<thead>
<tr>
<th>Variables</th>
<th>Secure Housing (Ref)</th>
<th>Crowding</th>
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<tbody>
<tr>
<td></td>
<td>Unadjusted No. (%)</td>
<td>AOR (95% CI)</td>
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<tr>
<td>Household food insecurity (n = 22 069)</td>
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<td>872 (7)</td>
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<td>1513 (17)</td>
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<td>Caregiver report of fair/poor child health (n = 22 069)</td>
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Unstable Housing, Hunger, Health Linked

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More than Half of Families in Philadelphia are Housing Insecure

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

Figure 1: Over half of Children’s HealthWatch Philadelphia families experience housing insecurity
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 Zaldívar, 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.

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

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 $2,500 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.

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.

Major complications were defined as those requiring hospitalization, including but not limited to pneumonia and encephalitis. Patients with major complications could go on to have no long-term sequelae, long-term disability, or death. The possibility that a vaccination program could cause changes in the

VARICELLA virus causes an estimated 3.7 million cases of chickenpox and 9000 hospitalizations in the United States annually.1 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 invested. 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.
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.
CCHMC has 90+% of all asthma admissions in county

**Quintile 1:**
- 18 admits among 29,000 kids
- 0.6 per 1000
- 17% of pop’n with 2% of admissions

**Quintile 5:**
- 299 admits among 17,900 kids
- 16.7 per 1000
- 11% of pop’n with 35% of admissions
“Heat map” of building code violations

Beck & D. Jones (2014)
Avondale and Asthma – Neighborhood approach

181 total utilizations – 130 ED visits, 51 admissions

Beck (2014)
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, and more than 1.8 million US homes (1.5% of all housing units) were subject to a foreclosure filing in 2011 alone. Researchers have expressed concerns about the impact of the housing crisis on the public's health, identifying housing distress and many of its sequela as health risk factors. 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). Current studies, though useful, are limited by cross-sectional data, ecologic study designs, retrospective reporting, and self-reported measures. 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.

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 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. Participants were observed in 203 municipalities over the course of the study.

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 ≥ 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)

METHODS
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 Arcaya¹*, M. Maria Glymour²; Prabal Chakrabarti³; Nicholas A. Christakis⁴; Ichiro Kawachi¹; S V Subramanian¹

+ Author Affiliations

¹*, Harvard School of Public Health, 9 Bow Street, Cambridge, MA 02138
marcaya@hsph.harvard.edu

Abstract

**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

Mariana Arcaya1*, M. Maria Glymour2; Prabal Chakrabarti3; Nicholas A. Christakis4; Ichiro Kawachi1; SV Subramanian1

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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.
Investing in the Housing Vaccine: What is the business case?
Spending on health care

Data downloaded from OECD StatExtracts. Available at stats.oecd.org
Health outcomes

US Ranking out of 34 OECD countries

Maternal Mortality: 25th

Life expectancy: 26th

Low birth weight: 28th

Infant mortality: 31st

Ratio of social to health spending is different
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.
Why a health insurance company entered the housing market
Perspective

Housing as Health Care — New York's Boundary-Crossing Experiment


Among the countries in the Organization for Economic Cooperation and Development (OECD), the United States ranks first in health care spending but 25th in spending on social services.¹ These are not two unrelated statistics: high spending on the former may result from low spending on the latter. Studies have shown the powerful effects that "social determinants" such as safe housing, healthful food, and opportunities for education and employment have on health. In fact, experts estimate that medical care accounts for only 10% of overall health, with social, environmental, and behavioral factors accounting for the rest.² Lack of upstream investment in social determinants of health probably contributes to exorbitant downstream spending on medical care in the United States. This neglect has ramifications for health outcomes, and the United States lags stubbornly behind other countries on basic indicators of population health.

The role of social determinants of health, and the business case for addressing them, is immediately clear when it comes to homelessness and housing. The 1.5 million Americans who experience homelessness in any given year face numerous health risks and are disproportionately represented among the highest users of costly hospital-based acute care.

Audio Interview

Interview with Dr. Nirav Shah on New York State's decision to address housing needs as a social determinant of health. (10:56)
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<th>Description</th>
<th>Funding dollars</th>
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<td>NY/NY III acceleration†</td>
<td>Capital funding to leverage unutilized federal housing tax credits to accelerate funding of NY/NY III units for high-cost Medicaid populations.</td>
<td>25,000,000</td>
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<td>Coler–Goldwater project</td>
<td>Funding to construct 171 apartments for current residents of a skilled nursing facility who could instead live safely in a community setting.</td>
<td>7,300,000</td>
</tr>
<tr>
<td>Homeless Housing and Assistance Program update</td>
<td>Capital funding to construct new supportive housing units for high-cost Medicaid populations.</td>
<td>14,365,000</td>
</tr>
<tr>
<td>Expansion of existing rental or service subsidies</td>
<td>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.</td>
<td>25,324,000</td>
</tr>
<tr>
<td>Office of Temporary and Disability Assistance subsidies</td>
<td>Funding to pay for ongoing rent subsidies for 300 formerly homeless persons with disabilities facing imminent eviction in New York City.</td>
<td>2,600,000</td>
</tr>
<tr>
<td>Other</td>
<td>Funding for supportive and permanent housing initiatives in Long Island (Long Island Housing for Persons with Disabilities) and the Bronx (“The Claremont”).</td>
<td>411,000</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
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*Details on the Supportive Housing Allocation Plan are available at www.health.ny.gov/health_care/medicaid/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

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• 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