

Quality Improvement Evaluation of the Community Asthma Initiative (CAI): A Comprehensive Model to Address Health Disparities

Susan J. Sommer, MSN, RN, NP, AE-C

Elizabeth R. Woods, MD, MPH

Urmi Bhaumik, MBBS, MS, DSc

Elaine Chan, BA

Ronald B. Wilkinson, MA, MS

Massiel P. Ortiz, RN, BSN

Margarita Lorenzi, BS

Amy B. Burack, RN, MA, AE-C

Elizabeth M. Klements, MS, PNP-BC, AE-C

Deborah U. Dickerson, BA

Shari Nethersole, MD



Boston Children's Hospital



HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Funding

- CDC REACH U.S. #1U58DP001055
- Healthy Tomorrows Partnership for Children, HRSA grant #H17MC21564
- MCHB, HRSA – LEAH grant #T71MC00009
- Ludcke, BJ's, Thoracic and Covidien Foundations
- Boston Children's Hospital, Office of Child Advocacy



Value Proposition

For \$280,000/year, CAI will reduce hospitalizations by 80% and ED visits by 60% in 12 months for 150 African American and Latino children, who present to Children's Hospital for emergency asthma care, by providing tailored asthma education, case management, home visiting, and home environmental assessment and remediation. This will produce \$400,000 in savings to the health care system in 2 years and \$855,000 in 5 years for those 150 children.



Assessing the Need

- Community needs assessment by Office of Child Advocacy—Asthma, Obesity, Mental Health, Injuries
- Asthma was leading cause of hospital admissions
- 70% of children hospitalized for asthma at Children's came from 5 low-income, predominately African-American and Latino neighborhoods in Boston
- Asthma hospitalization rates for African-American and Latino children in 2003 were 4-5 times the rate for white children



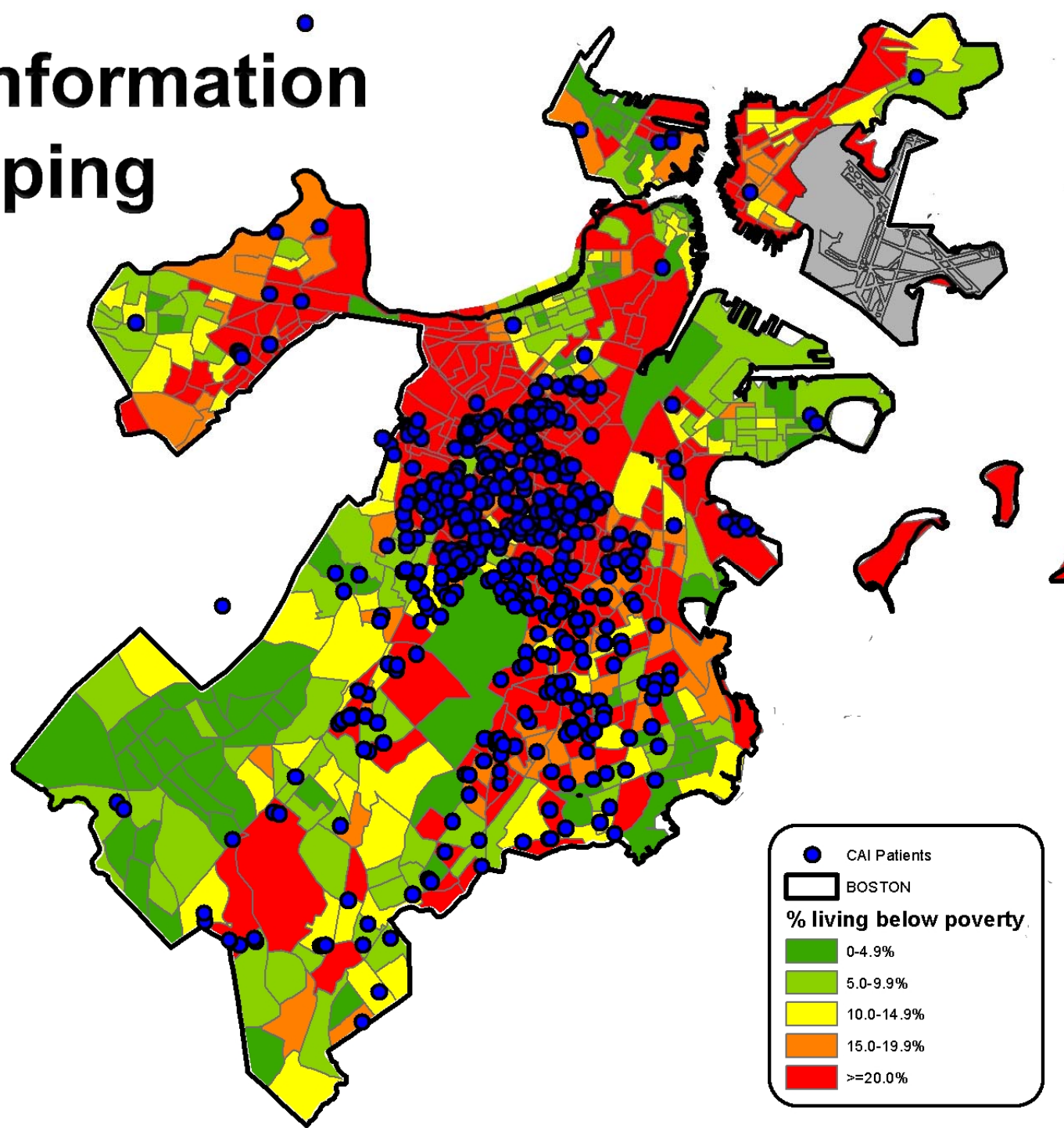
Population Health Approach

- Target population: Children ages 2-18 from four zip codes with high asthma rates for a pilot program (later expanded to more neighborhoods in Boston)
- Patients identified: Children's emergency department (ED) visits, inpatient admissions, and now referrals from Children's primary care providers



Geographic Information Systems Mapping

- 69.3% of CAI patients lived in an area where $\geq 20\%$ of families live below the Federal Poverty Level (FPL)



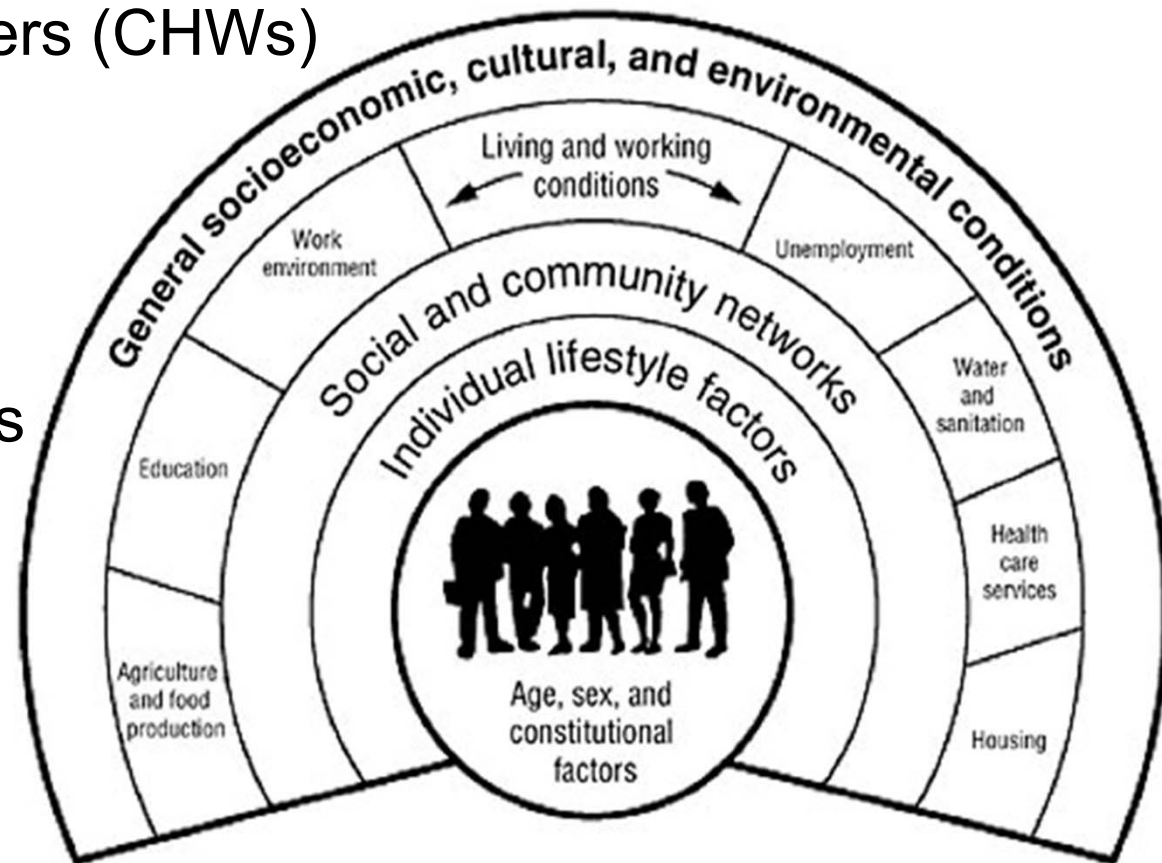
Social Determinants of Health

- #1 Substandard housing—pests, mold, etc.
- School buildings with many of same triggers
- Poverty/ competing demands(e.g. food insecurity, unemployment)
- Stress related to violence, racism
- Limited safe places to exercise
- Low health literacy/distrust of health care system
 - Fear and misconceptions about asthma medications, especially inhaled steroids



CAI: Addressing Multiple Levels of the Socio-Ecological Model

1. **Individual and Family:** Case management and home visiting by nurses and Community Health Workers (CHWs)
2. **Community:** Educational workshops, social marketing, community asthma events
3. **Systemic:** Work with coalitions to support payment for asthma programs and advocate for policy changes to address Social Determinants of Health (e.g. healthy housing and schools)



Institute of Medicine. (2003). The Future of the Public's Health in the 21st Century. Washington, D.C.: National Academies Press.



High Performing Collaborations

Boston Public Health Commission (BPHC)

Boston Medical Center (BMC)

Boston Inspectional Services Dept (ISD)

Boston Asthma Initiative (BAI)

Asthma Regional Council (ARC)

Boston Healthy Homes and Schools Collaborative

Massachusetts Asthma Advocacy Partnership (MAAAP)

MA Department of Public Health (DPH)

Boston Public Schools

Child Care Providers (e.g. Head Start)

Community Health Centers

YMCA/ Community Centers



Boston Children's Hospital



HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Individual/Family Intervention

- Mixed nurse/CHW model
- Identification of children meeting high-risk criteria
 - Hospitalization, 2 or more ED visits or courses of oral steroids
 - Plus exposure to asthma triggers, e.g. pests, mold, smoking
 - Other indicators of poor asthma control



Home Visit

- Tailored asthma education, based on child's history, family's understanding of asthma, asthma control and medications, check for medications and adherence
- Establishing family's goals for asthma control
- Dispelling misconceptions and myths about medications
- Identifying barriers to adherence (competing demands, no insurance, or high copays)



Home Environmental Assessment & Education

- Visual inspection—identify potential triggers--
pests, mold, pets, clutter, Environmental
Tobacco Smoke, strong cleaners
- Education
 - Integrated Pest Management (IPM)
 - Smoke-free housing
 - Motivational Interviewing re: smoking / referral to
Quit Line, if interested
 - Safe cleaning methods



Environmental Remediation

For all families:

- HEPA vacuum
- Dust mite-proof bedding encasements

As needed:

- IPM supplies (e.g. copper gauze, trash cans with lids, sticky traps)
- Plastic storage bins
- Advocacy with landlord, education re: asthma, IPM; referral for housing inspection
- 10% receive contracted IPM services thru CAI



Quality Improvement Evaluation

- Health outcomes
 - ED visits and hospital admissions
- Quality of Life measures
 - Patient missed school days, parent/guardian missed work days and days with limitation in physical activity
- Cost-effectiveness analysis of the program
 - Hospital administrative data of ED visits and hospital admissions
 - Demographically similar population in Boston used as a comparison



Results

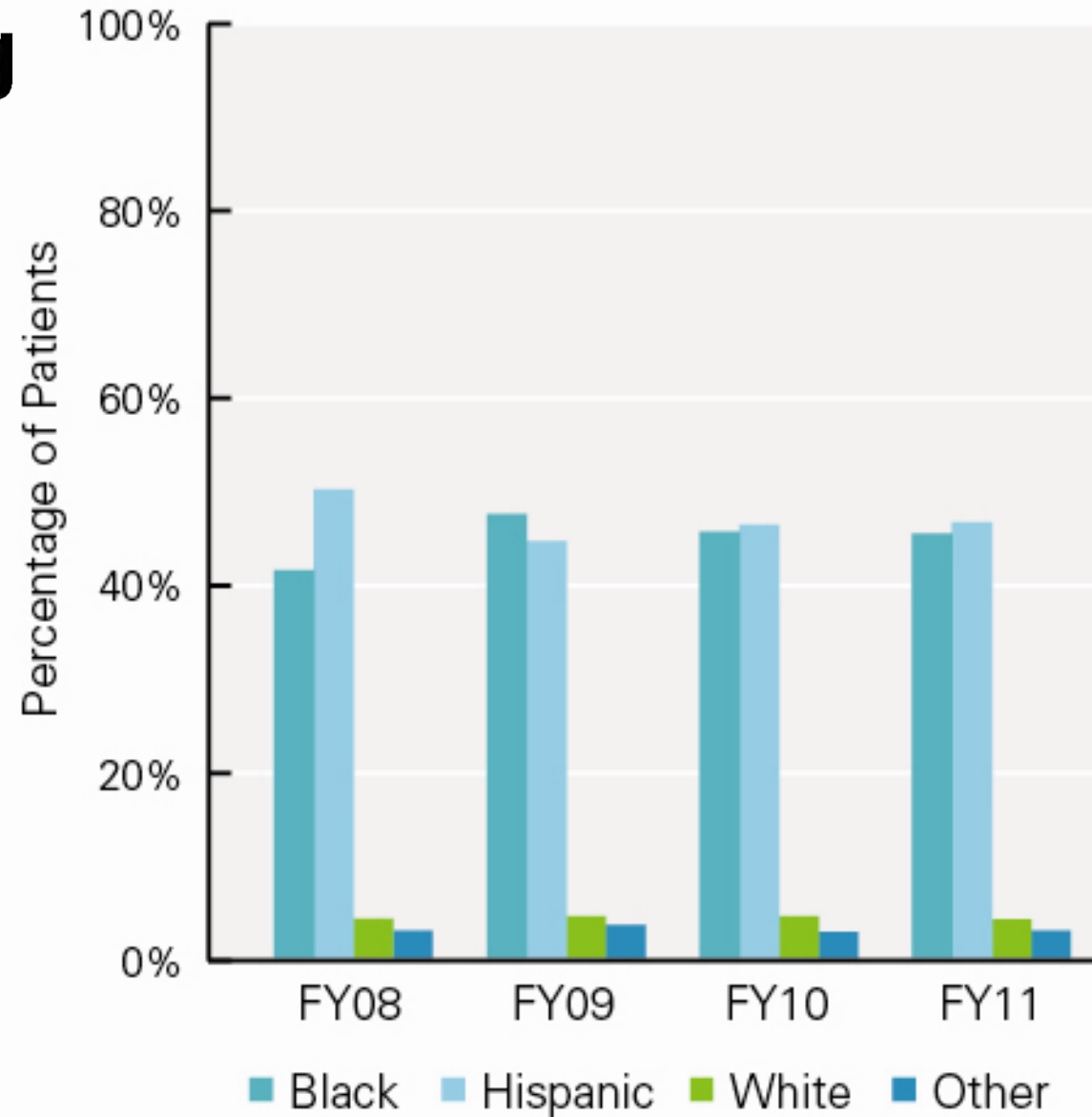
(through March 31, 2012)

- **908** patients enrolled
- **692 (76%) home visits** for families by nurses and/or Community Health Workers (CHWs)
- **Demographics:**
 - Mean age 7.3 years \pm 4.4 SD
 - 47.4% Latino, 45.4% African American, 7.2% other
 - 25.2% Spanish-speaking
 - Income 64.8% <\$25,000
 - 72% have Medicaid (MassHealth)

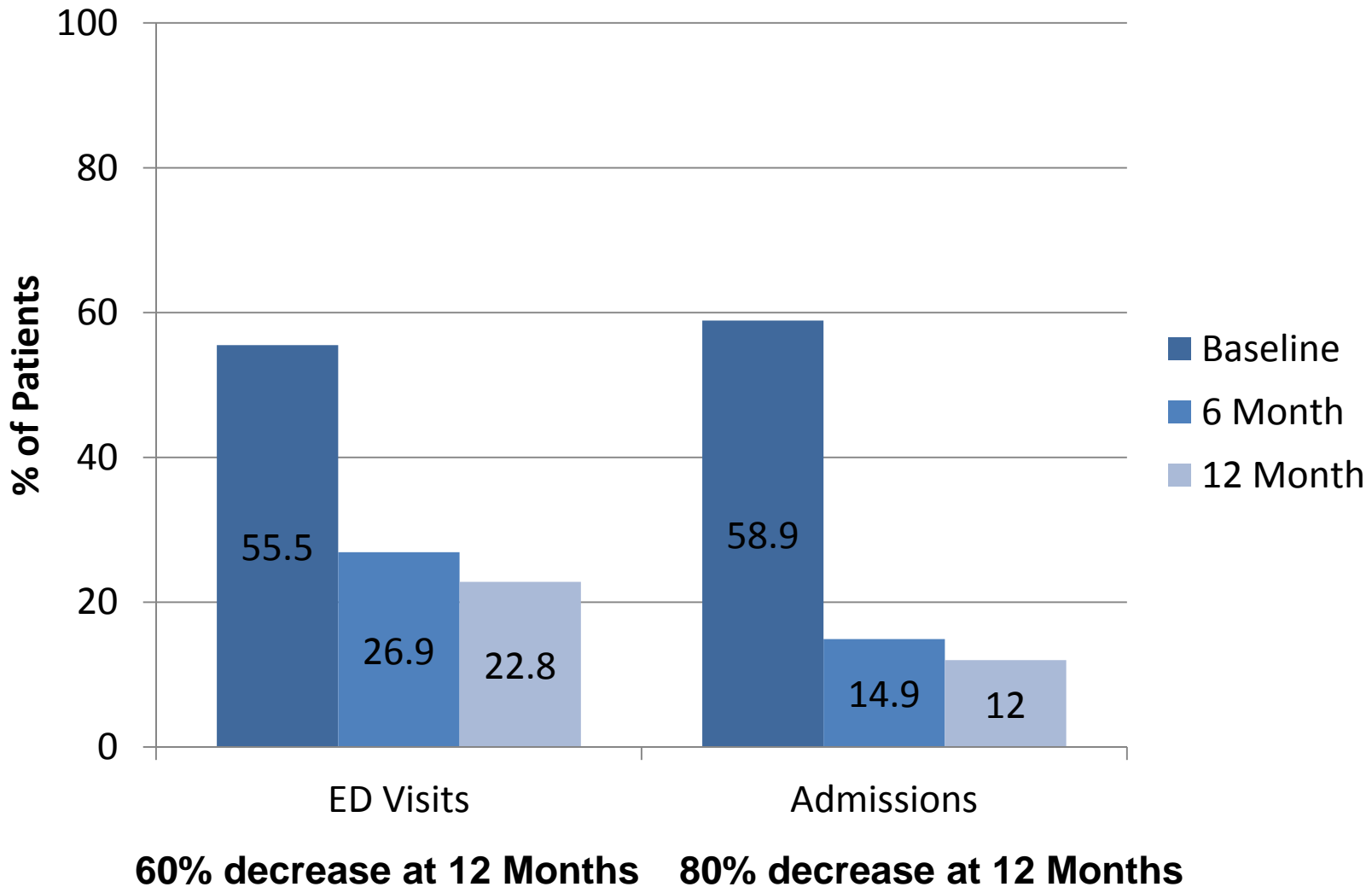


Addressing Disparities

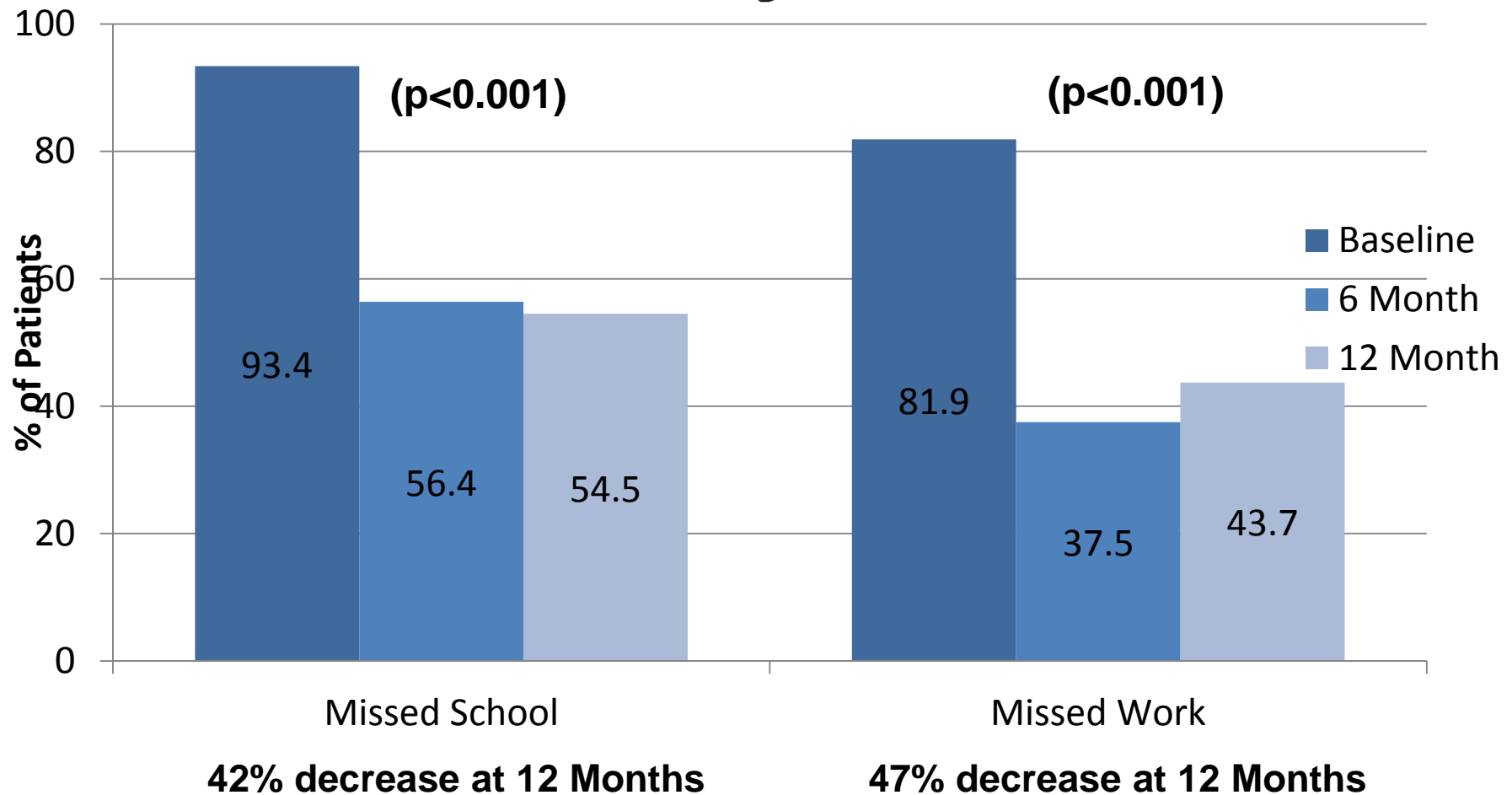
Race/Ethnicity of CAI Patients



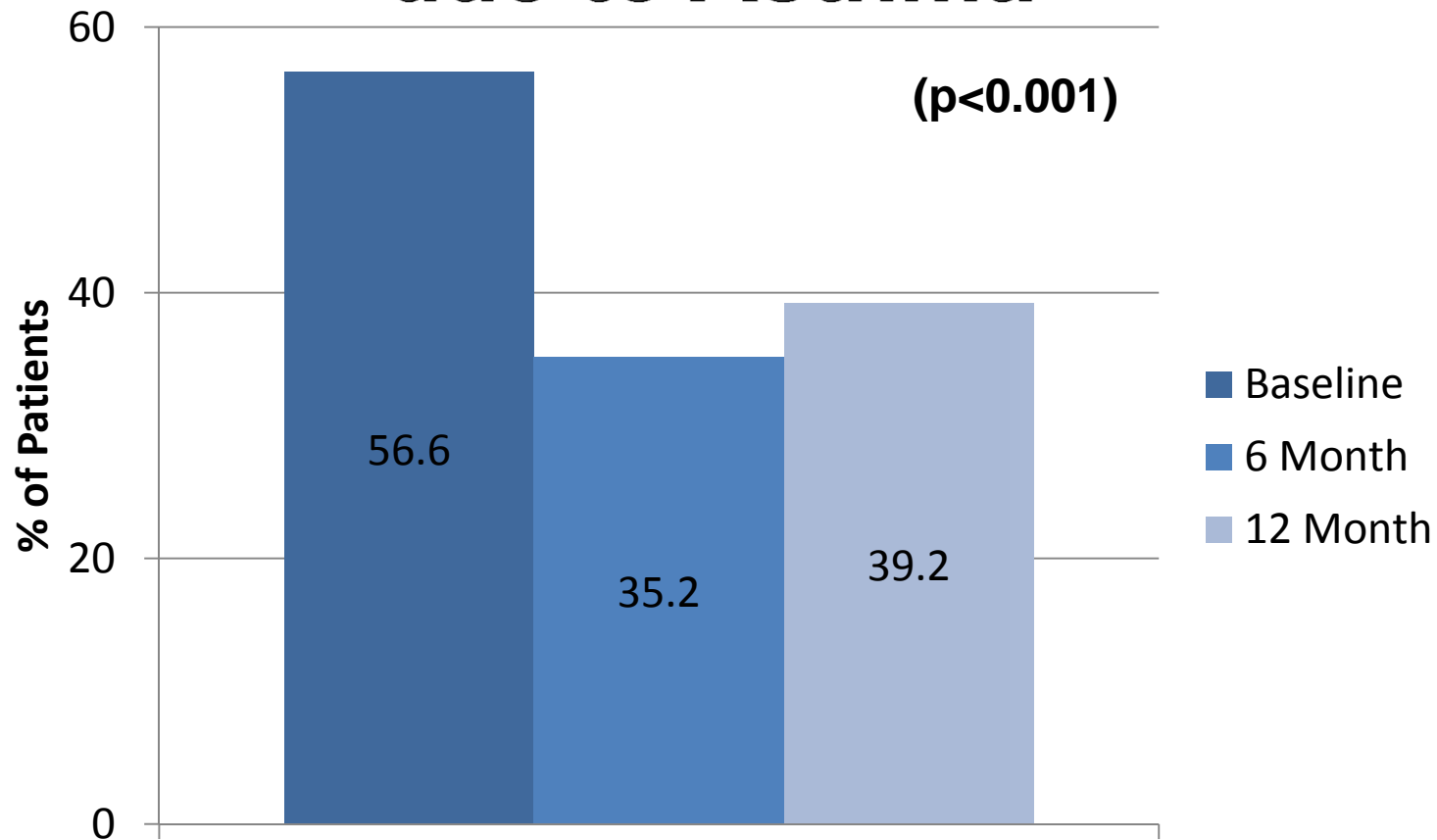
Decrease in % patients with any (≥ 1) ED Visits or Admissions due to Asthma



Decrease in % patients with any (≥ 1) Missed School or Parent/Guardian Missed Work Days due to Asthma



Decrease in % patients with any (≥ 1) Days of Limitation of Physical Activity due to Asthma

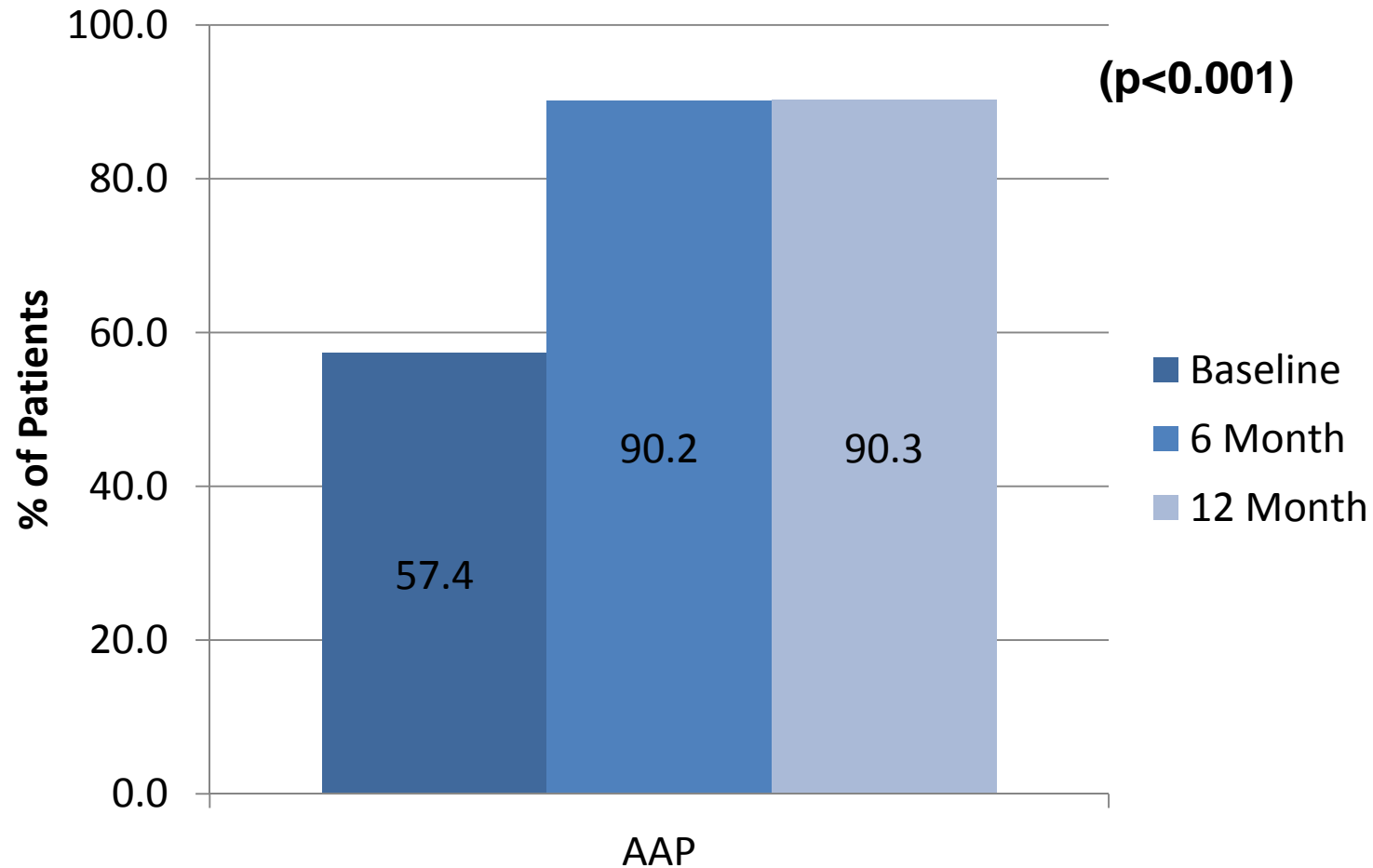


Limitation in Physical Activity

31% decrease at 12 Months



Increase in % patients with up-to-date Asthma Action Plans



57% increase at 12 Months



Housing: Environmental Findings and Interventions



Boston Children's Hospital



HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Home Environmental Findings

Findings:	Percent Patients:
Significant Clutter	51.0%
Rodents	37.6%
Pets	25.3%
Mold	20.0%
Cockroaches	13.4%
Environmental Tobacco Smoke	18.2%



Addressing Housing Conditions

- Breathe Easy at Home (based at Boston Public Health Commission/Inspectional Services (ISD)), web-based referrals by health care providers, feedback to providers from ISD
 - Steering Committee includes health care users, Medical-Legal Partnership, Boston Housing Authority
 - www.cityofboston.gov/isd/housing/bmc/default.asp
- Importance of Integrated Pest Management-education of residents, property managers



Violations Found by BEAH (N=81)

- 70% Mouse infestations
- 45% Mold/water damage/leaks
- 35% Cockroaches
- 23% Other structural problems

Number of violations found/ household

- 1 violation found 33%
- 2 violations found 43%
- 3+ violations 14%

42% violations clearly documented as corrected

Boston Asthma Home Visiting Collaborative (BPHC)

Mission:

- Coordinated CHW asthma home visiting program
- Culturally and linguistically competent
- Access regardless of health insurance or health care provider.
- **Potential outcomes:**
 - Standardization of home visiting protocols
 - Centralized referral system
 - Coordination of training, purchasing, referrals
 - Data sharing and evaluation
 - Coordinated negotiations with payers



Cost Analysis

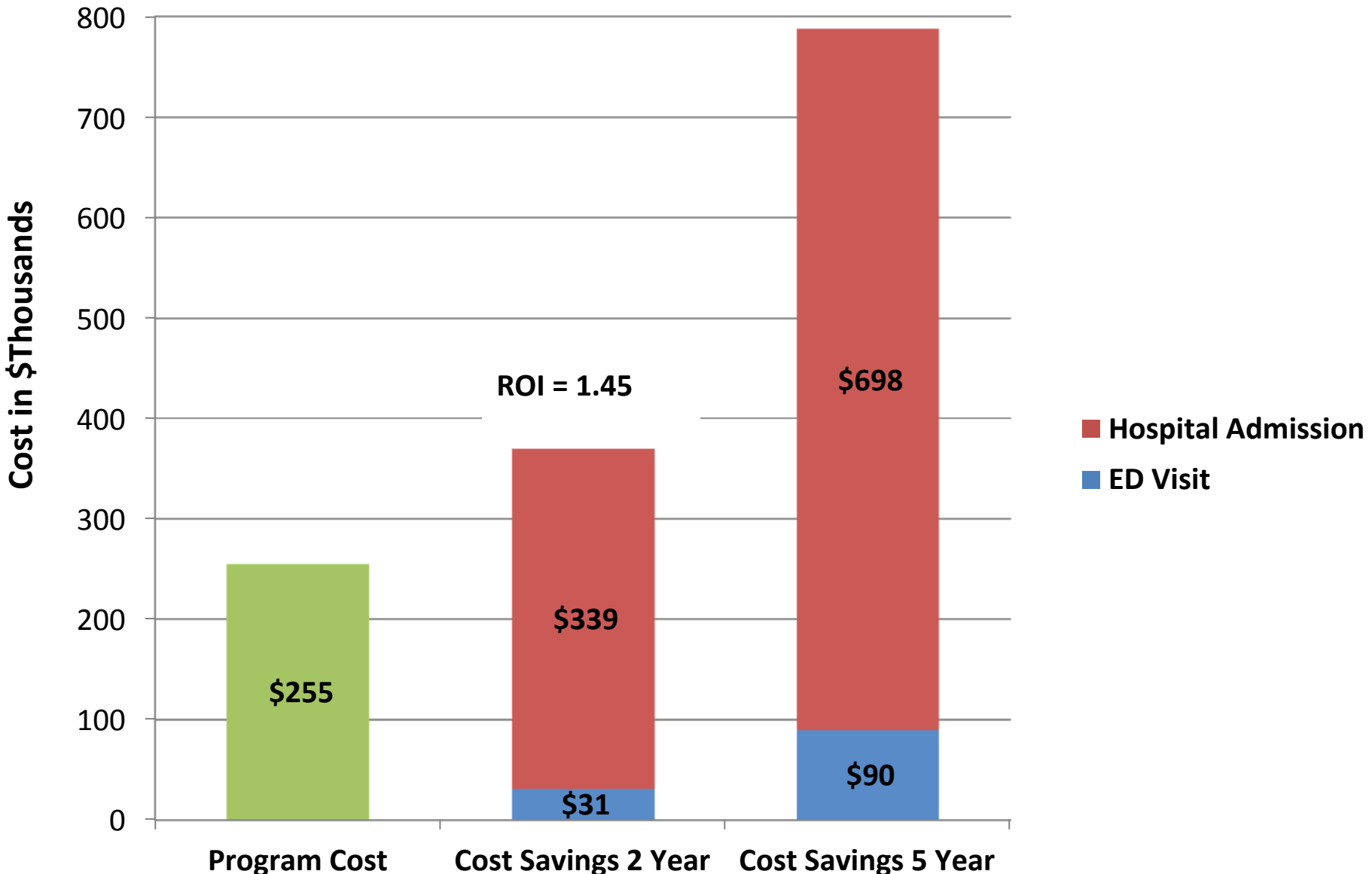
Return on Investment=

$$\frac{\text{Baseline costs (-1yr)- (ED + hospitalization costs)(+1 yr, etc)}}{\text{Cost of intervention}}$$



Return on Investment (ROI) in 2 Years and 5 Years

ROI = 3.09

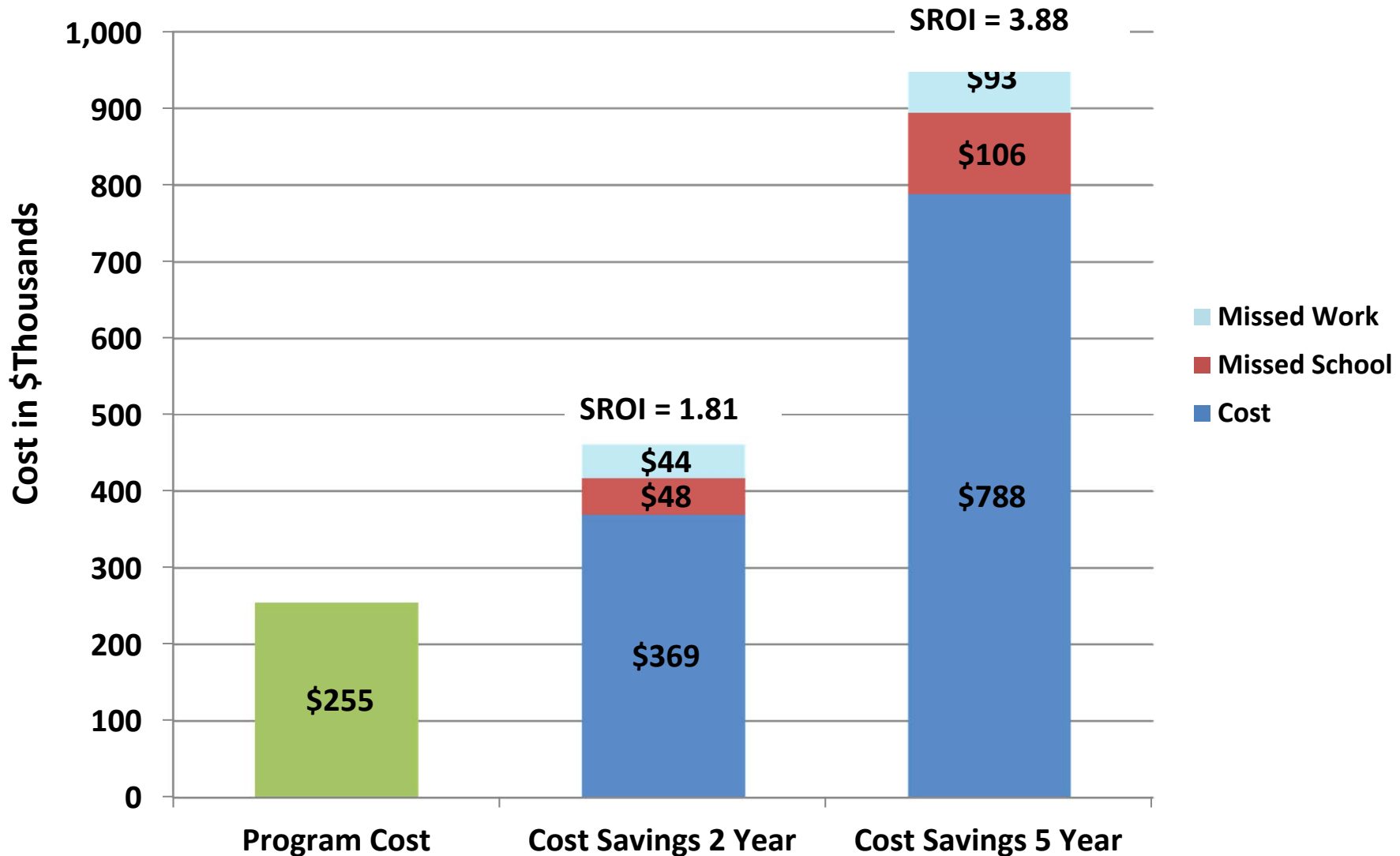


Social Return on Investment (SROI)

- Number of missed school days and number of missed workdays based on parental self-report
- Economic benefit of reduction in missed school days, using cost of instruction for student/day from annual Boston school budget for period 2006-2011 (\$39.67/Student/Day in 2006)
- Economic benefit of reduction in missed workdays based on wage data obtained from average annual household income of CAI households(13.66/Hour using 8 Hour Work Day)



Social Return on Investment (SROI) in 2 Years and 5 Years



Sustaining the System

- Goal: To establish sustainable funding for home visiting and CHW's through reimbursement by payers, rather than going from grant to grant
- Payer Advocacy with Asthma Regional Council (ARC) and partners:
 - Business case for asthma home visiting 2007, 2010
 - Forums for providers and payers



System Change Efforts

- Legislative Advocacy with Boston Urban Asthma Coalition (BUAC), consumer advocacy group:
 - Filed HB 2236/SB 1214, An Act to Improve Asthma Management, introduced over several sessions, educate legislators, develop champions, but never reached floor for vote
 - Budget amendment FY2011 directing the MA Executive Office of Human Services to establish a pilot Medicaid bundled payment program for high risk pediatric asthma patients—state obtained Medicaid waiver, but has yet to release RFA



Dissemination of Model

- American Academy of Pediatrics
“Accelerating Improved Care for Children with Asthma” project
 - Replication of model in Alabama
 - Replication manual
- Asthma Regional Council CMS Innovation grant
 - New England Asthma Innovation Collaborative (NEAIC) –MA, VT, RI, CT



New England Asthma Innovation Collaborative

- Collaborative includes: asthma providers, 5 payers, policy and training partners (AHECs, New England State Asthma Programs, ALA, MA Association of CHWs)
- Workforce development standardized CHW training and supervision
- Learning collaboratives
- Cost analysis that includes insurance claims data, which we hope will show cost savings
- By third year, payers will begin to pay for services



Conclusion

- Improved health outcomes and cost analyses demonstrate a successful, cost-effective model of enhanced asthma care, utilizing CHW home visiting that reduces racial and ethnic asthma disparities and addresses Social Determinants of Health .
- Health care reform offers opportunity to develop novel payment approaches for care that improve quality measures, reduce costs with potential for shared savings for providers and payers.
- SDOH need to be addressed through policies that address healthy housing, health care access, etc.



Thank you!



Boston Children's Hospital



HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL