Prevalence of Asthma in Black and Hispanic People as Compared to the General Population of Massachusetts

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Asthma

- Disease where the airway narrows and excess mucus develops, making breathing more labored.
- Symptoms include:
  - Wheezing/wheezing when exhaling
  - Chest Pain
  - Cough
  - Shortness of Breath
  - Viral illness symptoms are worsened
- No cure, symptoms can be relieved with medical treatments, such as an inhaler.
- Asthma has different triggers causing flares-ups in people
  - Exercise induced asthma
  - Occupational asthma (workplace fumes like dust, chemicals, etc.)
  - Allergy induced asthma

(U.S. Department of Health and Human Services)
What is a Health Disparity?

- Health Disparity: When a disease affects a specific group more than the general population.

- Prevalence: Proportion of a population who have a specific characteristic in a given time period.

- Incidence: The amount of new additions to a certain population or new cases of people who have a certain health disparity.

- Burden: Unnecessary difficulties that come as a result from the disparity.
Health Disparities in the Prevalence of Asthma

From our research, it is clear that asthma is more prevalent among the black and hispanic communities in Massachusetts.

“The prevalence of current asthma in Massachusetts was higher among Black, Non-Hispanic adults (13.8%) than White, non-Hispanic (10.4%) adults, whereas the prevalence of current asthma among adults was similar across race/ethnicity subgroups in 2015” (Bureau of Community Health and Prevention, & Health)

Main factors of the disparity:
- Low income housing
- Air pollution
Factors of the Health Disparity:
● Those living in low-income housing face increased prevalence of asthma triggers such as mold, dust, and insects
● Although all racial groups may live in low income housing, the treatment of black and latino tenants as compared to others causes a greater risk of severe asthma
● “In neighborhoods with the fewest White residents...models showed a 17 percent...slower median time until...requests for inspections...were closed, a 14 percent higher probability of being flagged as overdue, and a 54.4 percent lower probability of a repair” (Lemire).
● Odorless and invisible chemicals are prevalent in low income housing
● “Endocrine disrupting compounds, such as phthalates (e.g., DEHP, benzylbutylphthalate) and phenolic compounds (e.g., triclosan, bisphenol A, and parabens), can exacerbate asthma symptoms” (Perovich).
We found fragrance chemicals – which are avoidable asthma triggers – in every home.

Most of the homes also had antibacterial chemicals, another avoidable asthma trigger. These chemicals have been linked to worsening asthma symptoms.

Tips for a healthy home

- Choose fragrance-free and avoid anti-bacterial products.
- Soap and water are just as effective as antibacterial soap.

<table>
<thead>
<tr>
<th>Number of fragrance chemicals in air</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 fragrance chemicals</td>
</tr>
<tr>
<td>1 fragrance chemical</td>
</tr>
<tr>
<td>2 fragrance chemicals</td>
</tr>
<tr>
<td>3 fragrance chemicals</td>
</tr>
<tr>
<td>4 fragrance chemicals</td>
</tr>
<tr>
<td>5 fragrance chemicals</td>
</tr>
</tbody>
</table>

Fig. 4 This pictograph of study-wide results shows that fragrance use was ubiquitous in homes. The text links the results to actions that can reduce asthma symptoms for children in the study.
Particulate matter refers to inhalable particles such as dust, soot, or smoke (McKnight, 2020.)

- Particulate matter smaller than 2.5 micrometers in diameter (PM$_{2.5}$) is the largest environmental health risk factor in the U.S.
- In comparison to white residents, Asian American, African American, and Latino residents are exposed to higher concentrations of PM$_{2.5}$
- More than 372,000 Latino residents, 283,000 African American residents, and 231,000 Asian American residents live in areas of Massachusetts where pollution is above the state average. (Fact sheet Inequitable Exposure to Air Pollution from Vehicles)
FIGURE 1. High Variation in Exposure to PM$_{2.5}$ Pollution from On-Road Vehicles in Massachusetts

PM$_{2.5}$ from On-Road Vehicles, Average Annual Concentration (µg/m$^3$)

<table>
<thead>
<tr>
<th>Concentration Range</th>
<th>Colormap</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20-0.40</td>
<td>Lightest</td>
</tr>
<tr>
<td>0.40-0.51</td>
<td>Light</td>
</tr>
<tr>
<td>0.51-0.61</td>
<td>Medium</td>
</tr>
<tr>
<td>0.61-0.73</td>
<td>Medium</td>
</tr>
<tr>
<td>0.73-0.95</td>
<td>Dark</td>
</tr>
<tr>
<td>0.95-1.30</td>
<td>Dark</td>
</tr>
<tr>
<td>1.30-2.60</td>
<td>Darkest</td>
</tr>
</tbody>
</table>
How Does This Health Disparity Burden the Black and Hispanic Population Diagnosed with Asthma?
Costs of Asthma

Asthma costs the American economy more than $80 billion annually; medical expenses, deaths, missed work days and school days, etc.

Cost per person with asthma (breakdown):

- $3,266 total
- $1,830 toward prescriptions
- $640 for doctor’s office visits
- $529 toward hospitalization costs
- $176 for outpatient visits
- $105 toward Emergency Room bills/care

★ People with insurance paid more for treatment than people without insurance.
  ○ Could be biased. Cost of transportation for care was not included. People with untreated asthma were also not accounted for.

(Asthma costs the u. s. Economy more than $80 billion per year.)
Figure 8.8 Asthma Emergency Department Visits† by Race/Ethnicity and Year, Boston

ED visits per 10,000 residents

- 250
- 200
- 150
- 100
- 50
- 0

2011 2012 2013 2014 2015

Boston
Asian
Black
Latino
White

*
Side Effects of Asthma Medication

Very often, asthma treatment involves medical steroids (corticosteroids). These treatments are commonly lifelong which presents a possibility for various complications.

- **Infections**: immune system becomes suppressed over time
- **Ulcers** and other **gastrointestinal issues**
- **Osteoporosis** (thinning of bones); a person can lose 10%-20% of bone mass in the first 6 months of taking the medication!
- **Weight gain**: appetite often increases
- **Fluid Retention and Elevated Blood Pressure**: cortisone regulates water and sodium along with other electrolytes
- **Insomnia**: especially when taken in the evening

(Steroid side effects: How to reduce corticosteroid side effects)
Possible Solutions
Possible Solution to the impact of Air Pollution

Switching to electric vehicles (trucks, buses, cars)
- Reduces tailpipe exhaust
- There is some emission in charging the vehicle, but less than that of an average gasoline car

The switch will save money in the long run.
- Upfront investments makes it difficult for school districts, transit agencies or moderate-income consumers to afford

Create policies that accommodate electric transportation
- Financial assistance programs
- Investments in charging utilities for electric vehicles

(Fact sheet Inequitable Exposure to Air Pollution from Vehicles)
A before-and-after interventions were conducted in 176 low income household in Lowell, MA. (Turcotte)

- Education, tools to remove asthma triggers from the home, and home repairs were included in the interventions

- Interventions led to
  - significant improvements in asthma symptoms
  - Less healthcare utilization related to asthma

- Observations
  - Better health among children with asthma living in government-assisted housing

(Turcotte, D. A., Chaves, E., Gore, R., Adejumo, K. L., & Woskie, S.)
Interventions aimed at preventing asthma in children

- Asthma Link is a school nurse-supervised asthma therapy program
  - Partnership of pediatric practices, school nurses and staff, and families to deliver school-supervised asthma therapy to children with poorly controlled asthma.

- School-based programs are able to “reach diverse racial, ethnic, and socioeconomically disadvantaged populations because of their accessibility to all children that attend school”

- Preventative therapies also help children create healthy habits that will continue to adulthood

(Shillan, H. N., Luther, J. P., Ryan, G. W., Hoque, S., Spano, M. A., Lessard, D. M., Gerald, L. B., Pbert, L., Phipatanakul, W., Goldberg, R. J., & Trivedi, M. K)
Conclusion

- Black and Hispanic Communities are disproportionately affected by asthma compared to the general population

- Reasons for disparity:
  - Air pollution
  - Low income housing

- Burdens once diagnosed:
  - Very expensive costs for treatment
    - About $80 billion annually
  - Multiple side effects from medication causing further health issues

- Possible Solutions
  - Electric vehicles
  - Welfare checks for people at risk of asthma
  - School-based programs
References