AIR POLLUTION AND RISK ASSESSMENT

SUBMITTED TO – DR YOMI NOIBI
BY- SANJANA SAINI
MPH (EPIDEMIOLOGY)
GSU
Statement of Problem and Purpose (SOP)

◆ SOP –
1. Purpose - examine the current ways in which Health Risks are communicated to the vulnerable communities.
2. Recommend better ways to communicate risk to community.

◆ GOAL –
The goal of this presentation is to highlight the complex and complicated topic of air pollution and translate it into grades and ways that the public can understand.
Introduction

- Air pollution is a mixture of natural and man-made substances in the air we breathe. It is typically separated into two categories: outdoor air pollution and indoor air pollution. ([https://www.niehs.nih.gov/health/topics/agents/air-pollution/index.cfm](https://www.niehs.nih.gov/health/topics/agents/air-pollution/index.cfm))

- **Outdoor air pollution** involves exposures that take place outside of the built environment. Examples include:
  - Fine particles produced by the burning of fossil fuels
  - Noxious gases (sulfur dioxide, nitrogen oxides, carbon monoxide, chemical vapors, etc.
  - Tobacco Smoke
  - In 2013, the World Health Organization concluded that outdoor air pollution is [carcinogen](https://www.niehs.nih.gov/health/topics/agents/air-pollution/index.cfm) to humans.
Indoor air pollution involves exposures to particulates, carbon oxides, and other pollutants carried by indoor air or dust. Examples include:

- Gases (carbon monoxide, radon, etc.)
- Household products and chemicals
- Building materials (asbestos, formaldehyde, lead, etc.)
- Outdoor indoor allergens (cockroach and mouse dropping, etc.)
- Tobacco smoke
- Mold and pollen
About Georgia

- Ranked 25th among cities for the worst ozone, according to the Lung Association’s [2019 State of the Air report](https://www.lung.org/states/). The report said Atlanta/Athens/Sandy Springs had worse results on year-round particle pollution. The area tied for 19th worst in this form of pollution.
- Florida and Georgia are the two eastern states in the U.S. South most impacted by wildland fire events contributing to premature deaths and respiratory-related hospital admissions [9].
In the Lung Association report 2019, several metro Atlanta counties received F grades for ozone: DeKalb, Fulton, Gwinnett, Henry and Rockdale.

Receiving A’s were Chatham, Chattooga, Glynn and Richmond counties, none of which are in metro Atlanta.

11% of Georgia’s children have asthma – almost double the national average (American Lung Association of Georgia).
When are air pollution levels high?

- Any time of year
- When weather is calm
- Near busy roads
- In urban areas
- In industrial areas
- When there is smoke
Are you at risk?

Greater risk if you have or have had:

- Coronary artery disease
- Angina (chest pain)
- A heart attack
- Bypass surgery or an angioplasty
- Heart failure
- An internal cardiac defibrillator
- A stroke or transient ischemic attack
- Blockages in the arteries of the neck or legs
- Both kids and older adults are most susceptible, but so are people with heart and lung disease, and conditions such as asthma and diabetes
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>When this pollutant has an index value above 100</th>
<th>When this pollutant has an index value above 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ozone</td>
<td>Children and people with asthma are the groups most at risk.</td>
<td>People with respiratory or heart disease, the elderly and children are the groups most at risk.</td>
</tr>
<tr>
<td>PM2.5</td>
<td>People with respiratory disease are the group most at risk.</td>
<td>People with respiratory or heart disease, the elderly and children are the groups most at risk.</td>
</tr>
<tr>
<td>PM10</td>
<td>People with respiratory disease are the group most at risk.</td>
<td>People with respiratory disease are the group most at risk.</td>
</tr>
<tr>
<td>CO</td>
<td>People with heart disease are the group most at risk.</td>
<td>People with heart disease are the group most at risk.</td>
</tr>
<tr>
<td>SO2</td>
<td>People with asthma are the group most at risk.</td>
<td>People with asthma are the group most at risk.</td>
</tr>
<tr>
<td>NO2</td>
<td>Children and people with respiratory disease are the groups most at risk.</td>
<td>Children and people with respiratory disease are the groups most at risk.</td>
</tr>
</tbody>
</table>
Air Pollution Remains a Significant U.S. Public Health Concern
- Estimated excess mortality 125,000 deaths/year
- Over 20 million school days and workdays lost
- Over 1 million life-years lost
Poor Air Quality: EFFECTS ON HEALTH

- **Age** – might accelerate aging
- **Total Cholesterol** – increases cholesterol
- **Systolic BP** – increases blood pressure
- **Diabetes** – associated with type II diabetes
Poor Air Quality: EFFECTS ON HEALTH

- **Infertility** - irregular Menstrual cycle

- **Fetal Growth** - exposure to PM10, PM2.5 and NO2 was associated with reductions in measurements at birth. (Clemens T et al. Environ Internat 2017)

- **Stillbirth** - ambient air pollution suspected of increasing stillbirth (Siddika et al. Occup Environ Med. 2016) Emerging Areas of Health Effects Research Reproductive and Developmental Preterm Delivery

- **Low Birth Weight** - exposure to PM2.5 is associated with low birth weight. (Rosa MJ et al. Environ Internat 2017)

- "Particle pollution is made of soot or tiny particles that come from coal-fired power plants, diesel emissions, wildfires and wood-burning devices," June Deen, the Lung Association’s director of advocacy, said in a statement. “These particles are so small that they can lodge deep in the lungs and trigger asthma attacks, heart attacks and strokes, and can even be lethal.” Lung Association’s [2019 State of the Air report](https://www.lung.org//state-of-the-air-report).
How can I reduce my risk for air pollution exposure?

- Indoor air pollution can be reduced by making sure that a building is well-ventilated and cleaned regularly to prevent the buildup of agents like dust and mold. Occupants would also be wise to remove any known pollutants and or irritants (aerosols, stringent cleaning supplies, etc.) whenever possible.

- Outdoor air pollution exposures can be reduced by checking one’s Air Quality Index (AQI), avoiding heavy traffic when possible, and avoiding secondhand tobacco smoke.

According to the above study short term exposure to air pollutants such as [ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and particulate matter ≤10μm (PM₁₀) and PM₂.₅] increases risks of asthma-related ERVs and hospitalizations that constitute a considerable healthcare utilization and socioeconomic burden.
Better ways of communicating risk

- A study by Luz Claudio reveals that communicating environmental health information and risk reduction strategies along with group summary results can help people to understand the results better.
- Summary results of the study to the parents of the study participants instead of individual level results.
- The questionnaire can be designed to assess participants’ comprehension and knowledge of the health information presented in the newsletter
Communication mechanisms

- **The Internet** has become one of the main communication channels in public air quality information services.
- Information on local air pollution was made available to the public via specific sections (environment, air quality) of city council websites.
- The **mass media** are regarded as another key mechanism for communicating information about air pollution to the public.
- **Text messages** for air pollution episodes are sent in some of the cities.
- **Smartphone applications (apps)** are also being developed in some of these cities to inform the public about air pollution and about pollution episodes.
Communication mechanisms

- **Electronic street panels** can be used for providing information on air pollution.
- Organized **educational activities**, workshops and talks for the general public and students at university and high school have developed educational material on air pollution.
- **Local agencies** also routinely respond to public enquiries about air pollution.
- Sensitive groups or vulnerable population (generally children, the elderly and people with cardiorespiratory problems) are the main intended audience.
- The Madrid Region Plan, for example, refers to the need to inform “sensitive groups: children, adults engaging in outdoor physical activities, people with chronic respiratory diseases and ozone-sensitive individuals”
No information about air pollution on Atlanta city council website although the air quality information is available on Georgia Air Monitoring site and AIRnow site.
Communicating to vulnerable population

- Exposure to pollutants in the air threatens the health of people of all ages, in every part of the world, in both urban and rural areas, but it affects the most vulnerable among us – children – in unique ways.

- Children are especially vulnerable during fetal development and in their earliest years, while their lungs, organs and brains are still maturing.

- They breathe faster than adults, taking in more air and, with it, more pollutants.

- Similarly older age group and people with health problems such as respiratory problems should be told about the ill effects of air pollution by their health care providers.
THANK YOU
REFERENCES

- https://breathe.ersjournals.com/content/12/3/201
- https://apps.who.int/iris/bitstream/handle/10665/275545/WHO-CED-PHE-18.01-eng.pdf?ua=1
- https://apps.who.int/iris/bitstream/handle/10665/275545/WHO-CED-PHE-18.01-eng.pdf?ua=1
- Communicating environmental exposure results and health information in a community-based participatory research study
  - Luz Claudio, Jalisa Gilmore, Mohana Roy & Barbara Brenner