INFLUENCE OF ENVIRONMENTAL FACTORS AT APPEARANCE OF ATOPIC DISEASES AMONG STUDENTS

M. Karovska¹, M. Lazovska², M. Pavlova-Karovska³, V. Nikolovska-Dimitrovska*, V. Menkovska*.

Health Care Center for School Children and Adolescents Kavadarci¹,
Health Care Center for School Children and Adolescents Skopje²,
Gynecology and Obstetrician Hospital “Mother Teresa” Skopje³,
State of Sanitary and Health Inspectorate *.

Republic of Macedonia
INTRODUCTION

- The outdoor and indoor surrounding with their nonspecific and specific agents acts on the human system.

- Schools are very specific kind of indoor environment, where students spend considerable amount of time each day.

- Great parts of the outdoor pollutant are settled in school and domestic micro surrounding, frequently in great concentration.

- The indoor environmental is of increasing importance with respect to pollutants exposure as a result of the large time spent inside.

- Moderately elevated concentration of particulate pollution may result in reduction in children pulmonary function and increase risk for respiratory illness.

- Connection among the living environmental, air pollution and allergic diseases is multifactor problem.
Investigation of influence of living environmental pollutants in allergic diseases.
MATERIAL & METHODS

- Study was conducted in primary and secondary schools in the biggest communities in Macedonia in the period from 2006 to 2016.

- 572 students with clinically, allergologic and immunologic diagnosed allergic diseases were observed.

- We used WHO Questionnaire for parents and students inquiring.

- Air pollution data were taken from data basis of Institutes of Public Health.

- Annual Monitoring Data of pollution were taken from Ministry of Environment and Physical Planning.

- Cross-sectional study have conducted to examine the association between spatial variation in exposure to pollutants and spatial variation in the occurrence of symptoms of diseases.
SOURCES OF AIR POLLUTION

- Natural
  - Lightning
  - Volcanos
  - Wildfires
- Mobile
  - Airplanes
  - Cars, Trucks, Buses, Motorcycles
- Area
  - Cities
  - Livestock
  - Fertilizer
  - Forests
- Stationary
  - Industry, Power Plants, Sewage Treatment

Pollutant Emissions

9.3 51.7 74.1 17.9
SOURCES OF INDOOR POLLUTANTS

- **BATHROOMS**: mildew, bacteria, viruses, household cleaners (12.3)
- **BEDROOMS**: dust mites, pet dander (15.8)
- **ATTIC**: asbestos, dust, chemicals (24.1)
- **KITCHEN**: chemicals, smoke, carbon dioxide (22.6)
- **YARD**: pollen, herbicides, pesticides (23.9)
- **LIVING AREAS**: tobacco smoke, carpeting, furniture (35.6)
- **GARAGE**: carbon monoxide, paints, solvents (14.7)
Pollen monitoring provides the data about pollen appearance in the air and its forecasting.
CAUSE AND EFFECTS OF AIR POLLUTION

Weak winds and temperature inversion contribute to poor air quality. The warm air acts as a cover and retains the cool air in the ground layers.

Mountains increase the effects of inversion.

Pollution from forest fires and traffic is retained by inversion.

The winter sun delivers less heat on the earth’s surface.
Human influences, natural phenomena and disasters in recent years have reached a level at which the emissions of pollutants into the atmosphere have led to changes in its global composition.
## Results

**Climate zones in the Republic of Macedonia**

<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
<th>VI</th>
<th>VII</th>
<th>VIII</th>
<th>IX</th>
<th>X</th>
<th>XI</th>
<th>XII</th>
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<tbody>
<tr>
<td>°C</td>
<td>0.8</td>
<td>3.4</td>
<td>7.9</td>
<td>12.1</td>
<td>16.7</td>
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<td>22.6</td>
<td>22.6</td>
<td>19</td>
<td>13.5</td>
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<td>Min. Temperature (°C)</td>
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<td>-1.1</td>
<td>2.6</td>
<td>6.3</td>
<td>10.5</td>
<td>13.7</td>
<td>15.4</td>
<td>15.1</td>
<td>11.9</td>
<td>7.7</td>
<td>3.2</td>
<td>-0.9</td>
</tr>
<tr>
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<td>4.4</td>
<td>8</td>
<td>13.2</td>
<td>18</td>
<td>22.9</td>
<td>27.3</td>
<td>29.9</td>
<td>30.1</td>
<td>26.2</td>
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<td>5.8</td>
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<tr>
<td>Avg. Temperature (°F)</td>
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<td>46.2</td>
<td>53.8</td>
<td>62.1</td>
<td>68.9</td>
<td>72.7</td>
<td>72.7</td>
<td>66.2</td>
<td>56.3</td>
<td>44.8</td>
<td>36.3</td>
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<td>45.9</td>
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<td>30.4</td>
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<tr>
<td>Max. Temperature (°F)</td>
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<td>46.4</td>
<td>55.8</td>
<td>64.4</td>
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<td>42</td>
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<td>40</td>
<td>45</td>
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<td>38</td>
<td>31</td>
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<td>49</td>
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<td>54</td>
</tr>
</tbody>
</table>

**Legend**
- Sub-mediterranean zone
- Continental-submediterranean zone
- Sub-mountainous continental zone
- Sub-alpine mountainous zone
- Alpine mountainous zone
- Warm continental zone
CONCENTRATION OF COMMON POLLUTANTS BY YEARS

- NOx
- NMVOC
- SOx
- NH3
- PM 2.5
- PM10
- TSP
- CO

AVERAGE ANNUAL CONCENTRATION OF PM 10 and PM 2.5 - μg/m³

- Annual average concentration - 12 station
- PM 10
- PM 2.5

National annual standards
WHO Guidelines

PM 10
PM 2.5

Annual average concentration

OUTDOOR AGENTS

- grass pollen: 43.7%
- linden: 30.6%
- poplar: 20.1%
- horse chestnut: 12.8%
- oat tree: 4.2%
- birch: 9.1%
- pine: 27.6%
- willow: 15.6%
- bee prick: 2.4%
- wasp prick: 3.5%
INDOOR AGENTS

38,1%
32,3%
27,4%
8,1%
18,4%
15,7%
4,2%
12,8%
6,8%
10,8%

dermato phagoides
insect prick
cat dog bird parfum chamber
plant pollen
mould cockroach mite ant
AIR POLLUTION HEALTH PYRAMIDE

Death

ER Visits
Hospital Admissions

Doctor Visits
School Absence
Reduced physical activity

Respiratory symptoms
Medicine Use
Asthma attacks

Allergic skins and eyes manifestations
Inflammation
Heart rate effects

Impaired lung function
Immune cell response
Intestinal symptoms and diseases

Proportion of Population Affected

Magnitude of Impacts
Thousand
Tens of Thousands
Millions

Severity of Effects
Thousands
Millions
Tens of Thousands
Thousands
It is very important to address the potential causes of indoor air quality problems. If left untreated, air quality issues can have a very detrimental impact of health. Research is showing that people are now spending as much as 90 percent of their time indoors, and if the indoor air is polluted, this could pose a significant health risk.
Morbidity rate of non specific respiratory tract diseases among students
HEALTH EFFECTS OF POLLUTION

- URI: 22.8%
- LTRI: 14.2%
- Asthma: 5.9%
- Rhinitis: 15.7%
- Conjunctivitis: 10.8%
- Eczema: 20.6%
- Urticaria: 10.3%
- Dermatitis solaris: 2.9%
- IBD: 1.6%
- Hypertension: 0.5%
- Leucemia: 1.2%
FREQUENCY OF ASTHMA BY MONTHS

January: 9.4
February: 8.2
March: 9.1
April: 4.6
May: 3.1
June: 1.9
July: 0.9
August: 0.7
September: 2.4
October: 10.6
November: 7.8
December: 12.5
FEV1 and IgE antibodies in according with presentation of allergens

FEV1<80%

IgE
CONCLUSION

- The influence of increasing of the air pollution, increasing of exposure is associated with increasing number of students with allergic diseases.

- The reasons of increasing are changes of outdoor and indoor environmental in accordance with appearance of pollutants in the air and its forecasting.

- We have to recognize the significance of the individual lifestyle, behaviors and options, as well as the community or population effects treats to the environment.

- In schools greater attention need to be directed to bio aerosol components in air.

- Control of risk factors in micro surrounding is most important preventive method for the primary treatment of allergic diseases of students.