

The aim of the work is to determine the effect of air pollution, urban environment, urban heat islands on the incidence of respiratory diseases, including allergic rhinitis, bronchial asthma and wheezing in preschool children.

The project will be implemented the following test procedures: questionnaire addressed to parents/guardians of the child, measurement of air pollution using personal monitors, collecting data about the level of outdoor air pollution, analysis of the phenomenon of urban heat island based on the spatial structure of the Lodz region, the skin prick tests using standardized allergen extracts, the measurement of volatile organic compounds (VOCs) in exhaled with each child.

Diagnosis of asthma in young children in the light of current knowledge very difficult, often requires invasive procedures. The more difficult is to predict in which children with wheezing asthma will develop. In the last decade there has been tremendous interest in the scientific and medical research to develop non-invasive methods of diagnosing asthma using biomarkers. A promising diagnostic tool, which will allow for early, noninvasive detection of many diseases seem to be breathing tests, based on the chromatographic analysis of the composition of the exhaled air. Analysis of breath, has many advantages, it is fast, non-invasive, painless, and the same sample is safe and convenient for both the patient and staff. Substances produced during various biochemical processes in the healthy organism or patient (ie. Endogenous substances), get into blood, and then are released in the lungs. During the metabolic processes occur include Volatile organic compounds (ang. Volatile Organic Compounds - VOCs) have been determined by gas chromatography combined with mass spectrometry GC/MS. By using GC/MS it is possible to mark and to investigate the indicators specific to asthma and allergic rhinitis. These studies bring significant value in the diagnosis and treatment of chronic diseases, eg. Asthma. In the present study, we plan to use this method for differential diagnosis of asthma and wheezing breathing in preschool children. Asthma is an inflammatory disease and, therefore, suitable for the purpose of analyzing.

Population studies that aim to identify the main health problems, diagnosis of chronic diseases and the evaluation of the importance of individual risk factors for public health as well as the study of the effects of the changes in ecosystems on the health of the population are necessary to take preventive measures. In summary, previous studies conducted in Poland showed that the level of air pollution in the Lodz region is higher than in other regions of the country. Łódź Province is also distinguished by a high incidence of chronic respiratory diseases. The phenomenon called urban heat island, exposure to pollution and the environment to be assessed in the presented project may have a significant impact on the increase in cases of children with asthma and allergies in urban areas, because the average temperature is increasing and more and more people migrate to urban, which are characterized by higher temperature than the surrounding areas. Differential diagnosis of asthma and wheezing in children will be carried out using non-invasive tests tract. Identify and investigate the phenomenon urban heat islands (UHI) in coincidence with the size of exposure to air pollution and spatial data from a given region will help to evaluate the impact of the environment on the health of the population and investigate the cause and effect.

Chronic diseases of the respiratory system in children are perceived as a serious health, social and economic problem . Direct and indirect costs associated with the treatment of this group of sick children multiplied by the chronic nature of the disease process are high and constitute a significant part of the revenue budget . In the literature there are lacking reports on the evaluation of the impact of these effects on the respiratory system and allergies in children. The project results will provide the scientific basis for the development of prevention programs in the population of children in the Lodz region, the implementation of which we would reduce the costs associated with treatment as well as improve children's health.