

FINAL REPORT

IMPACTS OF PARTICULATE AIR POLLUTION ON THE RESPIRATORY HEALTH OF SCHOOL CHILDREN IN PAKISTAN

EXPERT INSTITUTIONS

- 1. Pakistan Environmental Protection Agency, Islamabad**
- 2. Pakistan Medical Research Council, Islamabad**

FUNDING

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UNEP Regional Resource Centre for Asia and the Pacific, Thailand

PROJECT DETAILS

Title of the Research Project:

Impacts of particulate air pollution on the respiratory health of school children in Pakistan

Name, Designation, and Institution of the Investigators:

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Institution/ Department participated in the study:

1. Pakistan Environmental Protection Agency (Pak-EPA), Islamabad
2. Pakistan Medical Research Council (PMRC), Islamabad

EXECUTIVE SUMMARY

Particle pollution known as "particulate matter" in the air includes a mixture of solids and liquid droplets with wide range of sizes. Those less than 10 micrometers in diameter are called as PM10 and less than 2.5 micrometers are known as PM2.5. These particulate matters are so small that they can get into the lungs, potentially causing serious health problems. Sources of fine particles include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes. Children are more prone to respiratory disease due to increased exposure and higher ventilation rates. This study was conducted to see the impact of particulate matters size 2.5 on the lungs of school going children in Pakistan.

In phase I, selection of schools was made which included two schools of lower strata (boys and girls) and one of upper strata. Any history of lung disease or allergy was questioned through a questionnaire which was distributed among the students of 4th to 9th classes along with the consent form. Those with preexisting lung diseases or allergy were excluded from the study while the rest of the students were selected for phase II of the study. In phase II, daily respiratory data of children was taken for 6 consecutive week using Peak Expiratory Flow Meter. Environmental data was collected through mobile air quality monitoring station which was placed at school site by Pak-EPA.

Using the baseline screening questionnaire, 38% children were suffering from sneezing, running nose or nasal blockage without common cold or flu, 19% had itchy watery eyes, 17% hay (allergic) fever, 13% wheezing, 12% urticaria and 7% asthma. All these were therefore excluded from Phase II of study.

The peak expiratory flow rate (PEFR) measures the amount of air that a lung can handle and use it for oxygenation of blood. Its value ranged from 120 L/min to 420 L/min, with a mean of 287.27 L/min. There was no significant difference in PEFR of children of both schools. The standard concentration of PM2.5 is 40 $\mu\text{g}/\text{m}^3$ for Pakistan but in the present study it was 81 (range 25-142 $\mu\text{g}/\text{m}^3$) which is twice more than recommended concentration. Over the six weeks monitoring, concentration of PM 2.5 started to increase in week 2 and kept on increasing till week 3 and than showed a decline. During this period a drop in lung function (PEFR) was also observed which reverted to normal at week 4. However this association was not significant.