

Assessment of Total Suspended Particulates Level and Some Physical Environmental Factors and Related Health Problems Among School Pupils in Alexandria

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Abstract: The present work aimed at measuring TSP, noise, and lighting levels in school environment and determining their possible effects on the health status of students. A systematic sample of 18 schools was selected from the Eastern region of Alexandria. From each school, 2-3 classrooms were selected at random where measurements of TSP, noise, and lighting levels were carried out. A total of 646 students were selected from 6 positions inside 46 classrooms. The health impacts of the studied parameters were assessed using a precoded observation sheet. The average TSP level was $2.10 \pm 1.30 \text{ mg/m}^3$. Schools and classrooms near markets showed significantly the maximum average TSP [$3.38 \pm 0.59 \text{ mg/m}^3$] while those lying within residential areas showed the lowest average [$1.33 \pm 0.67 \text{ mg/m}^3$]. No significant difference between pupils classified by history of allergy in the average TSP levels was found. The average noise levels were $64.45 \pm 3.7 \text{ dB}$ and $71.36 \pm 4.08 \text{ dB}$ during complete silence in the morning and afternoon respectively, $75.32 \pm 3.85 \text{ dB}$ during a lesson, and $78.32 \pm 6.87 \text{ dB}$ during tram or train passage. All noise levels exceeded the recommended maximum permissible levels [42-55 dB]. No statistically significant association could be detected between noise during a lesson in one hand and hearing acuity, performance, and concentration in the other. The median lighting level was 27.9 foot-candles. Pupils with visual acuity lower than 6/9 were significantly exposed to a higher average lighting level than those with visual acuity of 6/6 or 6/9 [Mann-Whitney $Z = 2.59$, $P < 0.01$].

INTRODUCTION

School environment is considered to be one of the most important factors affecting health status of the pupils especially young children. Its effect lies on the fact that pupils spend a lot of time inside their school and classrooms, and thus, they are exposed to different types of environmental pollutants such as dust and noise. Also, a great number of schools, both governmental and private, have been recently established in all localities in the developing countries without considering the nearby community pollutants, and their impact on pollution inside schools.

Dust or total suspended particulates [TSP] are the major pollutants found in the air of most sites both indoor and outdoor. This term includes a wide range of finely divided solids or liquids that may be dispersed into the air from different sources such as combustion processes. It includes carbon, tarry materials [e.g.

hydrocarbons], water soluble materials, and insoluble ashes. Particles smaller than 10μ are deposited in the lower respiratory tract causing harmful effects depending on concentration and time of exposure.¹⁻³

Noise pollution in schools results from activities outside school, such as traffic and business movements, and from inside school, such as physical students' activities and sport classes in school play yards. Although the effects of noise on hearing are not precisely defined and uncertainties remain, there is sufficient information to permit development of predictive indices of the hazardous effects of noise on human hearing sensitivity. Two main effects of noise may be experienced by exposed population which are speech interference and annoyance.^{4,5}

Pupils inside their classrooms require a relatively high level of illumination with good visual comfort in order to satisfy the needs for wide range of seeing tasks over long periods of