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STUDY OF AIR QUALITY AND DIFFICULTY IN CONCENTRATION IN INSTITUTIONAL AREAS OF GOPALGANJ, BIHAR

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ABSTRACT:

Monitoring was done both inside and outside the classrooms. Measurements were taken during complete college hours (5-6 hrs), along with each 30 minutes before (in morning, when college starts) and after the college (in afternoon, when college gets over). This feature was practice in order to evaluate P_M levels, when classrooms were occupied and when unoccupied, as the sampling duration was restricted for lecturing hours only. Intermediate to B. A., B.Sc. classrooms were chosen for monitoring at college. Due to unavailability of students during summer vacations (in June) and no allowance for sampling during examinations (in March), the respective two months were not included in the sampling schedule, along with weekends and government holidays.

INTRODUCTION:

During the breakthrough of modern hygiene, from mid 19th century, indoor environmental issues received much attention, as did the quality of drinking water and the treatment of sewage (e.g., linked to plagues such as cholera and tuberculosis).In many people's minds, air pollution is associated with the contamination of urban air from automobile exhausts and industrial effluents. However, in developing countries, the problem of indoor air pollution far outweighs the ambient air pollution. There are four principal sources of pollutants of indoor air: **(i) combustion, (ii) building material, (iii) the ground under the building, and (iv) bioaerosols .** Mostly they are present in minute amounts but several will be present in measurable quantities. The U.S. Environmental Protection Agency (EPA) studies of human exposure to air pollutants indicate that indoor levels of pollutants may be two to five times-and occasionally more than 100 times-higher than outdoor levels.

Therefore, Indoor Air Quality **(IAQ)** management is defined as "The environment that controls airborne pollutants, introduces and distributes adequate outdoor air and maintains acceptable temperature and relative humidity". In addition, outdoor sources that enter sensitive environments like college buildings through windows, doors, and ventilation systems can affect air quality in college. [28], Data released by the World Health Organization (WHO) indicates that, worldwide, indoor air pollution (mostly in developing countries) ranks fifth—behind malnutrition, AIDS, tobacco, and poor water/sanitation. This accounts for an estimated 1.6 million premature deaths each year. This estimate indicates, the burden of disease, as one which allows for combining deaths, illness, and injuries across all population groups (age and sex) into a single metric of lost life years; and is defined "As lost healthy life years, which includes those lost to premature death and those lost to illness as weighted by a disability

factor severity". The human health effects from poor indoor air quality are often similar to the symptoms of Sick Building Syndrome (SBS). Health effects linked to SBS include eye, nose, and throat irritation, dryness of mucous membranes and skin, nosebleeds, skin rash, mental fatigue, headache, cough, hoarseness, wheezing, nausea, and dizziness. Malcolm Sears of McMaster University claims that indoor contaminants are the most important sources of risk to the respiratory health of our students. Asthmatic students function, as the most sensitive biological sensors in such cases, are one of examples. Research has clearly documented that health and performance and college absenteeism from viral respiratory infections is well recognized .and has been found more frequent among asthmatic students than well students are, and that absenteeism increases with severity of the disease .A small number of students in the study moved between communities found, lung function growth increased when a child moved from an area of high background PM to a less polluted area.These data suggest that PM exerts a small but continuous ''downward pressure'' on lung function growth. When this pressure is relieved, the deviation in lung function ceases and, if there is sufficient time, compensatory lung growth recovers some of the deficit. Further evidence that PM impairs lung function in healthy children is provided by our cross-sectional study into the association between the amount of carbon in lower airway macrophages and lung function in healthy children.

METHODOLOGY:

A degree college each at roadside and residentially located college in city was monitored. Selection of college was based on the location of college located in different microenvironments (roadside and residential areas). Selection was done on the basis on variation in local activities both indoors and outdoors, at two different sites. Morning rush hours (9 am to 11 am) is usually occupied with heavy traffic intensity on roads (when children and elders go to college and offices) and between 1 am to 3 pm in the noon to evening rush hours (when people go back home) as observed during college days during 2019-2020. All the college were naturally ventilated, which means that ventilation was carried out by opening and closing of windows and doors. Roadside sites are those located near road crossing (with heavy traffic) and near main roads in commercialized dusty areas. College located in residential areas is those surrounded by streets having moderate traffic, related to locality activities. The areas are densely populated to moderately populated, less commercial to largely commercial and full of greenery to less greenery

SAMPLING TECHNIQUE:

Sampling was conducted both inside and outside the classrooms. Measurements were taken during complete college hours (5-6 h), along with 30 min before (in morning) and after the college (in afternoon). This feature was practiced to evaluate PM levels when classrooms were occupied and unoccupied, as the sampling duration was restricted within the teaching hours only. The sampling duration taken in winter season was different from that in summer due to different college timings in cold and hot seasons (08:30 am to 02:30 pm in winter and 07:00 am to 01:00 pm in summer, respectively). College activity usually starts in the morning with scheduled teaching hours along with few free intervals of 10-15 min. The afternoon hours are reserved for activities like studying, sports, and games for the students. The sampling unit was placed inside the classroom, opposite to the blackboard, about

1m above the floor level, the level at which the students would normally inhale and away from windows and doors. Outdoor measurements were taken outside the sampled classroom in the open at a distance of 2m. However, due to a lack of multiple samplers, indoor and outdoor measurements were taken alternately after each 30 min, by placing the sampler at any one location (I/O) for the first 30 min and for the other location (I/O) for the next 30 min until the stated sampling duration. In order to obtain continuous data of PM concentrations indoors and outdoors, the instrument was placed next day to monitor those locations lacking intervals of the previous day in the same order. Then, these measured values were merged together to obtain the full day data variation in indoor and outdoor environments of the college. Before this sampling schedule, monitoring was done in all the sampling locations continuously for a week.

A variation of only 4% to 12% in indoor and outdoor PM mass concentrations was found at these sampling sites on comparison between two successive days. Similar observations and methodology were also adopted by earlier studies done by Massey et al. (2010), in indoor environments to compare the indoor and outdoor data.

RESULTS AND DISCUSSION:

In order to have some idea of the possible effect of the adverse IAQ on the student health in college, a relationship between the past health records and present increase in symptoms were investigated by analyzing the returned 300 questionnaires. The symptoms like difficulty in concentration, dry throat, back pain, dizziness, dry flaking skin, itching, sneezing, high stress, eye irritation, shortness of breath, headache, drowsiness, cold and flu and allergies. These symptoms were higher at roadside of the study area than that at colony area with 1-5 (in winter) as dry flaking skin, 5.6 times and dizziness 5.3 times; and 1-7 (in summer) as Dizziness 7 and Dry flaking skin 6.6 times.

This increased difference supports the fact that outdoor as well as indoor polluted air could influence the air quality indoors Such a reported increased health symptom can be associated with outdoor locations in highly polluted areas with high diesel emissions, mechanical repair and commercial shops, and work activities could affects air quality in classrooms of college located near major roads. Monitoring was done both inside and outside the classrooms. Measurements were taken during complete college hours (5-6 hrs), along with each 30 minutes before (in morning, when college starts) and after the college (in afternoon, when college gets over). This feature was practice in order to evaluate P_M levels, when classrooms were occupied and when unoccupied, as the sampling duration was restricted for lecturing hours only. Intermediate to B. A, BSc classrooms were chosen for monitoring at college. Due to unavailability of students during summer vacations (in June) and no allowance for sampling during examinations (in March), the respective two months were not included in the sampling schedule, along with weekends and government holidays. During the summers and monsoons the classrooms are more naturally ventilated by keeping the doors and windows open, increased ventilation and indoor sources contribute equally to the particulate concentrations, whereas, in winters doors and windows are mostly kept closed from the extreme outside cold. On the other hand, most of the classrooms today are less frequently and less thoroughly cleaned (once or twice weekly wipe over the floor) so that the sediment dust particles are only partly removed from indoor spaces.

This in turn could result in a continued resuspension of particle on the room surfaces correlating with large number of occupants with high activities in small room size.

Indoor generation resulting from college activities like damaged walls, floor, ceiling, windows, chalk dust, dirty dusting material, storing broken and unused furniture or resuspension of previously deposited particles due to improper cleaning facilities, as cleaning of classrooms would be carried out usually after students have left the college.

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