Supplementary Material

Monitoring Campaign - Measurement of CO_2 levels

Method

The research team reached out to the School Board of one of the North Central Florida to measure CO_2 levels in schools. Two elementary schools, one each in urban and rural settings, participated in the study. In each elementary school, measurements of CO_2 concentrations were conducted on two days in September 2021 during school hours. The number of classrooms varied based on participation from respective class teachers.

Sample Location and Data Collection

In each elementary school, data were collected from classrooms (kindergarten to 5th grade), reception area, and cafeteria. To conduct the monitoring campaign in individual classrooms, class teachers' consent was obtained. In total, 16 classrooms, both schools' cafeteria and reception areas were sampled.

One clear spot, free from obstructions, was required for placing the monitoring equipment within each classroom. The location was selected to be representative of the CO_2 concentration in the room using the following rules: location at the center of the room and away from side walls / corners; away from air supply-input and exhaust, fans, diffusers; away from induction units and direct sunlight; away from local pollutant sources like computers, printers, photocopiers; and location didn't not interfere with the class activities. At every location, the instrument was operated to obtain 5-min averages of CO_2 levels. Measurements were made using handheld CO_2 meters (Extech CO260, Temtop M2000, Amprobe CO_2-100), which use an NDIR (Non-Dispersive InfraRed) sensor for measuring CO_2 concentrations.

The instruments were calibrated at the start of the monitoring campaign according to the manufacturer's specifications. Two measuring devices were used to check the performance of instruments by measuring CO_2 levels on site, by comparing two devices side-by-side parallelly at the same location. In all cases, the variation was less than 40 ppm which is less than 5% of the measured concentration.

Data for each room was collected for 6 min, inside the classroom through continuous data logging sessions. The first reading was discarded to allow the surrounding air to mix properly and give precise readings, and the next 5 readings were averaged to obtain CO_2 concentration.

Data Summary

Overall, CO_2 levels at the two elementary schools exceeded the level recommended by ASHRAE 62 standards for schools (i.e., 1000 ppm) in 66.6% and 90.9% of measurements recorded at the urban and rural schools, respectively (Figure S1). Classrooms of both the schools have higher CO_2 concentrations with the urban school having an average of 1152 ppm and the rural school having an average of 1981 ppm (Table S1). It was noted that the maximum CO_2 concentrations in classrooms occasionally exceeded 3200 ppm in the rural elementary school. Both schools have significantly higher CO_2 concentrations in classrooms than larger spaces like cafeteria and reception areas (Table S2).

Table S1. Mean CO_2 levels in rooms of visited schools

Mean CO_2 (ppm)	**Urban Elementary School**	**Rural Elementary School**
Classroom	1152 (N=35)	1981 (N=50)
Cafeteria	907 (N=5)	814 (N=5)
Reception	901 (N=5)	733 (N=5)

Table S2. Minimum, mean and maximum of CO_2 concentration in all grade levels of sampled elementary schools

Room	Rural Elementary School			Urban Elementary School		
	Min	Mean	Max	Min	Mean	Max
KG	913	1587.8	2676	846	855.2	872
1st Grade	1270	1335.2	1415	1779	1806	1818
2nd Grade	1377	2343	3295.8	1025	1055.2	1086
3rd Grade	3072	3138	3202	1034	1047.6	1065
4th Grade	1651	1670	1686	1327	1361.8	1380
5th Grade	1615	2039.7	2463	786	787.2	790
Cafeteria	801	811.6	823	894	907.4	921
Reception	690	733.2	755	892	901	914

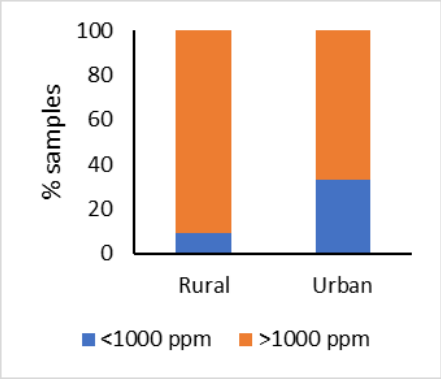

Figure S1. Percentage of samples where CO_2 concentration exceed 1000 ppm

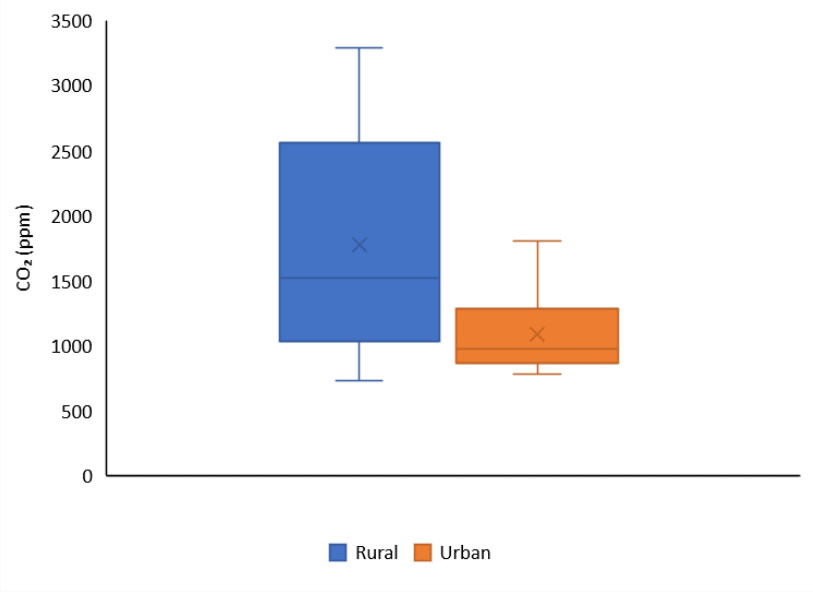

Figure S2. Distribution of CO_2 levels (ppm) in two Florida schools

