

PM_{2.5} and PM₁₀ Concentrations of Urban and Rural Primary Schools in Yangon division, Myanmar

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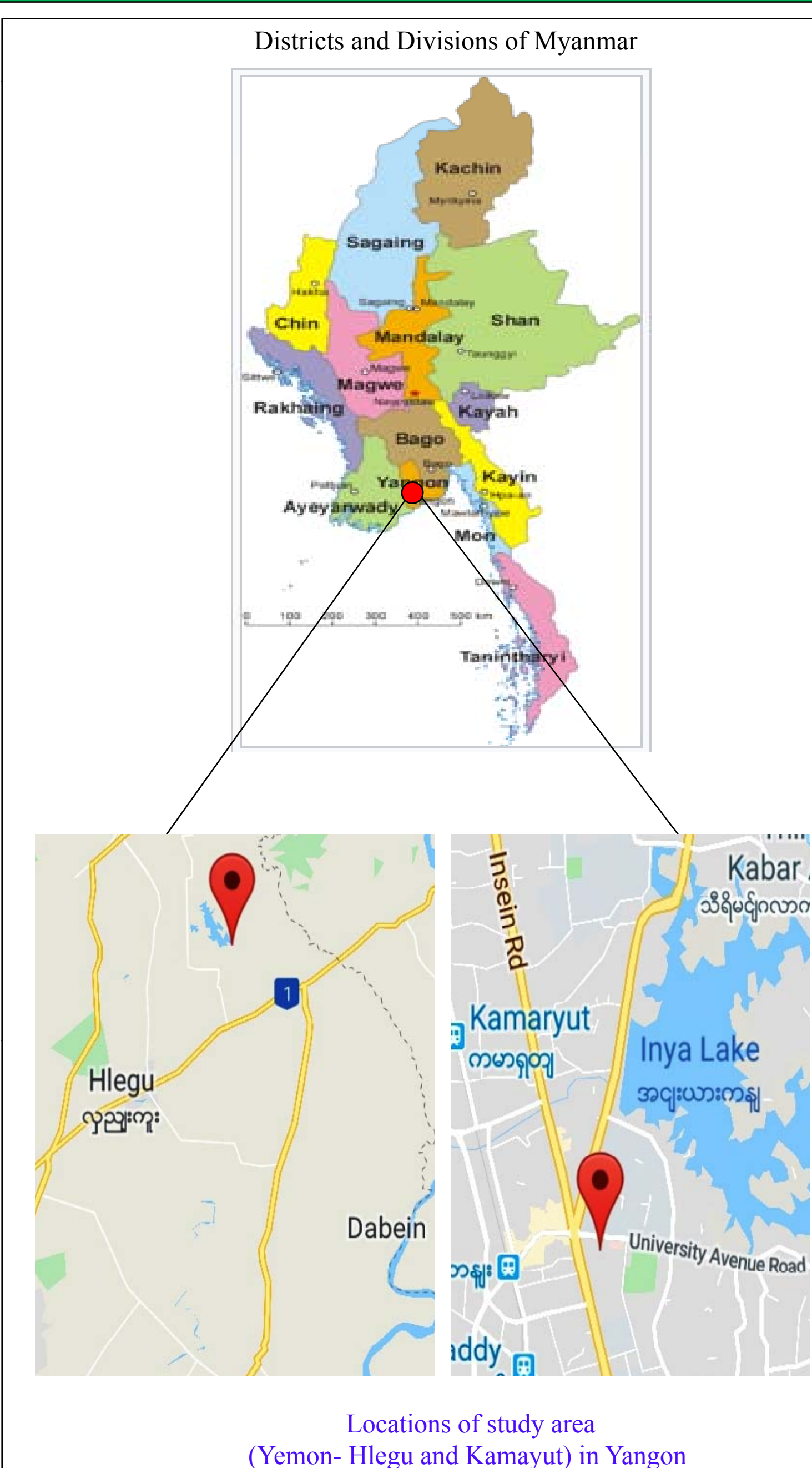
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Background and Aim

- Children are among those most vulnerable to suffering adverse health effects due to exposure to high levels of air pollution.
- Due to their higher breathing rate to body size ratio, and less developed natural barriers in the lungs warding against inhaled particles children are subject to heightened sensitivity to airborne pollutants in their environment.
- The healthy development of natural barriers such as the blood-brain barrier, nasal, gut and lung epithelia are of crucial importance for a child's healthy developmental outcome.
- For children, a significant amount of time is spent in school. Recently, in urban region due to industrialization, low air quality becomes one of the critical health issues especially in children because of their increased vulnerability.
- To assess PM_{2.5} and PM₁₀ Concentrations of Urban and Rural Primary Schools in Yangon division, Myanmar.

Materials and Methods



•School environment of Basic Education Primary School, Yemon (Hlegu) and Kamaryut was assessed by measuring PM_{2.5} concentration, PM₁₀ concentration, temperature and humidity of both indoor and outdoor air.

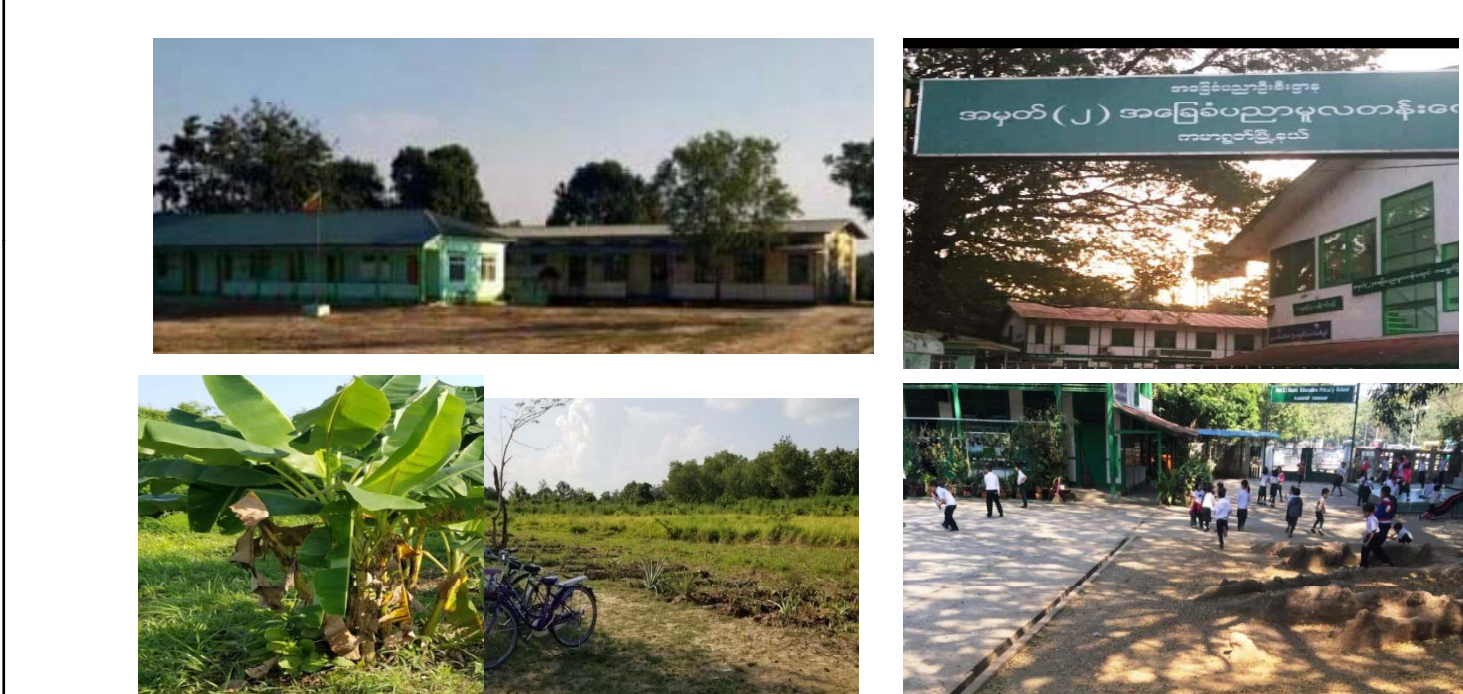
•PM_{2.5} concentration and PM₁₀ concentrations were determined by Pocket sensor (Yaguchi Electric Co., Ltd., Miyagi, Japan).

•PM_{2.5} and PM₁₀ concentrations were recorded every second for one hour in the morning (09:00-10:00 hr) and one hour in the evening (14:00-15:00 hr) in the classrooms, and one hour at noon (12:00-13:00 hr) in the playground for one school day.

•Temperature and humidity were measured by using ambient temperature and humidity recorder (T&D, Japan) at the time of PM_{2.5} and PM₁₀ concentration measurement.

Health hazards of air pollution with AQI

AQI	Health Level	Health Description
0-50	Good	Air quality is considered satisfactory, and air pollution poses little or no risk.
51-100	Moderate	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
101-150	Unhealthy for Sensitive Groups	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
151-200	Unhealthy	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
201-300	Very Unhealthy	Health alert: everyone may experience more serious health effects.
301-500	Hazardous	Health warnings of emergency conditions. The entire population is more likely to be affected.



Pocket Sensor for measuring PM_{2.5} and PM₁₀ concentration

Ambient temperature and humidity recorder

Characteristics of study schools

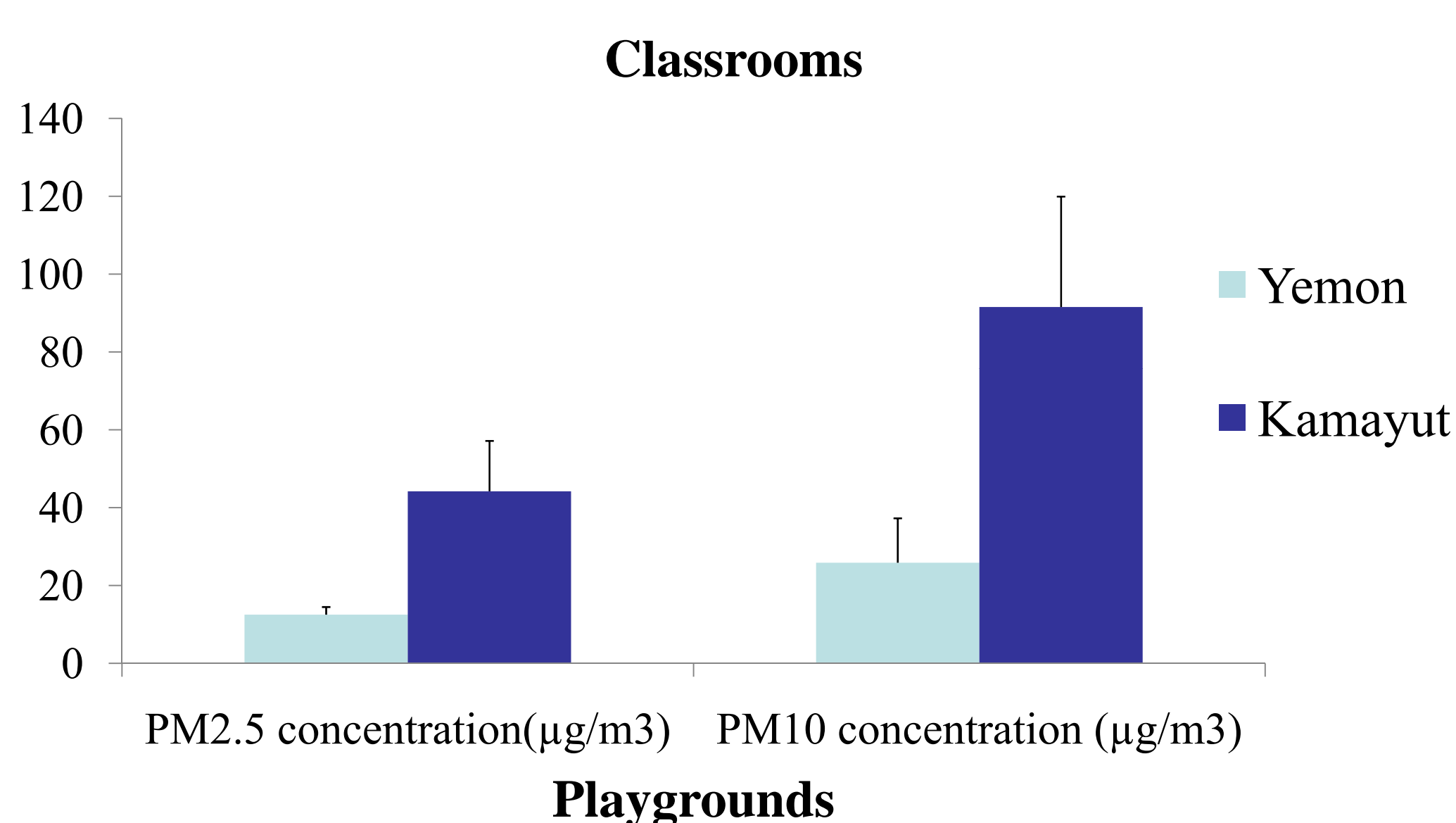
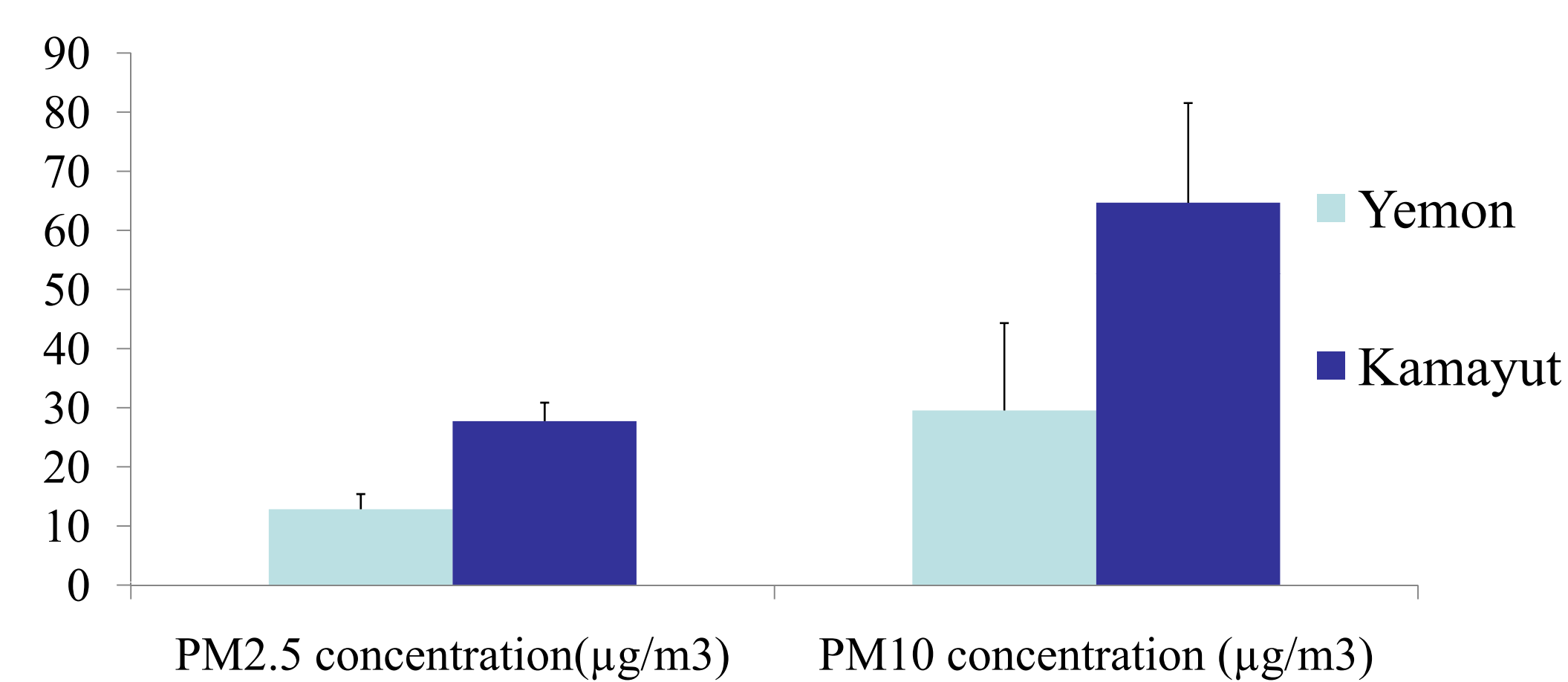
Rural School	Urban School
Basic Education Primary School, Yemon (Hlegu)	Basic Education Primary School, Kamaryut
Away from Main Yangon-Mandalay Highway Old Road	Near Yangon-Pyay Main Road
A few vehicle transportation	Crowded vehicle transportation
A few household fuel use	Much household fuel use due to many houses around
A few dry leaf firing except forest fire in summer holiday	Much dry leaf firing due to many big tree in school compus and surroundings

Results

Tables of PM_{2.5} and PM₁₀ concentrations of Rural (Yemon, Hlegu) and Urban (Kamaryut) Primary Schools

	Yemon PM _{2.5} (µg/m ³)			Kamaryut PM _{2.5} (µg/m ³)		
	in G2	in G3	Mean	in G2	in G3	Mean
Morning	9.1	14.1	11.6	18.7	28.2	23.5
Noon	13.8	11.2	12.5	46.9	41.5	44.2
Evening	9.8	18.3	14.1	32.6	31.4	32
Mean	10.9	14.5	12.7	32.7	33.7	33.2
SD	2.3	3.2	2.8	12.6	6.2	9.4

	Yemon PM ₁₀ (µg/m ³)			Kamaryut PM ₁₀ (µg/m ³)		
	in G2	in G3	Mean	in G2	in G3	Mean
Morning	20.5	28.3	24.4	37	73.4	55.2
Noon	27	24.7	25.9	122.4	60.7	91.6
Evening	22.8	46.6	34.7	66.7	81.6	74.2
Mean	23.4	33.2	28.3	75.4	71.9	73.7
SD	3	10.5	6.8	38.8	9.4	24.1



Figures of PM_{2.5} and PM₁₀ concentrations in the classrooms and playgrounds of Rural (Yemon, Hlegu) and Urban (Kamaryut) Primary Schools

Discussion and Conclusion

- According to the findings, both PM_{2.5} and PM₁₀ concentrations in the rural school were lower than those in the urban school.
- Due to the WHO air quality guidelines (10 µg/m³ annual mean, 25 µg/m³ 24-hour mean for PM_{2.5} concentration and 20 µg/m³ annual mean, 50 µg/m³ 24-hour mean for PM₁₀ concentration), PM_{2.5} and PM₁₀ concentration levels of urban school can be regarded as air pollution level.
- Indoor air pollution might pose a great risk for children owing to their developing bodies, large amount of time spending at school and breathing a relatively higher volume of air compared to their body size.
- Recently, in urban region due to industrialization, poor air quality problem might be more severe in urban children than in rural children.