

# Indoor PM<sub>2.5</sub> and PM<sub>10</sub> Concentrations in Teaching Rooms and Recreation Areas, University of Medicine 1, Yangon

Ei-Ei-Pan-Nu YI<sup>1</sup>, Win-Yu AUNG<sup>1</sup>, Cherry MAUNG<sup>1</sup>, Nay-Chi NWAY, Zaw-Lin THEIN<sup>1</sup>,  
Daisuke NAKAJIMA<sup>2</sup>, Yang ISHIGAKI<sup>3</sup>, Tin-Tin WIN-SHWE<sup>2</sup>, Ohn MAR<sup>1</sup>

<sup>1</sup>Department of Physiology, University of Medicine 1, Yangon, Myanmar

<sup>2</sup>Center for Health and Environmental Risk Research, National Institute for Environmental Studies, Tsukuba, Japan

<sup>3</sup>Graduate School of Informatics and Engineering, University of Electro-communications, Tokyo, Japan

## Background and Aim

- Particulate matter (eg; PM<sub>2.5</sub>, PM<sub>10</sub>) is an indicator of both indoor and outdoor air quality.
- Determination of the levels of PM has become important especially for indoor environment like Schools and Universities because the students and staff spend considerable amount of their day hours inside there.
- Levels of PMs in any University environment have not yet been studied in Myanmar.
- This study aimed to assess the concentrations of PM<sub>2.5</sub> and PM<sub>10</sub> in teaching rooms and recreation areas, University of Medicine 1, Yangon.

## Materials and Method

- Pocket PM<sub>2.5</sub> Sensors (Yaguchi Electric Co., Ltd., Miyagi, Japan) were utilized for measurement of concentrations of PM<sub>2.5</sub> and PM<sub>10</sub>.

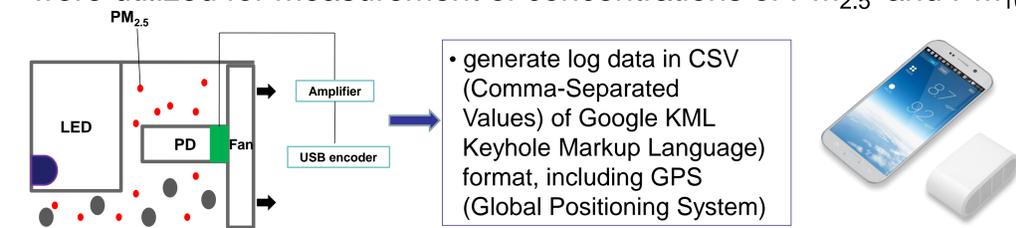
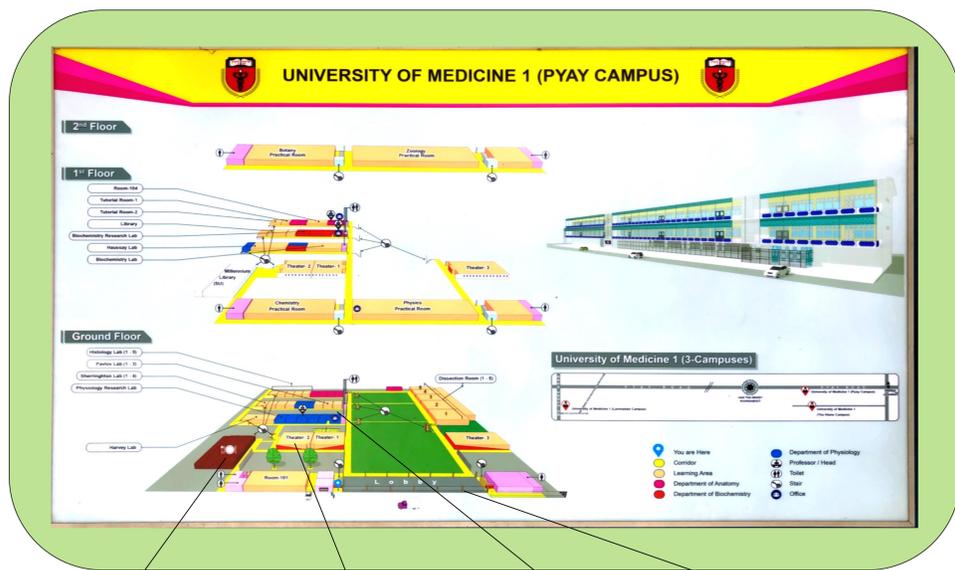


Fig 1. Principle of Pocket PM<sub>2.5</sub> Sensor Module (adapted from Ishigaki et al., 2017) LED-Light Emitting Diode, PD-Photodiode, USB (Universal Serial Bus)



University canteen    Lecture Theater    Tutorial room    Lobby

Fig 2. Locations of teaching rooms and recreation areas in University of Medicine 1

- Concentrations of PM in teaching rooms (lecture theater, tutorial rooms) and recreation areas (lobby and University canteen) were measured.
- PM measurements were done in all 4 areas simultaneously with the same duration (3 hours; from 9:00h-12:00h) for 5 days in August, 2019 (rainy season).

## Results

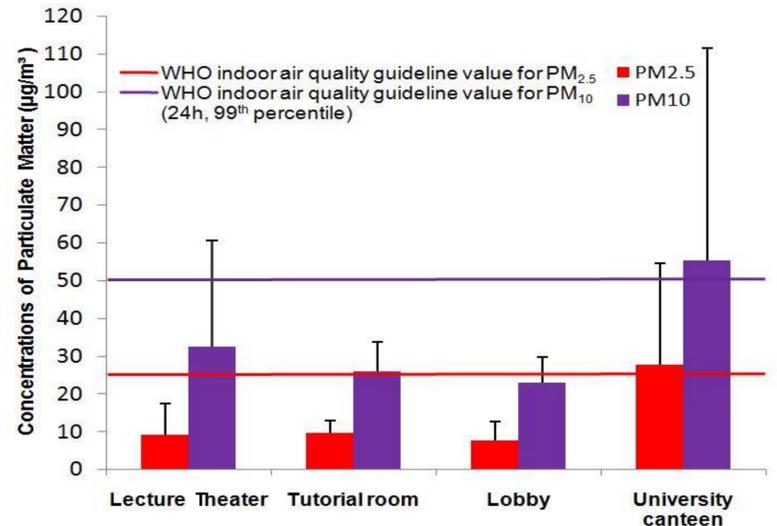


Fig 3. Comparison of PM concentrations (mean ± SD) of different locations of UM 1 with their respective WHO guideline values

- World Health Organization (WHO) indoor air quality guideline values, 25 µg/m<sup>3</sup> for PM<sub>2.5</sub> and 50 µg/m<sup>3</sup> for PM<sub>10</sub> (24h, 99<sup>th</sup> percentile).

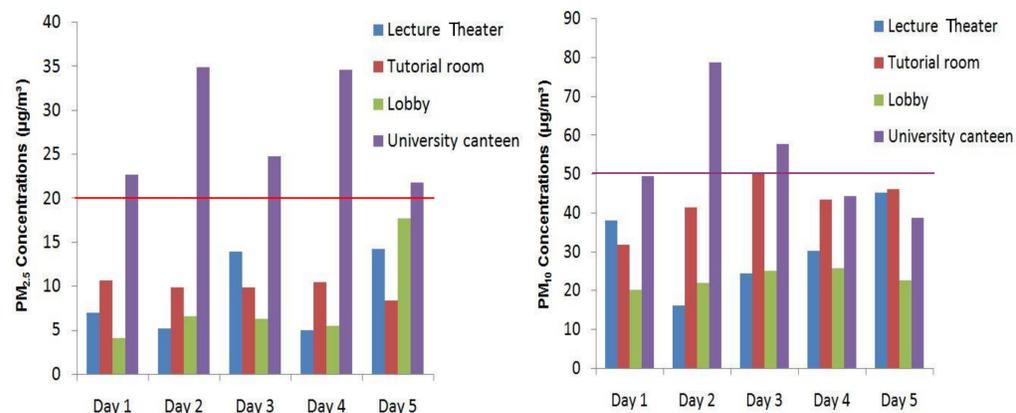


Fig 4. PM<sub>2.5</sub> concentrations of four locations of UM 1 during study period

Fig 5. PM<sub>10</sub> concentrations of four locations of UM 1 during study period

## Discussion and Conclusion

- The lowest concentrations of both PM<sub>2.5</sub> and PM<sub>10</sub> were recorded in the lobby with good natural ventilation.
- High PM levels in tutorial room of old building might be due to inefficient cleaning and maintaining ways.
- The highest values of PM in the University canteen could be attributed to emissions from
  - ✓ cooking stoves and cooking activities,
  - ✓ inadequate natural and mechanical ventilation and
  - ✓ crowded at lunch time.

## Recommendation

- Routine particulate matter monitoring and control measures are essential for maintaining and improving indoor air quality in University campus.
- Pocket PM<sub>2.5</sub> Sensor is found able to be used for evaluation of distribution of PM in local or specific areas easily and effectively.