

การศึกษาความแม่นยำของการประมาณค่าความเข้มข้นอนุภาคขนาดเล็กในช่วงเวลาสั้น
จากระยะการมองเห็น ในจังหวัดเชียงใหม่
(Accuracy of Estimating A Short-Term Particulate Matter Concentration from
A Human-Sighted Visual Range In Chiang Mai, Thailand)

Paisan Thanyawinichkul¹, Nongnutch Pattara-anantanop², Wipoo Krisanuruks⁴, Sate Sampattagul³,
Sarunnoud Phuphisith³, Artit Yawootti⁴, Suthep Phongsri⁵, Chuenkamol Sukde⁵, Supawit
Amornyoot², Paweena Kumpang², Nonthaphat Theerawattanasiri²

¹ Regional Health Office 1 Chiang Mai, ² Health Promotion Center Regional 1 Chiang Mai,
³ Climate Change Data Center, Chiang Mai University (CCDCCMU),
⁴ Rajamangala University of Technology Lanna, ⁵ Chiang Mai Provincial Public Health Office

Background: More than 80% of people and 97% of cities in Global are exposed to air pollutions that exceed the World Health Organization (WHO) guidelines [1], most are particulate matter(PM). In Thailand, the Upper North including Chiang Mai faced to PM pollution during January to April continuing every year; both high concentration level and amount of day that PM higher than standard. Although there are four air pollution monitoring stations reported air quality index (AQI) situation and alert to public. However, the stations are located in central city; these may not reflect air quality conditions in rural areas that effect to community people. The aims of this study are to apply and develop the estimating a short-term PM concentration level from human-sighted visual rang. The finding of the study would be applied for communities to protect themselves and the public from smoke.

Methods: A cross-sectional study was conducted on 1st April to 15th May 2018 at every districts areas in Chiang Mai. Twenty-four hospitals were purposive selected to reflect the PM2.5 and PM10 condition of each area. The Data of PM2.5, PM10 concentration, temperature and humidity were reported by *DustBoy* – the Air Bourn PM Monitoring sensor. The “Wildfire Smoke, A Guide for Public Health Officials” (US EPA,2008) was applied for estimating PM visual range level into six colors; blue, green, yellow, light orange, dark orange and red. The eleven hospitals of those were set the far distance (kilometers) for landmark targets following visual range guideline by the researcher, other were set by themselves. PM visual were reported three times a day; morning (9.00), afternoon (13.00) and evening (16.00). PM visual report and PM.25 PM10 level of *DustBoy* were matching by date and time. PM visual report with humidity higher than 65% were excluded. Descriptive analysis statistics was used to analyze and describe the finding. The accuracy of PM visual measurements was test by sensitivity and specificity.

Result: PM visual report were 2,791 times. PM report from *DustBoy* were 2,045 times. After matching the PM report were 1,598 times. There were some data were excluded because humidity higher than 65%. The 54.57% (782 times) of PM report were remained and

analyzed. The sensitivity and specificity of PM_{2.5}, PM₁₀ when have setting landmark targets area were 84.9%, 15.3% and 84.2%, 14.7 %. Respectively.

Conclusion: the accuracy estimating of PM_{2.5}, PM₁₀ concentration by visual range were 84.9% and 84.2%. This finding would be usefully for health policy authority to provide the communities and help people to determine PM concentrations levels for safe and alert the public. However, estimating visual range is not effective in early morning, twilight hours, raining day, cloudy or humidity higher than 65%. The accuracy of estimating effect by personal experience and judgment when assessing PM conditions.

Keywords: Particulate Matter, PM_{2.5}, PM₁₀, Visual range,