Editorial

PM2.5 and I

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Once upon a time, standing in the midst of the black tarry atmosphere, the intimate ties between humans and nature seemed clear to me. Gone now, however, are memories of fresh air; they have been replaced by the reality of intimidating air pollution threatening the lives of living beings across the country.

It is worth noting that the acronym "PM2.5" refers to particulate matter in the ambient air having a diameter of 2.5 micrometers or less. Such minute dust particles first received global recognition four years ago.[1] A larger particle, PM10, had been encountered much earlier. PM2.5 dust became of interest owing to its adverse health impacts, especially in the genesis of pathologies of the respiratory passages, such as chronic obstructive pulmonary disease (COPD) and malignancies. Studies have found that exposure to PM2.5 is more harmful to health than cigarette smoking.[2]

My initial encounter with dusty air pollution was the Great London Smog in December 1952 during my early student days in the United Kingdom. Subsequent experience was with Los Angeles smog during a brief visit to the United States of America in 1956. However, both encounters were not of special importance to me at that time. My genuine interest in air pollution developed in February 1992 on a trip to Mae Hong Son Province in northern Thailand when the aircraft in which I was travelling could not land due to dense smoke produced by bush fire covering the entire area. That incident prompted me to embark on a few studies,[3-7] which provided knowledge of the PM10 component of such smoke and touched on the mutagenicity of its contents.

Thereafter, during my service at the Faculty of Medicine Siriraj Hospital, I carried out a series of research studies on polluted environments. Among the successful studies, the highlight was finding asbestos bodies in a good number of the autopsied lungs I examined;[8] that study was confirmed by the same type of study 34 years later.[9] The findings of the two studies have led me to the conclusion that asbestos fibers are present in the ambient air. Other studies include the metal fume fever from brass melting,[10] aerosols containing the legionella microorganism,[11] and indoor radon gas.[12]

As a matter of fact, smoggy air pollution is not a new occurrence in Thailand. Such pollution has long plagued certain cities, such as Chiang Mai, Mae Hong Son, Khon Kaen, and Bangkok, as natural phenomena occurring in certain seasons of the year. Recently, polluted atmospheric conditions became worse in certain cities, especially in the winter months, owing to subsidence temperature inversion which traps air pollution close to the ground. The incidence of heavy air pollution in Bangkok and a few other cities in the period from January through March 2019 caused public concern when the 24-hour average of PM2.5 contents exceeded WHO Interim target 2, which is defined as the portion of a country's population living in places where mean annual concentrations of PM2.5 are greater than 25 micrograms per cubic meter.

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The general public grew concerned simply because visibility became poor and the atmospheric pollution produced adverse health impacts.[13]

PM2.5 refers to tiny particles having the ability to penetrate deep into the airways to produce lesions in bronchioles and alveoli, and in other organs when they enter blood circulation. The health hazard from exposure is determined by the compositions of the pollution, which depends on its source. PM2.5 pollutants in Thailand vary in terms of vicious potency in different parts of the country, according to the source of the pollution. In urban communities most PM2.5 derives from vehicular emission from internal combustion engines using fossil fuels, and industrial fumes, in contrast to rural towns where the severity of air pollution is aggravated by stubble biomass burning in agricultural areas together with smoke arising from natural or man-made forest fires. Therefore, the compositions of PM2.5 pollutants is not uniform.

Attempting resolution of air pollution in Thailand is most difficult and practically untenable due to a variety of factors. Air quality control programs have pledged to implement (a) emission standards for both new and used vehicles, (b) inspection and maintenance programs for cars, (c) roadside inspections and traffic management, and (d) implementing measures for achieving better control of power-plant- based sulfur dioxide emissions.

Notwithstanding the anticipated failure in this regard, successful resolution air pollution may be obtained if existing laws are enforced energetically, such as meeting out severe punishment for those starting forest fires, being strict in maintaining traffic disciplines and enforcing rules, stopping all vehicles using diesel engines from entering residential section of cities, planning for electric vehicles to replace vehicles using fossil fuels, controlling the population of private motor cars, moving long school holidays from the month of May to January - February in order to lower traffic density in those periods when air pollution is worst (January - March), and lastly relocating the Capital City of Bangkok to any province with low level of air pollution.

It is worth noting that in the first quarter of 2017 Bangkok registered 300,000 new vehicles, bringing the total registered cars in the capital to nearly 9.5 million. (From: https://www.thethailandlife.com/air-pollution-thailand. Accessed: 21/2/2563). These data indicate the size of the known cause of air pollutants being emitted by so many vehicles using fossil fuel, which is overwhelming the capacity of the city to cope with the problem.

Excerpt from Global Health Observatory data (From: https://www.who.int/gho/phe/outdoor_air_pollution/en/)

Industries, households, cars and trucks emit complex mixtures of air pollutants, many of which are harmful to health. Of all of these pollutants, fine particulate matter has the greatest effect on human health.

All pollution is associated with a broad spectrum of acute and chronic illness, such as lung cancer, chronic obstructive pulmonary disease and cardiovascular diseases.

Globally, air pollution it is estimate to cause about 20% of lung cancer deaths, 43 % of COPD deaths, about 25% of ischemic heart disease deaths and 24% of stroke deaths.

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