

## ABSTRACT

### AN ASSESSMENT OF INDOOR AIR QUALITY IN THE NATURALLY AND MECHANICALLY VENTILATED WARDS AT THE PHILIPPINE GENERAL HOSPITAL

Marian Fe Theresa C. Lomboy  
University of the Philippines, 2014

Adviser: Leni L. Quirit, PhD  
Co-Adviser: Victorio B. Molina, PhD  
Reader: Emmanuel S. Baja, ScD

This study assessed the quality of indoor air in the naturally and mechanically ventilated wards at the Philippine General Hospital (PGH). It aimed to characterize particulate matter 2.5 (PM<sub>2.5</sub>) and associated elements (AEs), black carbon (BC), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>) and volatile organic compounds (VOCs). The relationships of these air pollutants with selected indoor air quality-related factors were likewise determined. The samples of these chemical agents were collected from October to December 2013 and from March to April 2014. The sites at PGH which served as venues of this study were the Pediatric and Medical Wards, which are naturally ventilated and the Central and Neonatal Intensive Care Units (CENICU and NICU), which are mechanically ventilated. Results showed that minimal protection from outdoor air pollutants was found in all study sites based on the daily exceedances in the PM<sub>2.5</sub> levels as compared to the WHO guideline value; the I/O ratios of PM<sub>2.5</sub>, AEs and NO<sub>2</sub> considerably higher than zero; the presence with significant enrichment of the traffic-related elements such as bromine (Br), lead (Pb), nickel (Ni), sulfur (S), vanadium (V) and zinc (Zn) in indoor fine PM; and the strong correlation between S and Br in the Departments of Pediatrics and Medicine and NICU, V and Ni in the Department of Pediatrics and NICU, Zn and Pb in NICU and BC and V in CENICU. Human activities likewise affect the quality of indoor air as shown by the high enrichment factor of mercury (Hg) coming from broken medical devices; the strong positive correlations between soil-related elements such as calcium (Ca) and silicon (Si), which may have been introduced indoors through the infiltration and/or tracking of soil dust; and the presence of sodium (Na) and chloride (Cl) from the sodium hypochlorite solution used as a cleaning agent in all study sites. The IAQ-related factors like temperature and relative humidity showed minimal negative impacts on the quality of indoor air. Multiple regression analysis revealed that only air velocity affected the concentration of PM<sub>2.5</sub> in the Department of Medicine.