

## ABSTRACT

*Indoor air quality is very important for human health and comfort. Factors which affect the indoor air quality are pollutants (particulates/PM<sub>2.5</sub> and carbon dioxide/CO<sub>2</sub>) and microorganisms. The lack of information available regarding the quality of indoor air in Indonesia constrains the analysis of indoor air quality and limits the awareness of the Indonesian citizen. Therefore, there is a need of research of indoor air quality (four open offices in Telkom University) in order to measure non-biological parameters for 24 hours, and two times (in the morning and the afternoon) for the biological parameters. The non-biological measuring devices used for the research are low-cost based sensors which are PM<sub>2.5</sub> sensors, CO<sub>2</sub> sensors, and temperature (T) sensors with relative humidity (RH) sensors. The indoor air quality shown from the measurements did not qualify the standards/regulations applicable. Measurements shows that the 24-hour average of PM<sub>2.5</sub> concentrations and 8-hour average of CO<sub>2</sub> concentrations are 82.3 µg/m<sup>3</sup> and 710 ppm in room A, 86 µg/m<sup>3</sup> and 1044 ppm in room B, 84.5 µg/m<sup>3</sup> and 1105 ppm in room C, 1259 ppm in room D. These concentrations exceed the quality standards required (37.5 µg/m<sup>3</sup> from Singaporean SS 554 or 35 µg/m<sup>3</sup> from PerMenKes RI No.1077 Year 2011 for particulates, also 1000 ppm from PerMenKes RI No. 48 Year 2016 for CO<sub>2</sub>). The high concentrations of particulates (reaching 72 µg/m<sup>3</sup>) and carbon dioxide (1300-1600 ppm) in working hours, can be caused by the design of the room which have no ventilation systems. The uncontrolled exchange of air causes the entrance of particulate matters from the outdoor air, and also causes the buildup CO<sub>2</sub> due to the stagnation of air in the room. The measurements of microorganisms shows that the majority of bacterias in the indoor air is of the staphylococcus, streptococcus, and enterobacteriaceae genus, which are commonly found in human bodies. Indoor air conditions which are temperature, humidity, and the presence of food/biological materials, are very optimal for the said bacterias to breed and multiply. This states that condition of the indoor air (temperature, humidity, and presence of biological materials) are very optimal for said bacterias to multiply. Therefore, the problems of indoor air quality can be solved through designing and/or renovating the air-conditioned rooms to have a ventilations system which gives enough filtered air for the rooms and its inhabitants.*

**Keywords:** *Indoor air quality, PM<sub>2.5</sub>, CO<sub>2</sub>, Staphylococcus, Streptococcus, Enterobacteriaceae.*