The Impact of Industrial Activities on $PM_{2.5}$ and PM_{10} Levels and Their Association with Acute Respiratory Infection Incidence Study in Surabaya, East Java, Indonesia

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Abstract

$PM_{2.5}$ and PM_{10} are major environmental pollutants in industrial areas and pose threats to public health. In 2023, Indonesia recorded 1.5 to 1.8 million cases of Acute Respiratory Infection (ARI), while Surabaya reported 11,692 pneumonia cases in 2022. This study aims to examine the relationship between $PM_{2.5}$ and PM_{10} exposure and ARI incidence in Surabaya. A qualitative approach was used, employing secondary data from 24-hour air quality monitoring (AccuWeather) and ARI case reports from literature sources. In Rungkut, East Surabaya, average $PM_{2.5}$ and PM_{10} concentrations were 95.5 µg/m³ and 44.5 µg/m³, respectively. PM2.5 levels exceeded the WHO guideline (15 µg/m³), whereas PM_{10} remained below the standard (50 µg/m³). Literature findings support a significant association between elevated PM concentrations and increased pneumonia-type ARI, suggesting that fine particulate exposure contributes to severe respiratory outcomes. However, non-pneumonia ARI appeared unrelated to PM levels and may be affected by other environmental or behavioral factors. Recommended strategies include enhancing public education, reducing emissions from vehicles and industries, and promoting cleaner energy sources to reduce PM exposure and prevent respiratory diseases.

Keywords: $PM_{2.5}$; PM_{10}; ARI; Enviromental health.