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REVIEWER'S REPORT

Manuscript No.: IJAR- 57272

Title: INFLUENCE OF ROAD TRAFFIC ON AIR QUALITY ASSOCIATED WITH INHALABLE FINE PARTICLES IN THE CITY OF LUANDA

Recommendation:

Accept after minor revision

Rating	Excel.	Good	Fair	Poor
Originality		✓,		
Techn. Quality		✓,		
Clarity	✓,			
Significance	✓,			

Reviewer Name: Abdul Haseeb Mir

Detailed Reviewer's Report

The research article titled "Influence of Road Traffic on Air Quality Associated with Inhalable Fine Particles in the City of Luanda" provides a critical longitudinal assessment of urban environmental health in Angola's capital. The author evaluates the correlation between vehicular density and the concentration of fine particulate matter (PM_{2.5}), which are particles small enough to penetrate deep into the respiratory system. By comparing monitoring data from 2009 and 2014, the study establishes that road traffic is the primary determinant of air quality degradation in Luanda. The narrative successfully argues that despite a measurable decrease in average particle concentrations over the five-year interval, the levels remain sufficiently high to pose a persistent threat to public health, necessitating more stringent urban planning and emission control strategies.

The study utilizes a quantitative methodology, employing a Thermo particle analyzer (model ADR-1200S) installed along Avenida 21 de Janeiro near the Faculty of Engineering. The author explores the temporal variations in air quality, identifying consistent "peak days"—specifically Tuesdays and Thursdays—where PM_{2.5} concentrations are at their highest. These peaks are directly linked to the rhythm of urban mobility and commercial activity in Luanda. The findings reveal that the atmospheric concentration of these particles is not static but fluctuates in direct response to the volume of vehicles entering and exiting the city center. This level of empirical detail is essential for understanding the specific "hotspots" of pollution that affect commuters and residents in high-traffic corridors.

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A primary focus of the research involves the comparative analysis of the two monitoring periods. The author notes that PM_{2.5} concentrations dropped from a daily average of 105.3 µg/m³ in 2009 to 59.8 µg/m³ in 2014. While this reduction suggests an improvement in air quality, the author handled this data with scientific caution, pointing out that both figures significantly exceed the World Health Organization (WHO) air quality guidelines. The study suggests that the high concentration of particles is exacerbated by Luanda's specific environmental conditions, including a high volume of older, poorly maintained vehicles and the presence of unpaved roads that contribute to the re-suspension of mineral dust. The narrative effectively highlights that "modernization" in the form of increased car ownership has outpaced the development of infrastructure required to mitigate its environmental impact.

Furthermore, the paper addresses the broader public health implications for the population of Luanda. The author explores the link between fine particle inhalation and the prevalence of respiratory and cardiovascular diseases, noting that developing countries often bear a disproportionate burden of pollution-related mortality. The study evaluates the "invisible" nature of PM_{2.5}, which, unlike larger dust particles, remains suspended in the air for longer periods and can travel greater distances. The author argues that the city's geographical and climatic factors—such as low wind speeds and high humidity—can lead to the stagnation of pollutants, creating a toxic "micro-climate" along major arterial roads. This analysis reinforces the necessity of viewing air quality not just as an environmental metric, but as a critical component of urban social justice.

In summary, this article offers a robust and well-documented inquiry into the environmental challenges facing rapidly growing African metropolises. It successfully bridges the gap between technical air quality monitoring and urban sociology. The author's ability to link specific traffic patterns with particulate matter concentrations makes this a significant contribution to the fields of environmental science and public health. It is an essential read for urban planners, environmental regulators, and health officials in Angola and beyond, providing a clear evidence base for the implementation of policies aimed at reducing urban emissions and protecting the respiratory health of millions of city dwellers.

Recommendations

- The author should consider conducting a newer monitoring phase to provide a "2024 vs. 2014" comparison, which would allow for an assessment of how Luanda's recent infrastructure developments and changes in the national vehicle fleet have influenced air quality over the last decade.
- To improve the academic depth of the chemical analysis, it is recommended that the author perform a source apportionment study to distinguish between "combustion-derived" particles

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(from vehicle exhaust) and "crustal" particles (from road dust and construction), as this would allow for more targeted regulatory interventions.

- The paper would benefit from the inclusion of a GIS-based "Heat Map" of Luanda, overlaying traffic density data with the recorded PM2.5 concentrations to visually demonstrate the spatial correlation between road use and pollution levels.
- It is suggested that the author expand the discussion on "Policy Interventions," specifically evaluating the potential impact of introducing low-emission zones (LEZs) or improving public transit efficiency as a means to reduce the city's dependence on private vehicular travel.
- Future research should involve a health impact assessment (HIA) that correlates these air quality findings with hospital admission records for respiratory distress in Luanda to provide a direct quantitative link between pollution levels and local morbidity.

Recommendation: Recommend for publication with minor revision.