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AIRBORNE INFECTION CONTROL THROUGH VENTILATION IN MINIBUS TAXIS

Munyaradzi Matose[(1)], Mladen Poluta[(2)], Tania Douglas[(1)]

[(1)]**University of Cape Town, South Africa**
m9inester@gmail.com, tania.douglas@gmail.com

[(2)]**Western Cape Department of Health, South Africa**
Mladen.Poluta@westerncape.gov.za

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Summary: Airborne infection control (AIC) measures are used extensively in healthcare settings to curtail the spread of airborne infectious diseases; these measures include administrative, architectural, engineering (e.g. ventilation) and personal protective interventions, serving either to reduce the concentration of airborne infectious particles or to protect individuals from direct exposure to airborne infection. Few such measures are applied in public congregate spaces outside of health facilities, such as those associated with public transport. Existing AIC measures have yet to be studied in the context of public transport modalities. This study explores the role of ventilation as an AIC measure in minibus taxis in Cape Town, South Africa, to determine its potential role in reducing airborne infectious disease transmission.

The minibus taxi model chosen for the study was the Toyota Quantum Ses'fikile , which is commonly used in the Cape Town metropole. The Ses'fikile taxi has 6 windows, 2 at the front, 2 in line with the main passenger door and 2 towards the rear of the taxi. Ultrasonic anemometers were placed at key positions throughout the taxi-interior to measure and log airflow patterns, under different widow-open/close configurations and at different taxi speeds. The configurations were tested in an occupied taxi, with occupants comprising the driver, a researcher, and 14 volunteer participants.

Ventilation rates were found to depend on interior airflow as a result of the window configuration, as well as on the number of open windows, although the ventilation rate was not highest with the highest number of open windows. The best ventilation rates were found with four open windows, which included the front windows on both sides of the vehicle, and either the middle windows on both sides or the rear windows on both sides. The ventilation rates produced by these configurations at all tested taxi speeds (40 km/h, 80 km/h and 100 km/h) ranged from 108 to 316 L/s and exceeded the World Health Organization recommendation for new healthcare facilities, airborne precaution rooms, as well as for general wards and outpatient departments.