

## Effects of hoovering activities on biological contaminants and particulate matter levels in main prayer halls of Malaysian mosques

### ABSTRACT

In Malaysia, carpets are commonly used as finishing flooring material in the main prayer hall of mosques. In cleaning carpets, hoovering has been the most popular method, but it directly triggers the uplifting of dust that may contain bacteria and fungi. Hoovering activities and ventilation strategies (air conditioning split units (ACSUs) or by active ventilation (non-ACSUs)) can affect the prevalence of bacterial and fungal growth. This study aimed to establish the total bacterial counts, total fungal counts and also PM10 concentrations under different ventilation strategies (ACSUs and non-ACSUs) in the main prayer halls of mosques. Identification of bacterial and fungal species also took place in this study. Sampling was performed in 25 mosque buildings (17 ACSUs and 8 non-ACSUs) with carpeted flooring on Zohor-Asar and Friday-Asar prayer sessions at Pulau Pinang, Malaysia. Results revealed that the total bacterial counts, total fungal counts and mean PM10 concentrations were higher in mosques with ACSUs than in mosques with non-ACSUs at concentrations ranging from 166cfu/m<sup>3</sup> to 660 cfu/m<sup>3</sup>, from 118 cfu/m<sup>3</sup> to 660 cfu/m<sup>3</sup> and from 11.15 ± 9.32 µg/m<sup>3</sup> to 49.30 ± 13.13 µg/m<sup>3</sup>, respectively. The total bacterial counts exceeded the acceptable guideline limit by the Industrial Code of Practice on Indoor Air Quality (ICOP), but the total fungal counts and PM10 concentrations did not. In some mosques, the total bacterial and fungal counts did not decrease even after hoovering activities were completed. The dominant types of bacteria found in the mosque buildings were *Staphylococcus* spp., *Bacillus* spp. and *Micrococci* spp., whilst the dominant fungal species was *Aspergillus niger*. Although the findings were not alarming, care should be taken by mosques authorities especially while and after hoovering, to ensure that, the indoor air quality in mosques are being maintained within the permissible limit to protect worshippers from being exposed to bacterial and fungal.

**Keyword:** Airborne particulate matters; Air conditioning split units; Biological contaminants; Indoor air quality; Ventilation system

