



Hoisington A, Maestre JP, Kinney KA, Siegel JA. 2016. Characterizing the bacterial communities in retail stores in the United States. *Indoor Air*, 26(6), 857-868. DOI: [10.1111/ina.12273](https://doi.org/10.1111/ina.12273)

**Abstract**

The microorganisms present in retail environments have not been studied in detail despite the fact that these environments represent a potentially important location for exposure. In this study, HVAC filter dust samples in 13 US retail stores were collected and analyzed via pyrosequencing to characterize the indoor bacterial communities and to explore potential relationships between these communities and building and environmental parameters. Although retail stores contained a diverse bacterial community of 788 unique genera, over half of the nearly 118K sequences were attributed to the Proteobacteria phylum. *Streptophyta*, *Bacillus*, *Corynebacterium*, *Pseudomonas*, and *Acinetobacter* were the most prevalent genera detected. The recovered indoor airborne microbial community was statistically associated with both human oral and skin microbiota, indicating occupants are important contributors, despite a relatively low occupant density per unit volume in retail stores. Bacteria generally associated with outdoor environments were present in the indoor communities with no obvious association with air exchange rate, even when considering relative abundance. No significant association was observed between the indoor bacterial community recovered and store location, store type, or season. However, predictive functional gene profiling showed significant associations between the indoor community and season. The microbiome recovered from multiple samples collected months apart from the same building varied significantly indicating that caution is warranted when trying to characterize the bacterial community with a single sampling event.

**Practical Implications**

Like many other indoor environments, the bacterial community in most retail stores is diverse. The retail microbiome is a mixture of microorganisms from many sources including human oral and human skin-associated bacteria, soil bacteria, and the outdoor environment. Analysis of environment and building

parameters showed little association between these parameters and the bacterial community present in a given store. Despite utilizing a long-term, integrated sampling approach, substantial variation was observed in repeated samples over a 1-year period indicating that multiple samples are required to characterize the bacterial community present in environments such as retail stores.

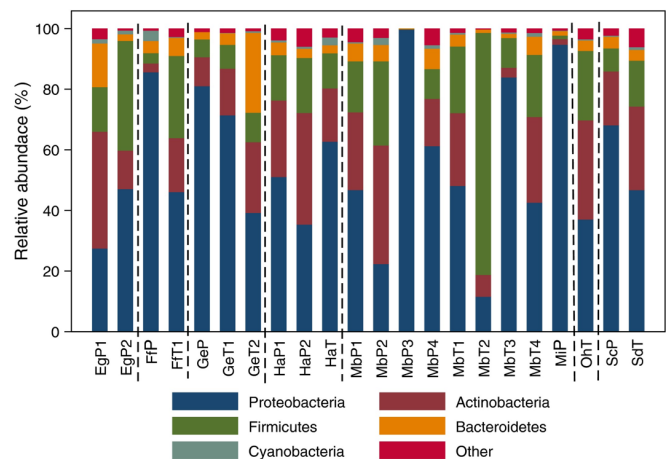


Figure 1. Relative abundance at the phylum taxonomic level for the retail stores grouped by category (dashed lines separate store types; E=electronics, F=furniture, G = medium grocery, H = home improvement, M= general merchandise, O = office supply, S = small grocery).

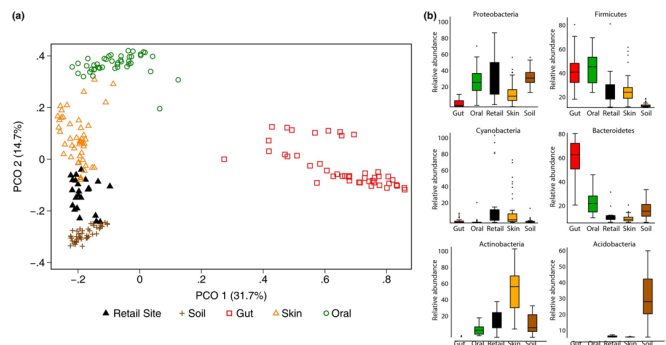


Figure 3. Community comparison between retail site, human (from Costello et al., 2009), and soil microbiomes (from Lauber et al., 2009). (a) Principal coordinates analysis (PCoA) plot comparing retail sites and others, (b) Scatter box plots showing relative abundance across six phyla.

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