

Testing Air Quality of Primary Health Care Centers in Qatar

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Abstract:

Poor indoor air quality results in significant effects on human health. Hospital atmospheric environment requires high air quality to protect patients and health care workers against airborne disease including nosocomial infections. This study was conducted at four health centres aiming to identify, monitor and report the level of airborne bacteria in Doha. Two sampling methods were used in this study: Anderson impactor (viable method) and filtration method (non-viable method). Then the samples were incubated at 37 °C for 24-48 hours. After that, the average colony-forming units (CFU) of bacteria was calculated per cubic meter of air (CFU/m³). The lowest average number of bacteria in the air was detected in QU HC, while the highest average number was Old Airport HC. However, more samples will be collected for better statistical sample size and analysis. In addition, the captured airborne bacteria will be identified by 16s r RNA sequencing later.

BACKGROUND

Airborne microorganisms (bioaerosols) such as bacteria are particles of biological origin that considered as one of the important constituents of the atmosphere because they have the potential to cause a variety of diseases in humans and animals upon inhalation (Chen, et al., 2012).

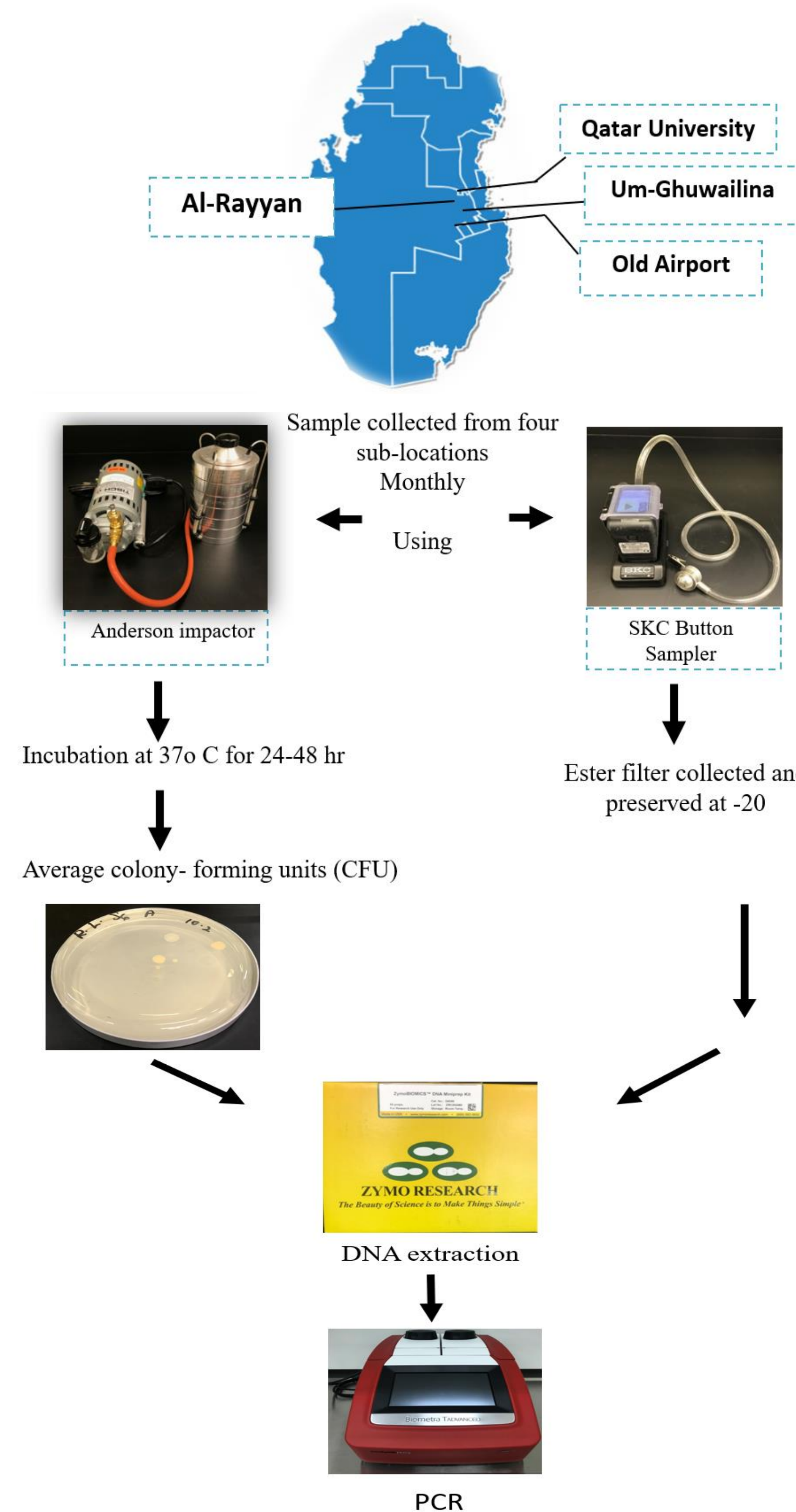
Airborne microbes are naturally present in both the outdoor and indoor environments and can be derived from a variety of sources including humans, animals, vegetation and soil. However, the presence of harmful airborne microorganisms has also been associated with serious health effects stemming from the contamination of food, building materials, consumer products, etc. Indoor airborne sources can be linked to various factors, such as the location of the building, occupant density, mechanical ventilation, cleanliness of the indoor environment, presence of organisms like molds on the ceiling (Csobod, et al., 2014). A study was done in the Australian indoor environment revealed indoor pollution levels larger than outdoor levels; since people spend about 90% of their time indoors, hence appropriate indoor air quality is very important (Jurado et al., 2014).

Poor indoor air quality results in significant adverse effects on human health. In particular, the hospital atmospheric environment requires high air quality to protect patients and health care workers against airborne disease including nosocomial infections. Monitoring and surveillance programs of air pollutants and communicable diseases are essential because they provide information on the effectiveness of occupational hygiene and hazard control, and also useful in assessing risks to community and environment.

OBJECTIVES

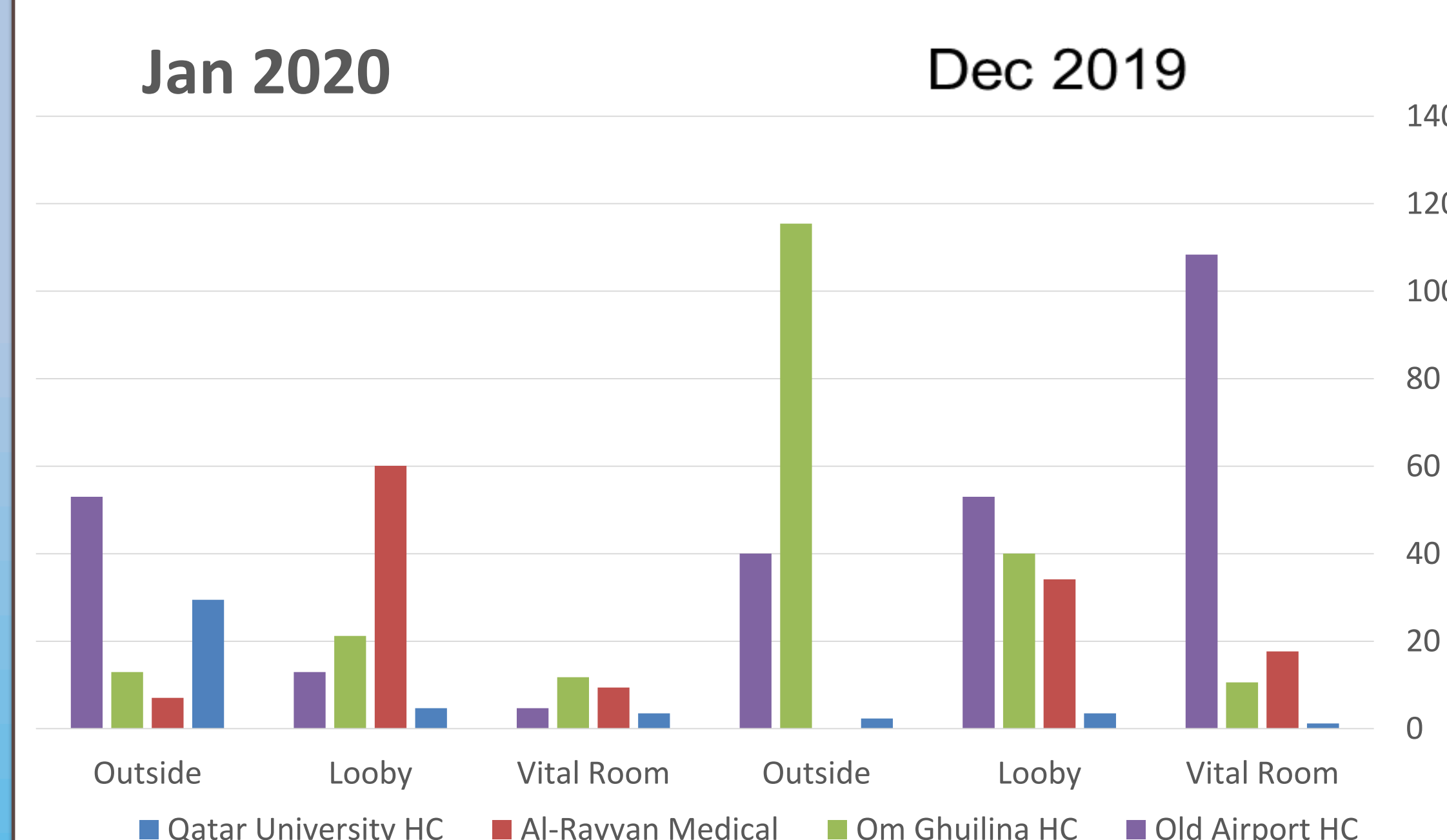
- The aim of this study was to investigate the quantity and size distribution of airborne microbes (bacteria) at indoor of multiple PHCC centers, as well as the outdoor environment (ambient air), in Doha, Qatar.
- Identify the airborne microbes (bacteria) using 16 s rRNA sequencing.
- Compare between the indoor and out door airborne bacteria.

METHODS



RESULTS

Fig. 1. The average of colony forming unit per cubic meter of air

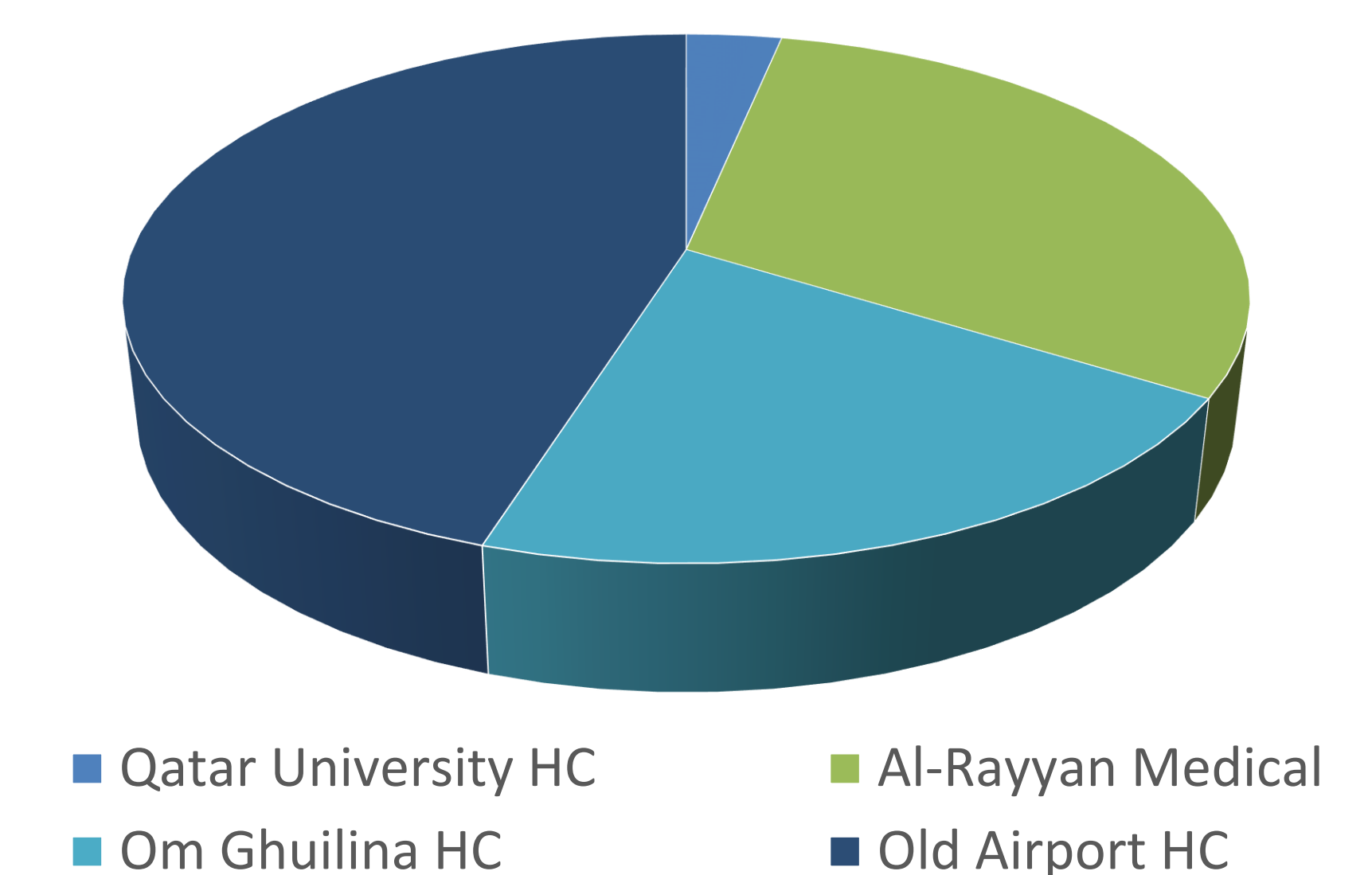


This chart displays the average of CFU/m³ different locations and sub locations in the health centers, which represents the indoors and outdoors. The highest CFU/m³ was on Dec 2019 for the outdoors samples. The highest number for the indoor was on Dec 2019 in the vital room of Old airport health center. The lowest count was always found in the Qatar University health center in both Dec 2019 and Jan 2020.

RESULTS

Fig. 2. The Average count of CFU/m³ for the indoor environment only.

Average of indoor CFU/m³ for Dec 19 & Jan 20



This Figure shows average of total count of CFU/ m³ in the four different health centers for the indoor samples only. The old airport showed highest number of CFU/m³ between the health centers followed by the Rayan HC , Om Ghuilina then finally the Qatar University HC.

CONCLUSIONS

Our preliminary results showed that QU HC had the least number of bacteria in the air. This is due to the modern building and air filters in the AC. Accordingly, the occupancy patterns and the size and age of the building affects the count of bacteria in the air.

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