



# INDOOR AIR QUALITY

## In the New Normal

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According to the Department of Occupational Health and Safety (DOSH), "Indoor air quality describes how inside air can affect a person's health, comfort, and ability to work. It can include but is not limited to temperature, humidity, mould, bacteria, poor ventilation, or exposure to other chemicals". As per the United States Environmental Protection Agency (EPA), IAQ can be at least 2 to 5 times worse than outdoor air quality, and in some cases, it can be even up to 10 times worse!

### Consequences of Poor IAQ

Some of the short term effects of poor IAQ include irritation of the eyes, nose and throat, headaches, dizziness, fatigue, allergy and asthma. Generally, it can lead to discomfort, ill health, absenteeism and lower productivity. Certain immediate effects are similar to those from colds and other infectious diseases that are transmitted through the air, and "sick building syndrome" symptoms due to elevated indoor pollutant levels. Some effects may be further aggravated by inadequate ventilation or humid conditions indoors. Other long-term health effects that may show up after years of exposure to poor IAQ include respiratory diseases, heart disease, lung cancer, carbon monoxide poisoning and Legionnaires' Disease.

### Sources of Indoor Air Pollution

Indoor pollution sources that release gases or particles into the air are the primary cause of indoor air quality problems. Inadequate ventilation can increase indoor pollutant levels by not bringing in enough outdoor air to dilute emissions from indoor sources and by not carrying indoor air pollutants out of the area. High temperature and humidity levels can also increase concentrations of some pollutants.

There are many sources of indoor air pollution including kitchen stoves, tobacco, building materials and furnishings, household cleaning and maintenance products, and personal care, air-conditioners and

humidifiers, excess moisture, radon, pesticides, formaldehydes, Volatile Organic Compounds (V.O.C.) and outdoor air pollution.

### Enter COVID

Based on the above effects of poor IAQ, it can already be seen that "flu-like" symptoms can be caused by the existing pollutants in the air including mould spores and dust, in part due to contaminated air-conditioner cooling coils as a result of humidity. Poor IAQ leads to lower immunity, making people susceptible to being infected by viruses.

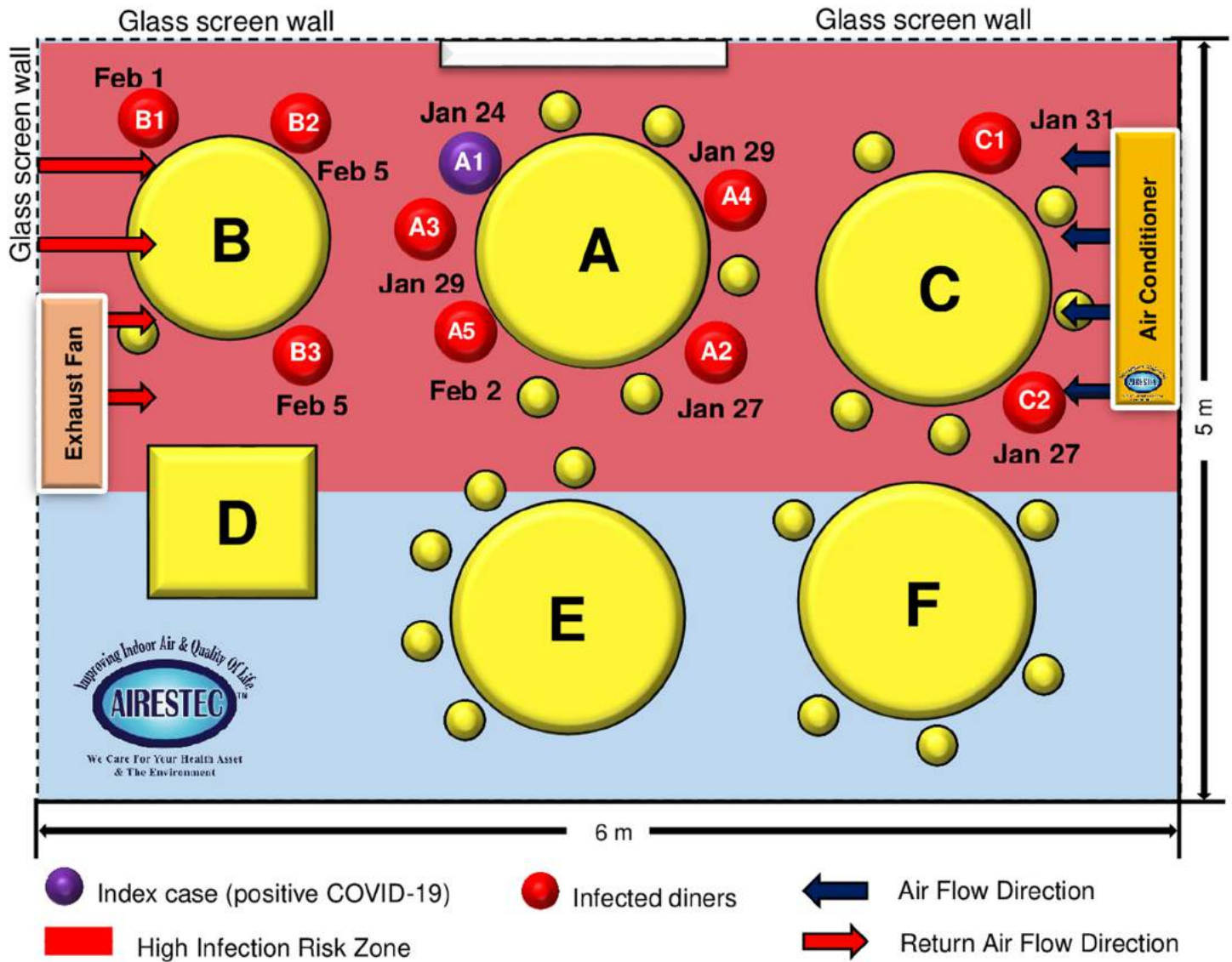
During the Movement Control Order (MCO) isolation period, many buildings have been left unoccupied and unattended, resulting in higher humidity which in some places have led to mould contamination. They will need to be decontaminated before being occupied again or else the "Sick Building Syndrome" will cause people to have lower immunity. Places with water retention like cooling towers, leaky air-conditioners and water dispensers may be at risk of Legionnaires' Disease, another deadly respiratory disease.

Infectious diseases like the COVID-19 can also be spread by the air-conditioner air flow as was seen in a recent article published in the Emerging Infectious Diseases Journal for US Centres for Disease Control and Prevention (CDC), largely due to poor air

ventilation. Although this setting was at a restaurant, it is applicable to any air-conditioned environment including offices, schools, malls and factories.

### The correlation of virus spread via the air-conditoner at a restaurant in Guangzhou, China

How a restaurant air-conditioning unit caused nine diners to be infected with COVID-19 from January 25 to February 5.



The gap between asymptomatic index case A1 and other people at different tables exceeded one metre. However, the research said that strong airflow from the air-conditioner may have spread the floating droplets from table A to table B, then back to table A again and to table C, causing diners A2, A3, A4, A5, B1, B2, B3, C1 and C2 to be infected despite social distancing. Contaminated air is often circulated in an indoor environment as ventilation is insufficient. The highlighted area illustrates the potentially higher risk of infection zone.

*(Credit: Letter of Research by a group of scientists in Guangzhou, China published in the Emerging Infectious Diseases Journal based at the US Centers for Disease Control and Prevention.)*

HVAC/Air-Conditioning System, provide an environment where biofilms, which are food source for bacteria, fungal & mould, will proliferate and continue to grow and expand uncontrollably in any aqueous environments.

Contamination will circulate through the system several hundred times a day with increased airborne contamination and associated risk, which can cause a range of health issues including fever, flu, respiratory /lung infection, asthma, fatigue, throat irritation, difficulty in concentration, food and beverage contamination, cosmetic and pharmaceutical product defects. These will compromise the immune system, where other forces such as VIRUSES (possibly even COVID-19) may attack. It is important that housekeeping and cleanliness be maintained. "Decontamination & Treatment" has to be placed as the highest priority as a "New Normal"

A swab test of the air-conditioners at the GreenRE office in Wisma REHDA last year also showed evidence that the bacterial count was considerably high despite the fact that the office was sparsely occupied and 'fairly clean'.

Many air-conditioned buildings in Malaysia have insufficient ventilation, resulting in poor IAQ. Airborne virus droplets spread through air movement can get

sucked into air-conditioning systems while being circulated and it can then be recirculated again. Central air-conditioning systems may even spread the virus further. The biofilms in the air-conditioner cooling coils could possibly even "host" viruses such as the COVID-19 (yet to be researched). It is advisable to decontaminate air-conditioners regularly to reduce these risks. When the air-conditioner has been decontaminated, it will also lead to improved efficiency in its performance, resulting in lower humidity, better IAQ and immunity, provided the decontamination does not deteriorate its condition, typically due to the use of corrosive, unhealthy chemicals. Obviously, there are good alternatives to the "normal practice" and perhaps it is time that the "new normal" also includes eco-friendly solutions.

Good ventilation is also a must so there has to be sufficient outlets that can release the stale indoor air and bring in "fresh" outside air. Unfortunately, there is a "cost" to allowing more outside air in as more energy will be consumed in order to cool the air.

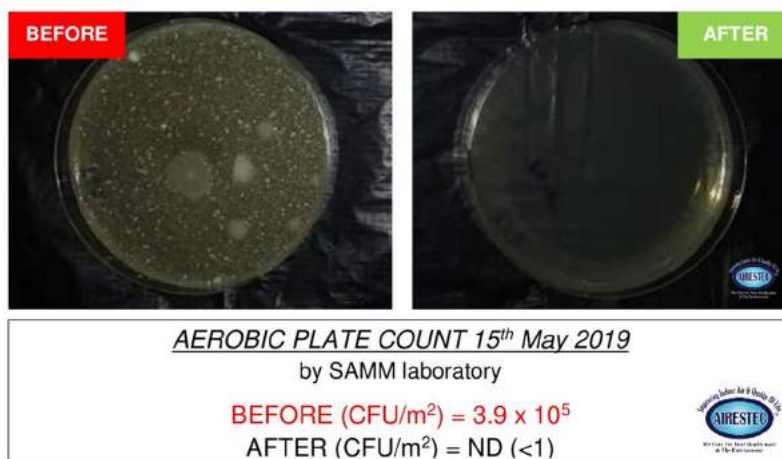


Figure 2: A swab test was done on the ceiling cassette air-conditioner cooling coil before a decontamination on 15<sup>th</sup> May 2019 and immediately after the decontamination on the same day by Airstec Sdn Bhd. The results showed that the bacterial count was very high at 39,000 CFU/m<sup>2</sup> before the decontamination and 99.99% eliminated after the decontamination when there was not a single count of bacteria that could be detected. The testing was conducted by an accredited SMM laboratory.

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## The Green Lesson

This pandemic should have made people realise that in the “new normal”, they should practice green and eco-friendly ways of doing things and protect the environment or else Mother Nature may strike back with another pandemic! IAQ will naturally improve if this is done as there is a “cause to every effect” just as there is a “cost for every lesson learnt”. Indeed it will be a pity if we continue with the “old normal” ways of polluting. Let us all ensure that certified “Green Buildings” use only certified Bio, Eco and Green products and services as a practice and hopefully it will be made a requirement for any renewal of Green Building Certifications for a truly greener future.



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The author, Michael Folk, is on a “Green Mission to Enhance Human Health, Improve Quality of Life and Save the Environment”. He takes care of Projects and Business Development at Airestec, a life and environmental sciences biotech group with 30 years of pioneering multi-enzyme technology. He speaks at seminars on green and sustainability matters especially relating to HVAC decontamination, IAQ and environment. He has contributed to a research paper on the “use of enzymes to remove biofilms and improve air flow, system and energy efficiency and prolong equipment life of air-conditioning systems.”

# Facts about Indoor Air Quality

## IAQ 101

25

GREENREBUILD ISSUE 3



### What is IAQ?

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants.

### Effects on Health

Poor IAQ can lead to irritation of the ENT, headaches, dizziness & fatigue. Years of exposure can lead to respiratory diseases, heart diseases and cancer. 1/6 allergy sufferers can tie their symptoms to fungi, bacteria and dust in HVAC systems.



### Pollutant Sources

Sources of indoor pollution include tobacco products, building materials, cleaning supplies, HVAC system and more. Indoor air can be 50% more polluted than outdoor air.

### Productivity and Work Performance

Improvements of the indoor air quality in offices and class rooms can increase productivity and work performance by 10%.

2x cognitive performance in purified than non purified work setting.

