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## 'Infectious aerosols can linger in shared washrooms'

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MUMBAI: Shared washrooms spaces in public areas such as restaurants, offices, trains and aircrafts are likely to have dead zones where aerosols carrying infectious agents like Sars-cov-2 – the virus that causes Covid-19 – can linger up to 10 times longer than the rest of the room, a new study by the Indian Institute of Technology-bombay (IIT-B) has revealed. Dead zones are corners where there is no circulation of fresh air. The study indicates that transmission of Covid-19 is, therefore, more likely in washrooms with dead zones, and that airflow should be well-engineered in order to mitigate the risk of the disease transmission. Researchers at IIT-B used a computer simulation model of a washroom that had a door, an exhaust fan on one wall, a washbasin console in the corner and a toilet seat in centre to study the airflow field and the distribution of aerosols. Their primary focus was on the regions of recirculating flow – which they called the dead zones – that can harbour infectious aerosol for much longer than the well-ventilated parts of the room.

The study found two dead zones: the most prominent one was the washbasin console where particles that were injected kept recirculating and took much longer to be evacuated. Wash-basins are typically crammed between walls, in a corner, which results in the air getting trapped and recirculating. This spot is more concerning in terms of disease transmission as one tends to spend more time near this area, said the authors. The second dead zone was at the height of two metres near the ceiling. This is a slightly less concerning spot as people using the washroom don't come in contact with the aerosols at such a height.

Dead zones could be right next to a window, door or even an air conditioner blowing air, and could be mistaken to be safe, ventilated spaces, the researchers pointed. They said that ventilation designs are often based on air changes per hour, but the air changes are not uniform in all corners of the room. In dead zones, these air changes could be 10 times lower. A way to tackle the infection hazard in such dead spaces is by studying the air circulation within the room before placing the ducts and fans, the study said.

Infectious disease expert Dr Om Srivastava, who was not involved in the study, said that the IIT-B study is "extremely significant in the current scenario." He said, "Countries such as Australia implemented a larger health measure by installing ultraviolet lights in public washrooms about two decades ago to deter intravenous drug users. They found that UV lights also played a role in reducing the bacteria and other pathogens in the washrooms. We should look at such technologies, not just for Covid-19 but for overall infection control in enclosed spaces." washrooms cough, sneeze, spit or talk, they release droplets that are also likely to linger around in areas which are recirculation zones or dead zones," he said. If a person using

the washroom is infected with Covid, it immediately puts the other washroom users at the risk of contracting the infection.

According to Sinha, disrupting the dead zones can play an important role in mitigating such risks. "Firstly, such dead zones should be identified in shared washrooms. Ways to disrupt or eliminate these zones include placing a fan to direct the airflow towards such corners, keeping the doors open between two consecutive usages or turning the angles of louvers towards the dead zones," he said.

The researchers said that the aim should be to replace the air in the washroom after every use, to let out any infectious aerosols generated by a user. "There should also be a good exhaust system to suck out the air from the room to enable air changes," said Janani Sree Murallidharan, an associate professor at IIT-B mechanical engineering department and a co-author of study.