

# The Air We Breathe.

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## Part 3:

# Fresh Air... the new standard for ventilation.

Every interior space requires some form of ventilation. Natural, mechanical or a hybrid, but this is especially true with the chemical-laden air of a waterpark. Indoor pools are guided by the guidelines set out by ASHRAE 62.1, but per the CDC report titled the “[Investigation of Employee Symptoms at an Indoor Waterpark](#)”<sup>1</sup>, these standards are not enough in a large voluminous space where water is splashed and spread differently than in a more typical pool.

## Why Ventilation is Priority

Ventilation is required to achieve and maintain good air quality, as well as thermal comfort levels but as the study shows, also the health and safety of staff and guests.





Natural ventilation was the main driver of architectural design before it was replaced with mechanical systems in the 20th century. Traditional buildings had a variety of shapes and layouts to promote ventilation by cross-breeze, stacking, wind towers, atriums, chimneys and more. However, studies of “old” buildings with high ceilings and large windows for natural ventilation, shows that they have greater ventilation than modern rooms of the same type.<sup>2</sup>

*There is little evidence that ventilation directly reduces the risk of disease transmission, but many studies suggest that insufficient ventilation increases*

*disease transmission.*<sup>3</sup>

After the SARS outbreak in 2003, the WHO (World Health Organization) extensively studied the design and role of ventilation in healthcare facilities to help reduce transmission of airborne infections and found:

*Increasing ventilation rate is believed to reduce the cross-infection of airborne transmitted diseases by removing or diluting pathogen-laden airborne droplet nuclei. A higher ventilation rate can dilute the contaminated air inside the space more rapidly and decrease the risk of cross-infection. Natural ventilation is able to deliver large ventilation rates with a low energy consumption. Compared with mechanical ventilation, natural ventilation can provide much higher ventilation rates.*<sup>4</sup>

This is of course subject to the layout of a facility to maximize airflow patterns, identify the main driving forces (of wind) and sizing and locating openings. The WHO study set the standards for natural ventilation and promoted the use of low-cost natural ventilation, followed by the air of mechanical ventilation to move air when natural forces do not supply necessary conditions.<sup>5</sup>

The benefits of a naturally ventilated space are clear, for healthcare-related facilities (the study focus). These benefits can now be applied to all other commercial spaces, and, in this time of a new pandemic, the study conducted by the Guangzhou Yuexiu District

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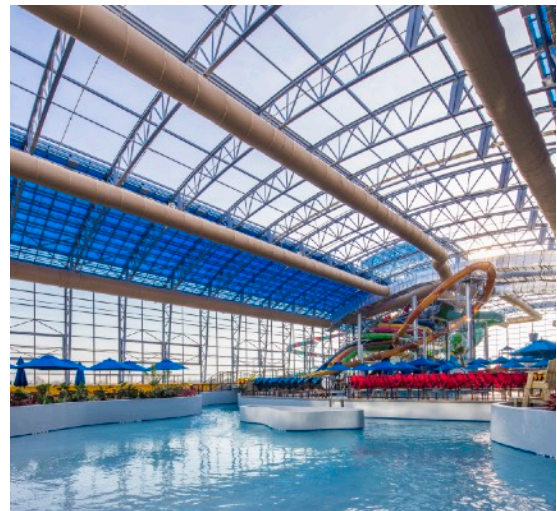
Center for Disease Control and Prevention, set to be published by the U.S. Centers for Disease Control and Prevention in July concludes:

***We conclude that in this outbreak, droplet transmission was prompted by air-conditioned ventilation... "The key factor for infection was the direction of the airflow. To prevent the spread of the virus in restaurants, we recommend increasing the distance between tables and improving ventilation."***<sup>6</sup>

## But, psychologically, will that be enough?

Will people return to crowded mechanically ventilated spaces when the risk is so great?

Given that waterparks are primarily family-oriented destinations, parents may hesitate to enter a space with their children or grandparents that aren't naturally and visibly ventilated. Even if they are able to socially distance in this environment, a family may worry if they can potentially contract a virus in the space, and reconsider if the space presents concerns or risk.



### Open up your space.

So, how can we improve ventilation in a space that is already built? Simply put, we can cut open a hole in the roof and the walls, and introduce natural ventilation. It's not always simple, but at this time when all options are on the table, there are solutions to be found.

The CDC has continued to recommend the following protocols for indoor pools:

- *Ensure that airflow in the swimming area is set up to minimize the buildup of chloramines in the air.*
- *Set up the heating, ventilation, and air conditioning (HVAC) system to move fresh air across the water's surface and towards air exhaust vents to prevent the buildup of chloramines on top of the water's surface.*
- *Exhaust air polluted with chloramines from the swimming area to the outside.*

- *Bring fresh air from the outside into the swimming area. If the fresh air is cold, this will increase heating costs, but compared with the cost of patron discomfort and illness linked to chloramines its a welcome trade-off.*<sup>7</sup>

No matter how you look at it, you need fresh air in your space, lots of it, as poor air quality can lead to staff and guest symptoms of illness, which now include the symptoms of COVID-19.

Using fresh air for ventilation has an added benefit:

***Using outdoor air as a dehumidifying source when it is cost-effective, rather than using a mechanical dehumidification system, can greatly reduce total operating costs, provide better indoor air quality, and improve system reliability.***<sup>8</sup>

But the ventilation efficiency decreases as ceiling height increases and the distance of the supply points from the deck increases<sup>9</sup>. So having an entire roof that opens up, might be the ideal solution to increase airflow.



There is a need to develop effective and appropriate engineering technologies and innovative architectural features to maximize the use of natural ventilation for different climatic conditions worldwide.<sup>10</sup>

In summary, per the global health experts, adding fresh air saves owners money and seems to allow operators to provide guests with a safer and healthier environment which may reduce the risk of virus transmission.



**OpenAire** has had the pleasure of building waterparks around the globe, challenging the stereotypes of traditional indoor parks. Our mutual goal is always to help them lead the way in creating enjoyable, practical and beautiful spaces, making custom solutions to suit their exact spaces and needs. From the northern border to the deep south, OpenAire supports clients in creating water parks for all seasons that are bound to “wow.” This

includes:

- [A top-five park in Texas; Epic Waters, the largest indoor Waterpark in the USA](#)
- [Kalahari in the Pocono Mountains Pennsylvania](#)
- [Zehnder's Splash Village in Michigan](#)
- [Pirate's Cay in Illinois](#)
- [Jay Peak's Pump House Waterpark in Vermont](#)
- [Water-Zoo Indoor Water Park in Oklahoma.](#)

Contact us to see how we can support your future waterpark vision, or assist in modifying your existing park to accommodate the future of improved daylight, hygiene, ventilation, and cleanliness.

### Footnotes:

<sup>1</sup> CDC Workplace Safety and Health; *Investigation of Employee Symptoms at an Indoor Waterpark*, Lilia Chen MS, Health Hazard Evaluation Report HETA 2007-0163-3062, Great Wolf Lodge, Mason, Ohio, June 2008

<sup>2</sup> WHO; *Natural Ventilation for Infection Control in Health-Care Settings*, Edited by: James Atkinson, Yves Chartier, Carmen Lúcia Pessoa-Silva, Paul Jensen, Yuguo Li and Wing-Hong Seto, ISBN 978 92 4 154785 7 (NLM classification: WX 167), © World Health Organization 2009

<sup>3</sup> *ibid*

<sup>4</sup> *Ventilation control for airborne transmission of human exhaled bio-aerosols in buildings*, Hua Qian, Xiaohong Zheng, School of Energy and Environment, Southeast University, Nanjing 210096, China, <http://dx.doi.org/10.21037/jtd.2018.01.24>

<sup>5</sup> WHO; *Natural Ventilation for Infection Control in Health-Care Settings*, Edited by: James Atkinson, Yves Chartier, Carmen Lúcia Pessoa-Silva, Paul Jensen, Yuguo Li and Wing-Hong Seto, ISBN 978 92 4 154785 7 (NLM classification: WX 167), © World Health Organization 2009

<sup>6</sup> *Study: Restaurant Outbreak In China Suggests Limits To Airborne Transmission of COVID-19*, 22 APRIL 2020, SF NEWS, Jay Barmann, <https://sfist.com/2020/04/22/study-restaurant-covid-19-outbreak-in-china/>

<sup>7</sup> <https://www.cdc.gov/healthywater/swimming/aquatics-professionals/chloramines.html>

<sup>8</sup> *Energy efficiency in indoor aquatic facilities. Thoughtful choices yield significant energy savings*, by Gary Lochner, Unison Comfort Technologies, [innoventair.com](http://innoventair.com)

<sup>9</sup> *ibid*

<sup>10</sup> WHO; *Natural Ventilation for Infection Control in Health-Care Settings*, Edited by: James Atkinson, Yves Chartier, Carmen Lúcia Pessoa-Silva, Paul Jensen, Yuguo Li and Wing-Hong Seto, ISBN 978 92 4 154785 7 (NLM classification: WX 167), © World Health Organization 2009