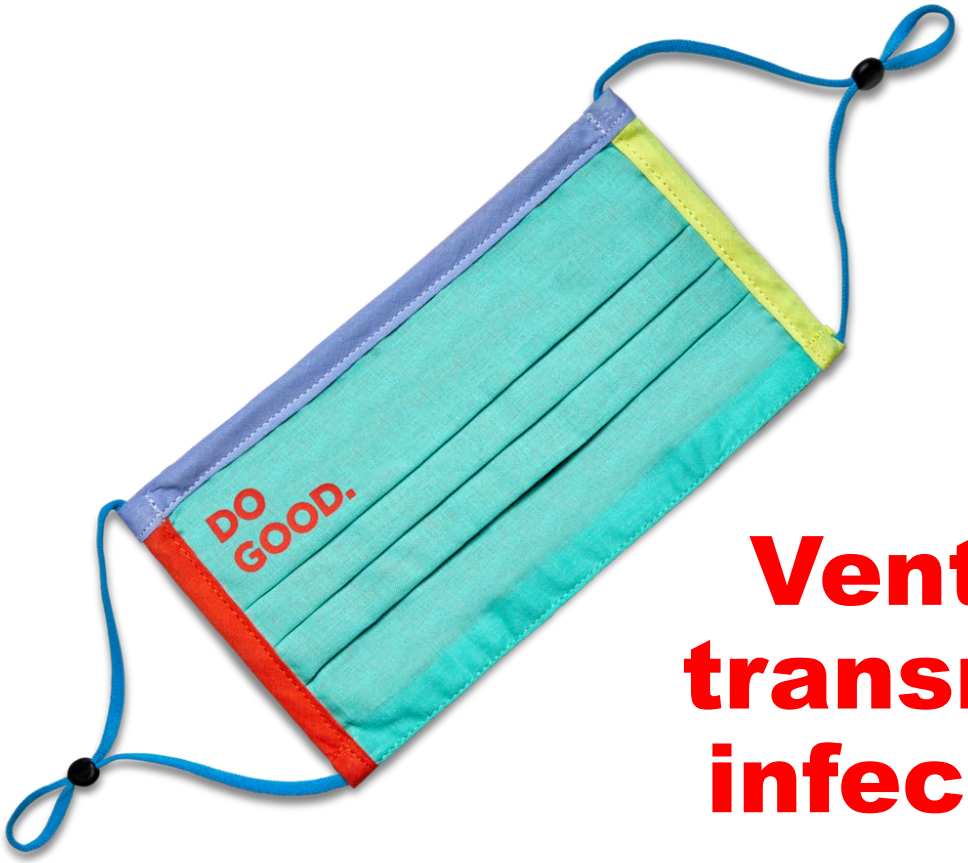

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Ventilation and indoor transmission of airborne infections in residential buildings.

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06-10-2022

About the project

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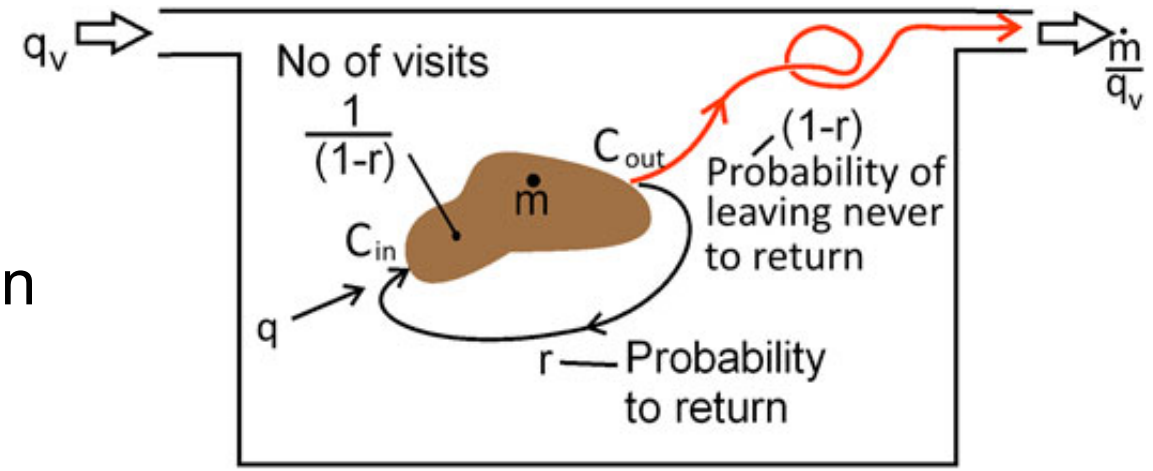
Theoretical and experimental study on ventilation strategies to reduce airborne infection transmission in residential buildings based on the purging flowrate and the visitation frequency concepts within or between rooms.



Objectives

1. Unified epidemic and building compartment model on transmission risk.
2. Experimental and numerical study of ventilation strategies based on unified model

Project duration: 01/2022 to 12/2025

Funder: FORMAS (Dnr 2021-01606)

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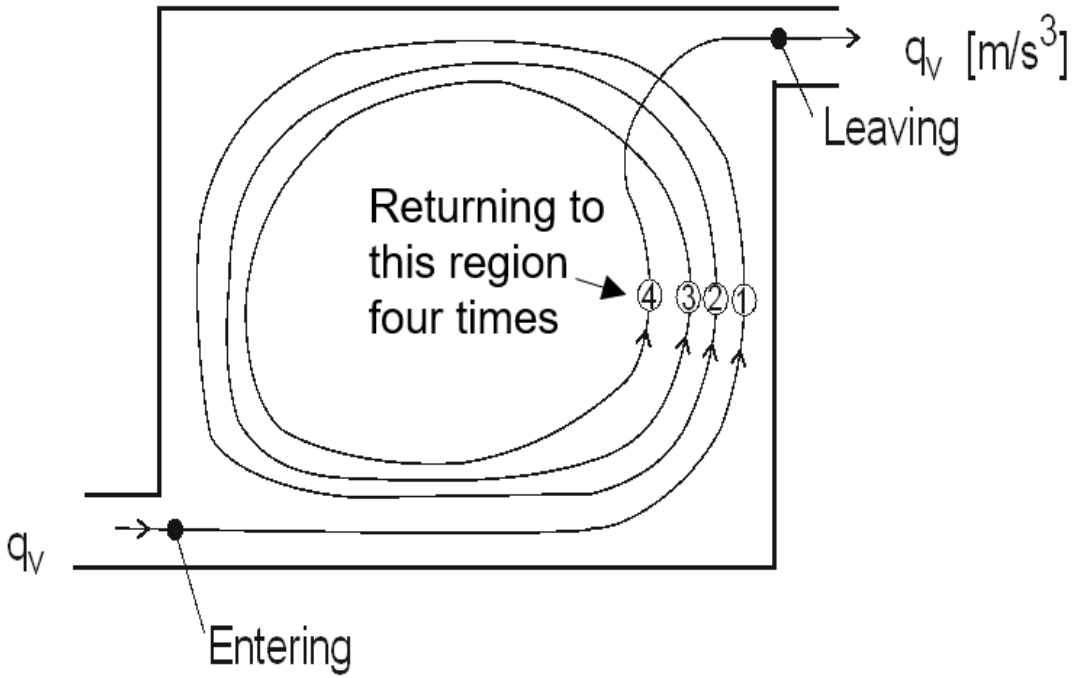
A refined model of the ventilation process



$$Purging\ flow\ rate = \left(1 - \frac{C_{In}}{C_{Out}}\right) q.$$

$$\text{Visitation } frequency = \frac{1}{(1-r)}$$

The ventilation system is reducing the concentration of contaminant agents and spreading them at the same time.

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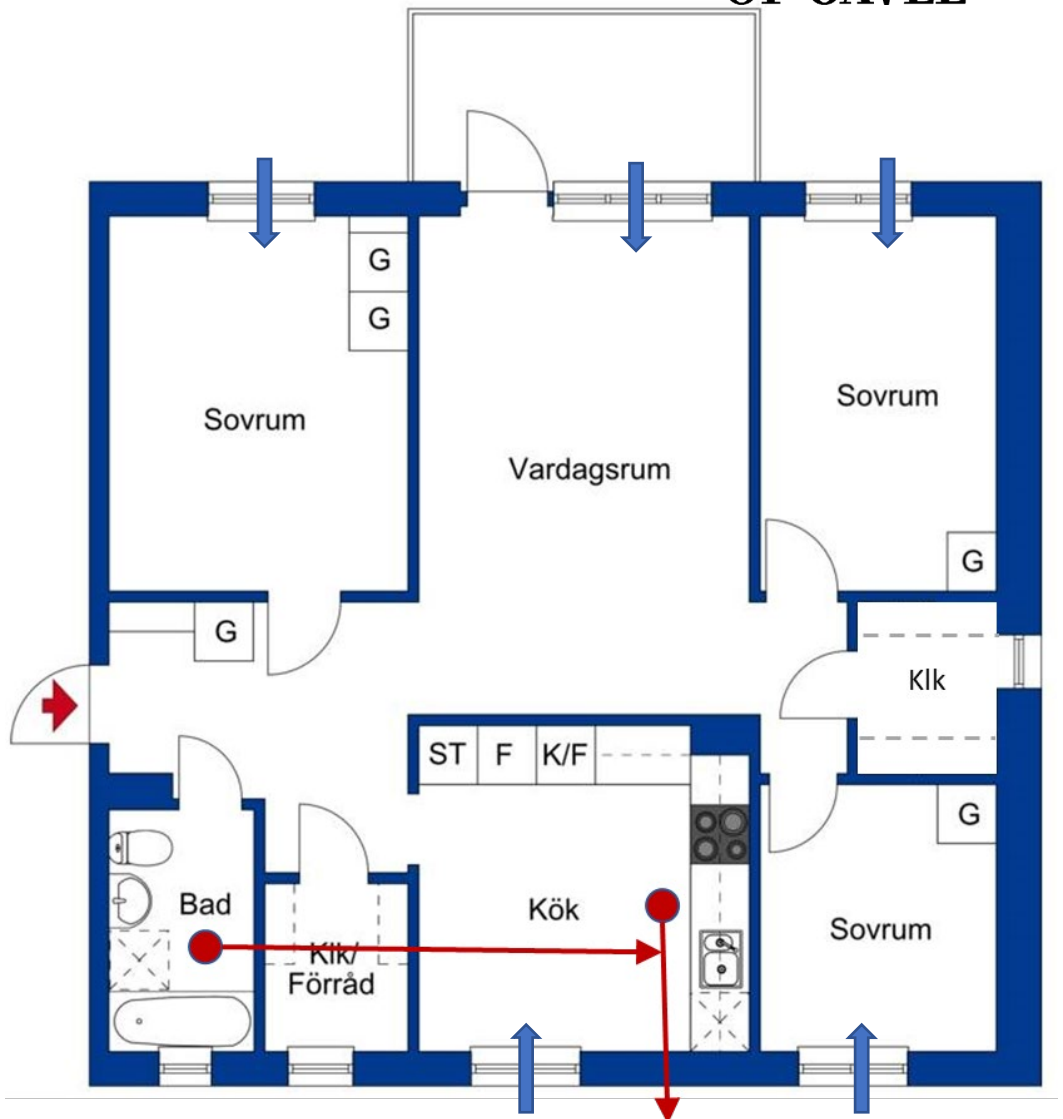
Ventilation in residential buildings



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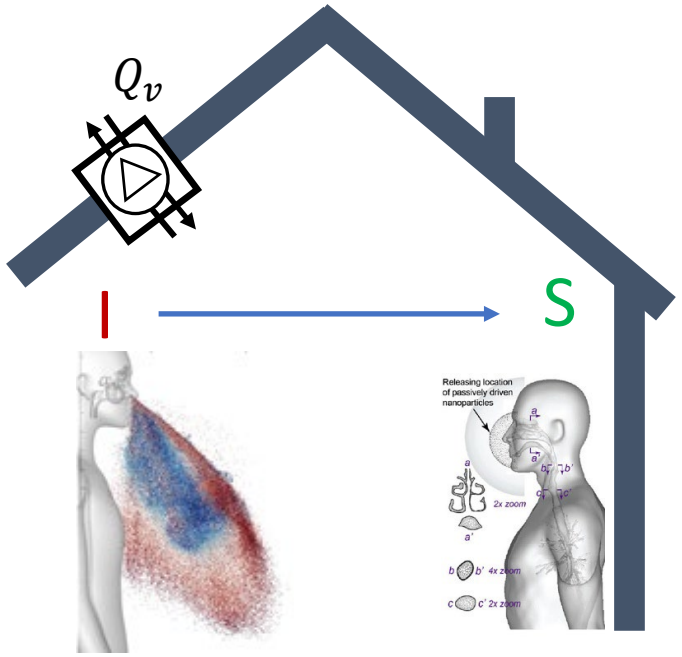
Risk of being infected model

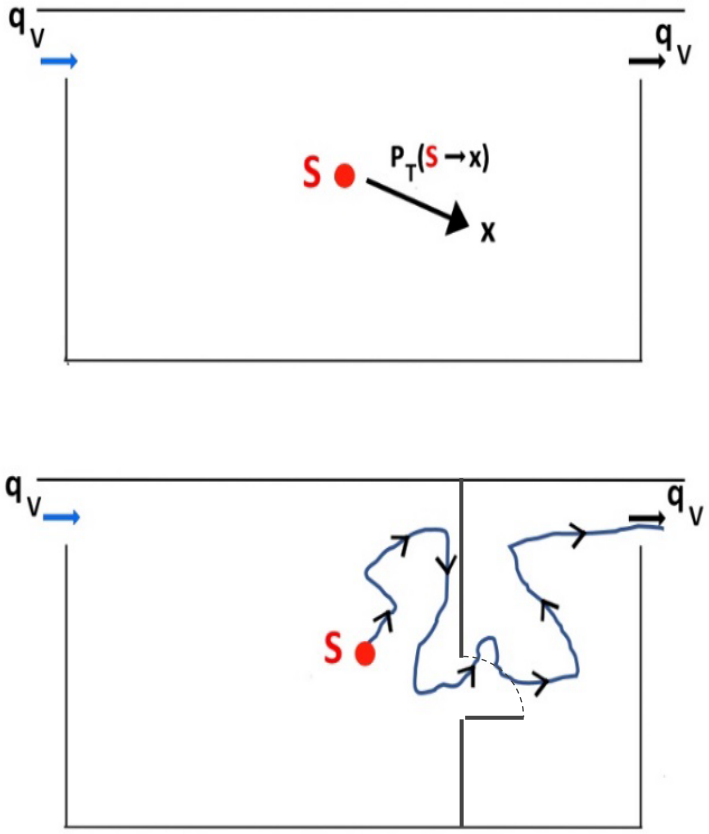
– Epidemic compartment model



$$P_I(x;S) = \left(1 - e^{-\frac{Iqpt}{Q_v}}\right)$$

Wells-Riley model

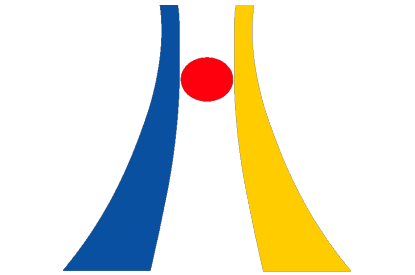
– Building compartment model



$$P_I(x;S) = \left(1 - e^{-\frac{P_T(S \rightarrow x)\, qpt}{Q_p(x)}}\right)$$

The project team

Alan Kabanshi, Mats Sandberg
Elisabet Linden, Mikael Sundberg, Dario Senkic,
Leif Claesson



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