

Indoor Area Assessment

(using the COVID-19 Indoor Safety Guideline - MIT App)

Background Information

This app, uses a theoretical model to calculate safe exposure times and occupancy levels for indoor spaces. By adjusting room specifications, ventilation and filtration rates, face-mask usage, respiratory activities, and risk tolerance (in the other tabs), you can see how to mitigate indoor COVID-19 transmission in different indoor spaces.

This guideline does not consider short-range transmission through respiratory jets, which may substantially elevate risk when face masks are not being worn (*Bazant & Bush, 2020*). " This Quantitative Tool provides the authorities and employers with a clearer reference and objective evidence to support occupancy limits. Please refer to the details on the website for more information <https://indoor-covid-safety.herokuapp.com/>

- *The science behind the app is also taught in a free, self-paced massive, open online course (MOOC) on edX: [10.S95x Physics of COVID-19 Transmission](#)*
- Frequent Asked Questions are also available on the site
- For more detailed explanations and references, see "[Beyond 6 Feet](#)" and other links posted at the top of the webpage.

General Note

1. When you log into the app, information will already be displayed. This is essentially an "illustration" of the output from the app. *This information will be updated as you customize the data for your workplace.*
2. If the viewing magnification is above 80% the layout of the information will be slightly different.
3. These instructions may not reflect changes to the app that were made after August 2022.

COVID-19 Indoor Safety Guideline

[Kasim Khan](#), [John W. M. Bush](#), and [Martin Z. Bazant](#)

Bazant & Bush, A guideline to limit indoor airborne transmission of COVID-19, [PNAS \(2021\)](#), Beyond Six Feet, [medRxiv \(2020\)](#)

Monitoring carbon dioxide to quantify the risk of indoor airborne transmission of COVID-19 ([Bazant et al., 2021](#))

<http://web.mit.edu/bazant/www/COVID-19/>

<https://github.com/kawesomekhan/covid-indoor>

Language:

English

Units:

British

Mode:

Basic

About

Room
Specifications -
Details

Human Behavior -
Details

Frequently Asked
Questions

Room Specifications - Details

Total floor area (sq. ft.):

910

Average ceiling height (ft.):

12

Room Specifications:

Classroom

Human Behavior:

Masks, Speaking

Age Group:

Adults (15-64 years)

Viral Strain:

Omicron (BA.1 South Africa)

Figure 1: View of the App at <80% Magnification

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Language:

English

Units:

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Mode:

Basic

Room Specifications:

Classroom

Figure 2: View of the App at >80% Magnification

Instructions for Use of the App

The order for completion of the instructions does not matter however, steps are provided for clearer guidance.

Step 1 – Get Room Details

- a) Identify and define all indoor spaces separated by partitions and entry points (e.g. lunch room, office 1, office 2, storage room 1 etc).
- b) For each defined room, determine the room dimensions using either building schematics or by measurement.

Step 2 – Administrative Set-up

Go to the webpage <https://indoor-covid-safety.herokuapp.com/> (Screenshot is provided Fig. 1).

- a) **Language**
 - Select “English” (if applicable)
- b) **Units**
 - Select “British”
 - *For this option the measurements to be provided later should be in feet and inches*
- c) **Mode**
 - Select “Basic”
 - *This option is for simplified calculations suitable for a typical workplace*

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Language: English

Units: British

Mode: Basic

Figure 3 - Administrative Set-up

Step 3 – Set the parameters for the assessment

a) **Room Specifications**

- Select “Custom”
- *Considers the different types of rooms ranging from a classroom to a restaurant or even a church*

b) **Human Behaviour**

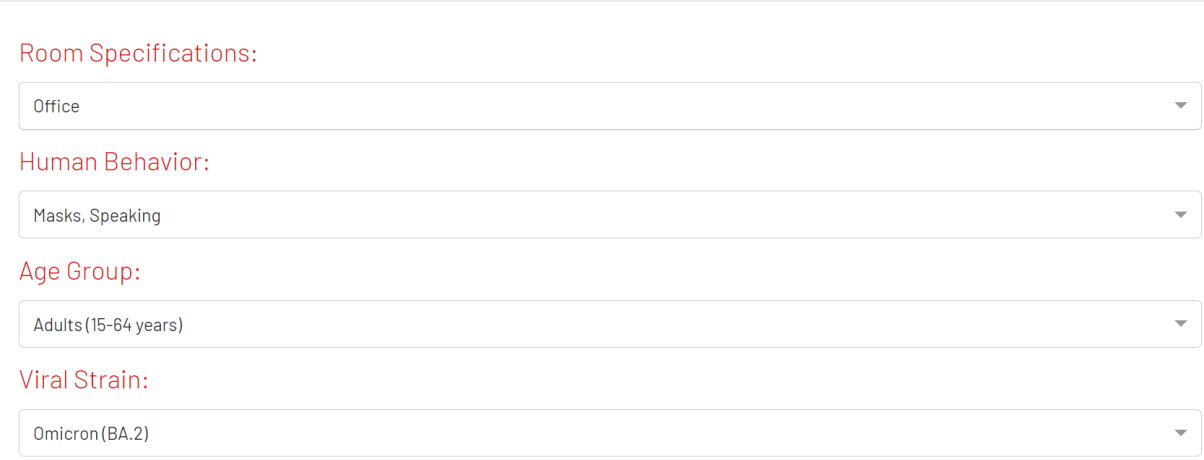
- Select “Custom”
- *Considers the use of masks and the level of respiratory activity (e.g. speaking vs. exercising)*

c) **Age Group**

- Select “ Adults (15-64)” (for a typical workplace)
- *For a school setting or elder-care facility the necessary updates should be made*

d) **Viral Strain**

- Use the most recent strain for which data is available



The screenshot shows a user interface with four sections, each with a dropdown menu. The sections are: 'Room Specifications' with 'Office' selected, 'Human Behavior' with 'Masks, Speaking' selected, 'Age Group' with 'Adults (15-64 years)' selected, and 'Viral Strain' with 'Omicron (BA.2)' selected. Each section title is in red text.

Parameter	Selected Value
Room Specifications	Office
Human Behavior	Masks, Speaking
Age Group	Adults (15-64 years)
Viral Strain	Omicron (BA.2)

Figure 4: Parameters for the assessment

Step 4 –Select the tab labelled “**Room Specifications – Details**” (screenshot provided) and input the following

- a) Total floor area (sq. m) –
 - The product of the length and width of the room (for rectangular shaped rooms)
 - For non-rectangular shaped rooms, divide the room into rectangles, determine each floor area and sum the areas
 - Ensure the Units used are the same as the Units setting chosen previously - “British” = feet and inches (for example)
- b) Average ceiling height – The distance from the floor to the ceiling
 - if you have a room with different ceiling heights you should use the average
- c) Choose the most appropriate selection (that represents the condition of the room) from the dropdown boxes provided:
 - **Option 1: Ventilation**
 - i. Most applicable choices
 - Closed Windows
 - Open Windows
 - ii. Mechanical Ventilation refers to the use of fans for intake and outtake of air (Air conditioning is not a form of mechanical ventilation)
 - **Option 2: Filtration System** (MERV - Minimum Efficiency Reporting Values, or MERV, reports a filter's ability to capture particles. Filters with *MERV-13* or higher ratings can trap smaller particles, including viruses)
 - **Option 3: Recirculation** (Default – Moderate)
- d) Set relative humidity at 60%.
 - According to MIT’s research this is the *average indoor humidity* in most environments
 - If there is a device installed to measure relative humidity input the actual reading in the app

The screenshot shows the 'Room Specifications - Details' tab selected in the app. A blue arrow points to the tab with a box labeled 'Step 4'. The form fields are as follows:

- Total floor area (sq. ft.): 910
- Average ceiling height (ft.): 12
- Ventilation: 3.0 hr⁻¹ (outdoor ACH)
Dropdown menu: Mechanical Ventilation
- Filtration System: MERV 6
Dropdown menu: Residential/Commercial/Industrial
- Recirculation Rate: 1.0 hr⁻¹
Dropdown menu: Moderate
- Relative Humidity: 60%

Figure 5: Section of the app for entering room specification details

Step 5 –Select the tab labelled **Human Behaviour – Details**

- a) based on observations of employees in the room (*including compliance with the company's policies*) choose the most appropriate representation for the following:
- Breathing Rate
 - Respiratory Activity
 - Mask Type/Efficiency
 - Mask Fit/Compliance

Human Behavior - Details

Breathing Rate: 0.29 ft³/min
Resting

Respiratory Activity: 2.04 q/ft³
Talking (normal)

Mask Type/Efficiency: 90%
Disposable Surgical

Mask Fit/Compliance: 95%

Room Specifications: Classroom

Human Behavior: Masks, Speaking

Age Group: Adults (15-64 years)

Viral Strain: Omicron (BA.2)

To limit COVID-19 transmission* after an infected person enters this space, there should be no more than:
2 people for 94 hours (4 days)
5 people for 24 hours

Figure 6: Section of the app for entering Human-behaviour details

Step 6 – Guidance (Generic) from the App

Example using the data (scenario) that is provided when you log into the app

To limit COVID-19 transmission* after an infected person enters this space, there should be no more than:

- 2 people for 122 hours (5 days)
- 5 people for 31 hours
- 10 people for 14 hours
- 25 people for 5 hours
- 100 people for 87 minutes

In contrast, the six-foot (or two-meter) rule would limit occupancy to 25 people which would violate the guideline* after 5 hours (Fig. 7)

To limit COVID-19 transmission* after an infected person enters this space, there should be no more than:

2 people for 7 hours
5 people for 2 hours
10 people for 54 minutes
25 people for 25 minutes
100 people for 10 minutes

In contrast, the six-foot (or two-meter) rule would limit occupancy to 25 people which would violate the guideline* after 25 minutes.

*The guideline restricts the probability of [airborne transmissions](#) per infected person to be less than the risk tolerance (10%) over the cumulative exposure time listed. Other risk scenarios are considered in Advanced Mode. Specifically, one may consider the prevalence of infection in the population, immunity acquired through vaccination or previous exposure, and the risk to a specific individual.

Figure 7: Initial generic output from the App to guide room occupancy limits

Step 7 – Output from the App

Set specific occupancy limits using the information relevant to your workplace

- How much time a specified number of people can stay in a room?
 - Enter the number of persons typically found in the current room being assessed
- How many people can remain in a room for a specified time period
 - Enter the average time a person typically spends in the current room in question

For each room assessed determine whether occupancy guidelines should be set according to time or the number of people. For example, if persons spend a lot of time in the room, occupancy should be set based on time (e.g. lunchroom). In contrast, for a small, high traffic room (e.g. Customer Service Area) the limits should be based on the number of people. A combination of both variables can also be used to set occupancy guidelines.

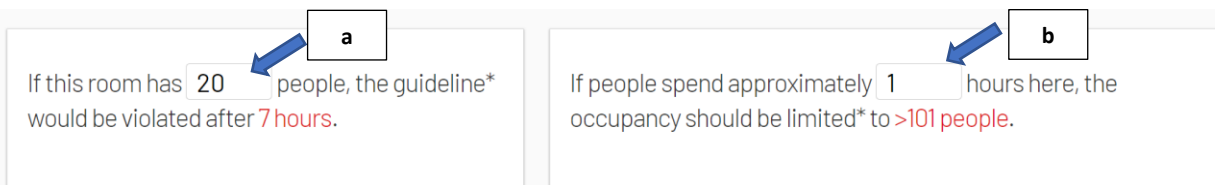


Figure 8: Evaluating room occupancy based on the **a)** number of people and **b)** amount of time they are expected to spend in the space

Step 7 – Record the output from the app in your Risk Assessment Document

- a) Use the results from the assessments to set specific occupancy rules throughout the workplace, particularly for high use, small spaces (lunchrooms, storage rooms, locker rooms, conference rooms)
- b) Evaluate room occupancy based on the number of people and amount of time they are expected to spend in the space
- c) Reminder: a combination of both variables can also be used to set occupancy guidelines

Reminders:

- The app has information in it by default and this is displayed on the main page when you log in.
- Please note the information will be updated as you alter the data in the app.
- Remember, all the required information must be updated for the user to get the customised final update (control strategies to limit the number of people or time in a room).