

## COVID-19 & Altitude

Areas at altitude, such as mountain towns in Colorado, are beautiful places to live and visit. For those with asthma, COPD or other lung diseases, visiting or living at 8,000 feet or more above sea level can make symptoms of pulmonary conditions worse.

The higher you go in elevation, the more the atmospheric pressure lowers. This makes less oxygen in the air for you to inhale. Most people with normal lung function who are used to 8,000 to 10,000 feet in elevation will not have any problems. But people who are not used to higher elevations and those with pulmonary conditions may find it hard to breathe.



## Altitude and COVID-19

Recently, researchers reviewed the number of cases reported at high and low altitude areas of Bolivia, Tibet and Ecuador. Researchers found that individuals whose bodies were used to the lower oxygen environment at altitude may actually be protected from severe effects of COVID-19. Studies have shown that the COVID-19 virus attaches to an enzyme called ACE2 to be able to enter cells in the body. ACE2 is found in multiple organs such as the heart, lungs, kidneys and liver. For those who have adjusted to living at high altitude, their body produces a lower amount of the ACE2 enzyme because they have gotten used to living in an environment with less oxygen. Altogether, it is believed that people who live at higher elevations have a lower chance of being infected with COVID-19 because they create a lower amount of the ACE2 enzyme.

It's important to note that the research findings only apply to those who live at high altitude. Those who travel from lower altitude environments are still at higher risk of severe complications from COVID-19, as they have higher levels of the ACE2 enzyme.

Lower oxygen levels at higher elevations can have a negative impact on those who contract COVID-19. COVID-19 affects the respiratory system by weakening the lung's ability to absorb oxygen normally. When this happens, it can cause difficulties breathing such as shortness of breath. Breathing difficulties can cause dangerously low blood oxygen levels. This increases the need for supplemental oxygen support in high altitude areas.

According to Peter Stubenrauch, MD, a critical care pulmonologist at National Jewish Health, "a COVID-19 patient who only needs a little supplemental oxygen support (e.g., 1-2 liters per minute) in Denver may need two to three times as much if they're in the mountains."

For COVID-19 patients, the chances of being placed on a ventilator is even greater at a high altitude. "The higher you go in elevation, the more oxygen and breathing support a COVID-19 patient may require," explained Dr. Stubenrauch.

To help the recovery process, COVID-19 patients in areas such as Colorado ski towns have been transferred to hospitals in Denver and other areas at lower elevation, according to Dr. Stubenrauch.

## Altitude Sickness and COVID-19

Altitude sickness is a set of symptoms that some may experience when at a higher than normal altitude.

Symptoms of altitude sickness are:

- dizziness
- fatigue
- shortness of breath
- loss of appetite

In more severe cases, altitude sickness may cause chest tightening and severe headache. These symptoms can worsen COVID-19 symptoms. Dr. Stubenrauch advises that patients remain in quarantine, wherever they are, unless directed to move to a lower altitude by their health care provider. During the COVID-19 pandemic, it is best to avoid all non-essential travel, especially to areas of higher altitude. To minimize the spread of the virus and your potential of coming into contact with it, stay home.

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