Caused by a novel coronavirus (SARS-CoV-2), COVID-19 is an infectious disease that was first identified by the World Health Organization in late December 2019. There is significant range on the COVID-19 disease spectrum—from completely asymptomatic or mild infection to advanced disease progression that results in death. Much remains to be determined about the disease—and movement along its various stages—but there is strong evidence that certain populations are particularly vulnerable to adverse consequences and that certain underlying medical conditions exacerbate it. Smokers and smoking fall into these respective categories.

This factsheet provides the most up-to-date information on what is presently known about smoking and COVID-19 during various inflection points; clarifies misinformation; and summarizes biochemical research on tobacco, ACE2 receptors, and SARS-CoV-2.

Smoking and Infection with SARS-CoV-2

In May 2020, the World Health Organization noted that the act of bringing fingers to the lips could increase “the possibility of transmission of viruses from hand to mouth.”1 To date, however, there are limited studies examining the relationship between smoking and SARS-CoV-2 infection. Two are notable. A non-peer reviewed case-control study from Israel2 found that both current and former smokers were at significantly lower infection risk than non-smokers. A study from Kuwait3—it is limited in failing to clearly define smoking—also found that smokers were at lower infection risk. Clarifying the relationship between smoking and infection with SARS-CoV-2 would require testing large samples of the population to locate asymptomatic cases as well as mild ones that do not require hospitalization.

There is presently insufficient information to draw any conclusions about smoking risk and infection.

Smoking and Emergence of COVID-19 symptoms that require an outpatient hospital visit or hospitalization of 24+ hours

Several studies—from the US4, the UK5, Denmark6 and Mexico (none were peer reviewed)7 8 9 10 11 12—found that smokers are less likely to develop significant COVID-19 symptoms. Because all four include positive and negative patients and compare the two groups for smoking risk, they support the hypothesis that smoking is less prevalent among confirmed COVID-19 cases. At the same time, however, the studies demonstrate two significant limitations—major misclassification of smokers and reliance on hospital records to determine smoking status—that might skew the findings in significant ways.

Additional research is critical to understanding the relationship between smoking and hospitalization (in or outpatient) from COVID-19.

Smoking and Advanced COVID-19 Disease Progression: ICU Admission, Mechanical Ventilation and Mortality

There is sufficient evidence to conclude that the world’s 1.3 billion smokers—eighty percent of whom live in low- and middle-income countries—are at increased risk of advanced COVID-19 disease progression that results in grave consequences.

Data regarding advanced disease progression first emerged in February 2020, with a seminal piece of research providing the first indication that smokers were disproportionately affected by COVID-19. Study authors noted that when compared to non-smokers, infected smokers were 2.4 times more likely to be admitted to an intensive care unit, need mechanical ventilation, or die. Several weeks later, a second study out of China found that while smokers accounted for just 8 percent of total cases, they comprised 12 percent of severe cases. A subsequent systematic review and six meta-analyses also determined that smoking (past or present) was associated with elevated risk of severe COVID-19 outcomes. And, the U.S. Centers for Disease Control cautions that smoking—present or past—predisposes adults of all ages to “increased risk of severe illness from the virus that causes COVID-19.”

Smokers are at increased risk of the worst outcomes associated with COVID-19.

Nicotine and COVID-19

In April 2020, three studies garnered significant attention for bold claims that nicotine use and/or smoking might have a protective effect against COVID-19. Collectively referred to as the “French studies,” they occupied headlines, confused people, and put tobacco control advocates on the defensive. As desperate people engaged in panic-induced purchase of nicotine replacement therapies, the French government temporarily limited product sales. As noted by the World Health Organization and STOP these studies are fraught with problems.

Nicotine should not be consumed in the hopes that it will prevent COVID-19.

Biochemistry, Smoking and COVID-19

Biochemists are in general agreement that SARS-CoV-2, the virus that causes COVID-19, enters human cells through the ACE2 receptor. They are, however, divided on whether smoking and nicotine upregulates or downregulates ACE2 activity, which could affect the chance of SARS-CoV-2 entering cells. Upregulation might, as certain researchers have proposed, create a cytokine storm, which would exacerbate COVID-19 outcomes.

The relationship between smoking and ACE2 receptors is unclear; additional research is critical.