



Rapid Review: What is the effect of the COVID-19 pandemic on the use and cessation of tobacco and vaping products?

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The authors declare they have no conflicts of interest to report.

Executive Summary

Background

The coronavirus 2019 (COVID-19) pandemic and related public health measures may have affected people's health behaviours and stress-reduction strategies. The availability of public health programs to support healthy behaviours and provide options for tobacco and vaping cessation may have been limited, due to lockdowns and competing priorities of pandemic response. Evidence related to the use of tobacco and vaping products during the pandemic may help public health decision makers to respond effectively to current usage patterns and public interest in cessation.

This rapid review was produced to support public health decision makers' response to the COVID-19 pandemic. This review seeks to identify, appraise, and summarize emerging research evidence to support evidence-informed decision making.

This rapid review includes evidence available up to October 26, 2020 to answer the question: **What is the effect of the COVID-19 pandemic on the use and cessation of tobacco and vaping products?**

Key Points

- There was no clear direction of effect of the COVID-19 pandemic on use of tobacco or vaping products. Most cross-sectional studies reported a mixed result, that some smokers increased their use during the pandemic, some decreased their use, and others did not change their use. The factors associated with an increase versus a decrease in smoking were not clearly identified in the research. The overall certainty of this evidence is very low (GRADE), and findings are very likely to change as more evidence accumulates.
- There was no clear effect of the COVID-19 pandemic on cessation or cessation attempts. Studies reported cessation rates of 8-21% among smokers since the pre-pandemic period, with 36-40% of smokers making a cessation attempt. However, the comparison of these cessation and attempt rates to pre-pandemic rates is generally not reported, so it is not possible to determine whether this was an increased rate. The overall certainty of this evidence is very low (GRADE), and findings are very likely to change as more evidence accumulates.

Overview of Evidence and Knowledge Gaps

- Factors that may be associated with increases in use of tobacco and vaping include reported anxiety or depression, female gender, unemployment, low educational level, younger age or age over 50 years. Individuals' perceived risk of worse COVID-19 infection outcomes due to smoking was shown to be related both to decreases and increases in tobacco use, and to an increased motivation to quit in two studies.
- Stockpiling tobacco and vaping products to avoid shortages was reported in two studies, with 14.5% of users reporting stockpiling vaping products (1 study) and 20-67% of users reporting stockpiling tobacco products (2 studies).

- The association between any changes in tobacco or vaping use and the timing of pandemic measures such as lockdown, movement restrictions or curfews is not clear from the research.
- No clear effect of country or jurisdiction was found across studies. No Canadian studies were identified.
- Almost all of the available research is cross-sectional, which raises questions about response rate, accuracy of self-reports, and representativeness of the samples.
- There are very few studies (n=5) that report on vaping and e-cigarette use related to the pandemic.

Methods

Research Question

What is the effect of the COVID-19 pandemic on the use and cessation of tobacco and vaping products?

Search

On October 26, 2020, the following databases were searched using key terms tobacco, cigarette, smok*, vaping, e-cigarette, and cessation:

- Pubmed's curated COVID-19 literature hub: [LitCovid](#)
- [Trip Medical Database](#)
- World Health Organization's [Global literature on coronavirus disease](#)
- [COVID-19 Evidence Alerts](#) from McMaster PLUS™
- [Public Health +](#)
- [COVID-19 Living Overview of the Evidence \(L·OVE\)](#)
- [McMaster Health Forum](#)
- Cochrane Rapid Reviews [Question Bank](#)
- [Prospero Registry of Systematic Reviews](#)
- NCCMT [COVID-19 Rapid Evidence Reviews](#)
- [MedRxiv preprint server](#)
- NCCDH [Equity-informed Responses to COVID-19](#)
- NCCEH [Environmental Health Resources for the COVID-19 Pandemic](#)
- NCCHPP [Public Health Ethics and COVID-19](#)
- NCCID [Public Health Quick Links](#)
- NCCID [Disease Debrief](#)
- NCCIH [Updates on COVID-19](#)
- [Institute national d'excellence en santé et en services sociaux \(INESSS\)](#)
- [Uncover \(USHER Network for COVID-19 Evidence Reviews\)](#)
- [Alberta Health Services](#)
- [Public Health Ontario](#)
- Centers for Disease Control and Prevention's [Morbidity and Mortality Weekly Report](#)

A copy of the full search strategy is available at this [link](#).

Study Selection Criteria

The search results were first screened for recent guidelines and syntheses. Single studies were included if no syntheses were available, or if single studies were published after the search was conducted in the included syntheses. English-language, peer-reviewed sources and sources published ahead-of-print before peer review were included. Expert opinion sources were excluded. Surveillance sources were excluded.

	Inclusion Criteria	Exclusion Criteria
Population	General population	Clinical populations: COVID-19 patients, mental health patients, cardiac patients etc.
Intervention	COVID-19 pandemic	
Comparisons	Prior to COVID-19 pandemic	
Outcomes	Use of tobacco products, including cigarettes Use of vaping products and e-cigarettes Tobacco/vaping cessation, cessation attempts or cessation intention Resumption of tobacco or vaping product use	Symptoms/outcomes of COVID-19 infection in people who use tobacco or vaping products Cannabis Traditional/Indigenous uses of tobacco

Data Extraction and Synthesis

Data relevant to the research question, such as study design, setting, location, population characteristics, interventions or exposure and outcomes were extracted when reported. We synthesized the results narratively due to the variation in methodology and outcomes for the included studies.

Appraisal of Evidence Quality

We evaluated the quality of included evidence using critical appraisal tools as indicated by the study design below. Quality assessment was completed by one reviewer and verified by a second reviewer. Conflicts were resolved through discussion.

Study Design

Cohort

Cross-sectional

Critical Appraisal Tool

Joanna Briggs Institute (JBI) [Checklist for Cohort Studies](#)

Joanna Briggs Institute (JBI) [Checklist for Analytical Cross Sectional Studies](#)

Completed quality assessments for each included study are available on request.

The Grading of Recommendations, Assessment, Development and Evaluations ([GRADE](#)) approach was used to assess the certainty in the findings based on eight key domains.

In the GRADE approach to quality of evidence, **observational studies**, as included in this review, provide **low quality** evidence, and this assessment can be further reduced based on other domains:

- High risk of bias
- Inconsistency in effects
- Indirectness of interventions/outcomes
- Imprecision in effect estimate
- Publication bias

and can be upgraded based on:

- Large effect
- Dose-response relationship
- Accounting for confounding.

The overall certainty in the evidence for each outcome was determined taking into account the characteristics of the available evidence (observational studies, some not peer-reviewed, unaccounted-for potential confounding factors, different tests and testing protocols, lack of valid comparison groups). A judgement of 'overall certainty is very low' means that the findings are very likely to change as more evidence accumulates.

Findings

Summary of Evidence Quality

This document includes two in-progress syntheses and 33 single studies, for a total of 35 publications included in this review. The quality of the evidence included in this review is as follows:

Research Question	Evidence included		Overall certainty in evidence
What is the effect of the COVID-19 pandemic on the use and cessation of tobacco and vaping products?	In-progress syntheses	2	Very Low
	Single studies	33	

Warning

Given the need to make emerging COVID-19 evidence quickly available, many emerging studies have not been peer reviewed. As such, we advise caution when using and interpreting the evidence included in this rapid review. We have provided a summary of overall certainty of the evidence to support the process of decision making. Where possible, make decisions using the highest quality evidence available.

Table 1: In-Progress Syntheses

Reference	Anticipated Release Date	Description of document
Currie, C. L., Larouche, R., Voss, M. L., Higa, E. K., Spiwak, R., Scott, D., & Tallow, T. (2020). The impact of eHealth group interventions on the mental, behavioral, and physical health of adults: A systematic review protocol . <i>Systematic Reviews</i> . BioMed Central Ltd. <i>PROSPERO</i> , CRD42020187551.	Oct 30, 2020	This review will summarize the evidence for eHealth group counseling and coaching programs supporting population-based mental health and wellbeing among community-dwelling adults. One primary outcome will be behavioral health conditions, including smoking.
Hughes, S., Canfell, K., Carle, C., Caruna, M., Egger, S., Ginsburg, O., ... Soerjomataram, I. (2020). Is the COVID-19 pandemic associated with changes in tobacco smoking behaviour? A systematic review . <i>PROSPERO</i> , CRD42020206383.	Dec 31, 2020	This review will report on whether the COVID-19 pandemic is associated with changes in tobacco smoking behaviour, including initiation, intensity, and cessation.

Table 2: Single Studies of Tobacco Smoking

Reference	Date Released	Study Design	Country	Population	Summary of findings	Quality Rating:
Africa						
Matsungu, T. M., & Chopera, P. (2020). Effect of the COVID-19-induced lockdown on nutrition, health and lifestyle patterns among adults in Zimbabwe . <i>BMJ Nutrition, Prevention & Health</i> .	Sep 1, 2020	Cross-sectional	Zimbabwe	n=507 adults aged 18 or older; most between 31-40 years	<p>Compared to pre-pandemic smoking behaviour, this online survey of adults in Zimbabwe found:</p> <ul style="list-style-type: none"> • 45.9% increased their smoking. <p>A higher proportion of participants with symptoms of generalized anxiety disorder reported increases in smoking (55.2%, p=0.133)</p> <p>Limitations of this study include the potential for under-representation of people from lower socioeconomic groups and rural settings.</p>	Moderate
Americas						
Sharma, P., Ebbert, J. O., Rosedahl, J. K., & Philpot, L. M. (2020). Changes in substance use among young adults during a respiratory disease pandemic . <i>SAGE Open Medicine</i> . Epub ahead of print.	Oct 14, 2020	Cross-sectional	United States	n=1,018 young adults aged 18-25	<p>Compared to pre-pandemic smoking and vaping behaviour, a survey of young adults in a mixed urban/rural Midwestern USA setting found that:</p> <ul style="list-style-type: none"> • 9.6% increased and 15.1% decreased their use of vaping products • 8.3% increased and 16.2% decreased their use of tobacco products <p>Substance use changes were reported (including all substances, and with change in either direction) for respondents with increasing degree of loneliness (continuous loneliness score: prevalence ratio = 1.12, 95% CI 1.01–1.25), anxiety (prevalence ratio = 1.45, 95% CI 1.14–1.85), and depression (prevalence ratio = 1.44, 95% CI 1.13–1.82).</p> <p>Limitations include low response rate (16.6%) and a reliance on self-reported data.</p>	Moderate

Weber, C.A.T., Teixeira Monteiro, I., Medeiros Gehrke, J., & Silva de Souza, W. (2020). The Use of Psychoactive Substances in the Context of the Covid-19 Pandemic in Brazil . <i>Preprint</i> .	Sep 27, 2020	Cross-sectional	Brazil	n=1,145 adults aged 18 or older; mean age 37 years	Compared to pre-pandemic smoking behaviour, an online social media survey of adults in Brazil found: <ul style="list-style-type: none"> • A significant reduction in the consumption of tobacco (P<0.001). Limitations include lack of generalizability due to convenience sampling and the overrepresentation of white, educated, employed females in the survey.	Moderate; <i>PREPRINT</i>
Malta, D.C, Szwarcwald, C.L., de Azevedo Barros, M.B., Gomes, C.S., Machago, I.E., de Souza Junior, P.R., ... Gracie, R. (2020). The COVID-19 Pandemic and changes in adult Brazilian lifestyles: a cross-sectional study, 2020 . <i>Epidemiol. Serv. Saude, Brasilia, 29</i> (4), e2020407.	Sep 25, 2020	Cross-sectional	Brazil	n=45,161 adults aged 18 or older	Compared to pre-pandemic smoking behaviour, an online survey of adults in Brazil found: <ul style="list-style-type: none"> • 12.1% had reduced smoking • 53.9% had not changed their smoking habits • 6.4% smoked around 5 more cigarettes daily • 22.5% smoked around 10 more cigarettes daily • 5.1 % smoked at least 20 more cigarettes daily More women reported increasing their daily cigarettes than men.	Low
Chertok, I.R.A. (2020). Perceived risk of infection and smoking behavior change during COVID-19 in Ohio . <i>Public Health Nursing</i> . Epub ahead of print.	Sep 21, 2020	Cross-sectional	United States	n=810 adults aged 18 or older; mean age 35.5 years	Compared to pre-pandemic smoking behavior, a survey of current or recent smokers found: <ul style="list-style-type: none"> • 35% increased their frequency of smoking • 21% decreased their frequency of smoking • 43% reported smoking as frequently • 36.7% had attempted to quit since the start of the pandemic. Having diabetes (adjusted odds ratio (OR) 6.984, 95% CI 1.781, 27.387) or a perceived risk of severe COVID-19 infection (adjusted OR 1.185, 95% CI 1.114, 1.376) were associated with having a desire to quit smoking. Limitations include possible selection bias and over-representation of females in study sample.	Moderate

<p>Knell, G., Robertson, M. C., Dooley, E. E., Burford, K., & Mendez, K. S. (2020). Health Behavior Changes During COVID-19 Pandemic and Subsequent "Stay-at-Home" Orders. <i>International Journal of Environmental Research and Public Health</i>, 17(17), 6268.</p>	<p>Aug 28, 2020</p>	<p>Cross-sectional</p>	<p>United States</p>	<p>n=1,809 adults aged 18 or older</p>	<p>Compared to pre-pandemic smoking behaviour, a survey of US adults found:</p> <ul style="list-style-type: none"> • 30.5% increased their tobacco use • 19.2% decreased their tobacco use • 50.3% stayed the same <p>Those with a college education (OR = 0.29, 95%CI: 0.10,0.80) and those unemployed/having an "other" job status (OR = 0.11, 95%CI: 0.02,0.58) had lower odds of reporting a decrease in tobacco use.</p> <p>Females had greater odds (OR = 2.46, 95%CI: 1.10,5.47) of reporting an increase in tobacco use.</p> <p>Those aged 50 and older had lower odds (OR = 0.31, 95%CI: 0.10,0.92) of reporting an increase in tobacco use.</p> <p>Limitations include lack of generalizability as a high proportion of respondents were female, highly educated and non-Hispanic white.</p>	<p>Moderate</p>
<p>Kowitt, S. D., Cornacchione Ross, J., Jarman, K. L., Kistler, C. E., Lazard, A. J., Ranney, L. M., ... Goldstein, A. O. (2020). Tobacco Quit Intentions and Behaviors among Cigar Smokers in the United States in Response to COVID-19. <i>International Journal of Environmental Research and Public Health</i>, 17(15), 5368.</p>	<p>Jul 25, 2020</p>	<p>Cross-sectional</p>	<p>United States</p>	<p>n=777 adults aged 18 or older; mean age 39.9 years</p>	<p>An online survey of cigar users found:</p> <ul style="list-style-type: none"> • 76% perceived higher risk of COVID-19 complications compared to non-smokers • 70% planned to quit in next 6 months due to perceived COVID-19 risk <p>Since COVID-19 started:</p> <ul style="list-style-type: none"> • 46% had made at least one quit attempt • 40.9% had increased tobacco use • 17.8% had decreased tobacco use <p>Limitations of the study include a small sample size.</p>	<p>Low</p>

<p>DiClemente, R., Capasso, A., Ali, S., Jones, A., Foreman, J., & Tozan, Y. (2020). Knowledge, beliefs, mental health, substance use, and behaviors related to the COVID-19 pandemic among U.S. adults: A national online survey. <i>Preprint.</i></p>	<p>Jul 21, 2020</p>	<p>Cross-sectional</p>	<p>United States</p>	<p>n=6,391 adults aged 18 or older; approx. half were aged 50-69 years</p>	<p>An online survey of adults recruited through Facebook found that COVID-19-related anxiety and depression were associated with:</p> <ul style="list-style-type: none"> • Increased smoking (adjusted OR=2.17; 95% CI=1.64, 2.88, p<0.001). <p>High stress scores were associated with:</p> <ul style="list-style-type: none"> • Increased smoking (adjusted OR=1.75; 95% CI=1.31, 2.33, p<0.001). <p>Limitations include lack of generalizability as a high proportion of respondents were older, female, and non-Hispanic white.</p>	<p>Moderate; <i>PREPRINT</i></p>
<p>Klemperer, E. M., West, J. C., Peasley-Miklus, C., & Villanti, A. C. (2020). Change in Tobacco and Electronic Cigarette Use and Motivation to Quit in Response to COVID-19. <i>Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco, 22(9), 1662–1663.</i></p>	<p>Apr 28, 2020</p>	<p>Cross-sectional</p>	<p>United States</p>	<p>n=366 adults aged 21 or older; mean age 35.3 years</p>	<p>An online survey of current or recent dual users (tobacco and e-cigarette) who had ever made an e-cigarette quit attempt found that in April 2020, during the pandemic:</p> <ul style="list-style-type: none"> • Decreased use of cigarettes was reported by 28.3% • No change in use of cigarettes was reported by 41.4% • Increased use of cigarettes was reported by 30.3% • Perceived risk of harm was not associated with change in use of cigarettes or e-cigarettes. <p>Limitations include that the sample was largely white and male.</p>	<p>Low</p>

Asia						
Siddiqi, K., Siddiqui, F., Khan, A., Ansaari, S., Kanaan, M., Khokhar, M., ... Bauld, L. (2020). The impact of COVID-19 on smoking patterns in Pakistan: findings from a longitudinal survey of smokers . <i>Nicotine & Tobacco Research</i> . Epub ahead of print.	Oct 8, 2020	Cohort	Pakistan	n=6,014 smokers aged 15 or older; mean age 45 years	<p>A longitudinal survey of cigarette smokers aged 15 and over, conducted before and twice during lockdown, found:</p> <ul style="list-style-type: none"> • 14% quit smoking, of which 39.3% subsequently relapsed <p>Among those who continued smoking:</p> <ul style="list-style-type: none"> • 68% reduced, 14% maintained, and 18% increased their cigarette consumption • The mean number of cigarettes smoked per day dropped from 14 to 9 • 37% made at least one quit attempt • 41% were more motivated to quit • 21% were less motivated to quit <p>Those who increased their cigarette consumption were more likely to be single, younger, and less dependent on tobacco.</p> <p>There were no statistically significant differences between groups on mental health and wellbeing outcomes.</p> <p>Limitations include reliance on self-reported data and a limited time frame (e.g. some of the reported changes may have occurred prior to COVID-19).</p>	Moderate

<p>Gupte, H., Mandal, G., & Jagiasi, D. (2020). How has the COVID-19 pandemic affected tobacco users in India: Lessons from an ongoing tobacco cessation program. <i>Tobacco Prevention & Cessation</i>, 6(September):53.</p>	<p>Sep 1, 2020</p>	<p>Cross-sectional</p>	<p>India</p>	<p>n=650 adults, age not specified</p>	<p>Compared to pre-pandemic smoking behaviour, this study of participants under active follow-up in a tobacco cessation program in India found:</p> <ul style="list-style-type: none"> • 30% of the users felt that the pandemic had affected their tobacco use due to unavailability (45%) and increased prices of tobacco products (27%) • 24% saw the pandemic as an opportunity to quit • 4% reported increased tobacco use due to increased stress • The proportion of smokers, smokeless tobacco users and dual users who stopped their use due to the lockdown was 13%, 22% and 18%, respectively, with the overall proportion being 17% • 51% of those who quit did so because of the lockdown or concerns over COVID-19 • Abstinence among those who were aware of the association between the coronavirus and tobacco was twice that among those who were not aware. <p>Limitations include generalizability of the findings to all tobacco users.</p>	<p>Moderate</p>
<p>Ahmed, I., Hasan, M., Akter, R., Kumar Sarkar, B., Rahman, M., Sarker, S., & Samad, M. A. (2020). Behavioral preventive measures and the use of medicines and herbal products among the public in response to Covid-19 in Bangladesh: A cross-sectional study. <i>Preprint</i>.</p>	<p>Aug 17, 2020</p>	<p>Cross-sectional</p>	<p>Bangladesh</p>	<p>n= 1,222 adults aged 18 or older; mean age 30.8 years</p>	<p>Compared to pre-pandemic smoking behaviours this survey of adults in Bangladesh found:</p> <ul style="list-style-type: none"> • 48.6% of participants reported smoking less frequently 	<p>Moderate; PREPRINT</p>

<p>Luk, T. T., Zhao, S., Weng, X., Wong, J. Y.-H., Wu, Y. S., Ho, S. Y., ... Wang, M. P. (2020). Exposure to health misinformation about COVID-19 and increased tobacco and alcohol use: a population-based survey in Hong Kong. <i>Tobacco Control</i>. Epub ahead of print.</p>	<p>Aug 13, 2020</p>	<p>Cross-sectional</p>	<p>China</p>	<p>n=1,501 adults aged 18 or older</p>	<p>Compared to pre-pandemic smoking behaviour, this survey of adults in China found:</p> <ul style="list-style-type: none"> • 19.0% (95% CI 16.8%-21.4%) of respondents reported exposure to misinformation regarding tobacco as protective against COVID-19 • 15.6% of current tobacco users reported having increased their tobacco consumption • Having been exposed to misinformation was associated with increased tobacco use (OR 2.37, 95% CI 1.08 to 5.20) in current tobacco users (n=280) <p>Limitations of the study include cross-sectional design, small sample size and self-reported measures.</p>	<p>Moderate</p>
<p>Ma, L., Gao, L., Tak-Fai Lau, J., Atif, R., Johnson, B. T., Yan, A. F., ... Xue, Q.-L. (2020). Mental distress and its associations with behavioral outcomes during the COVID-19 pandemic: A national survey of Chinese adults. <i>Preprint</i>.</p>	<p>Aug 12, 2020</p>	<p>Cross-sectional</p>	<p>China</p>	<p>n=10,545 adults aged 18-80</p>	<p>Compared to pre-pandemic smoking behaviour, this online survey of adults in China found:</p> <ul style="list-style-type: none"> • Among current smokers, greater mental distress was associated with increased tobacco consumption [OR=1.42, 95% CI 1.20-1.68 and OR=1.54, 95% CI 1.31-1.82 per one SD increase in mental distress]. <p>Limitations of the study include cross-sectional design and self-reported measures.</p>	<p>Moderate; PREPRINT</p>
<p>Sun, Y., Li, Y., Bao, Y., Meng, S., Sun, Y., Schumann, G., ... Shi, J. (2020). Brief Report: Increased Addictive Internet and Substance Use Behavior During the COVID-19 Pandemic in China. <i>The American Journal on Addictions</i>, 29(4), 268–270.</p>	<p>Jun 18, 2020</p>	<p>Cross-sectional</p>	<p>China</p>	<p>n=6,416, age not specified</p>	<p>This online survey of addictive behaviors during the pandemic found:</p> <ul style="list-style-type: none"> • Overall proportions of self-reported smoking increased from 12.8% pre-pandemic to 13.6% during the pandemic, although the significance of this difference is not reported • 25% of ex-smokers had resumed smoking during the pandemic • 20% of regular smokers increased their usage • 8.4% of regular smokers quit smoking • 6.7% of occasional smokers were smoking regularly 	<p>Moderate</p>

Europe						
<p>Jackson, S. E., Garnett, C., Shahab, L., Oldham, M., & Brown, J. (2020). Association of the Covid-19 lockdown with smoking, drinking, and attempts to quit in England: an analysis of 2019-2020 data. <i>Addiction</i>. Epub ahead of print.</p>	Oct 21, 2020	Longitudinal	England	n=20,558 smokers aged 16 or older	<p>Compared to pre-pandemic prevalence rates of smoking and smoking cessation, a survey of adults in England aged 16 and over found, among past-year smokers, an increase in:</p> <ul style="list-style-type: none"> • Quit attempts (39.6% vs. 29.1%, adjusted OR 1.56, 95% CI 1.23-1.98) • Cessation (8.8% vs. 4.1%, adjusted OR 2.63, 95% CI 1.69-4.09) <p>The pandemic lockdown was not associated with a significant change in smoking prevalence.</p> <p>There was no significant change in use of evidence-based support among smokers who tried to quit, but use of remote support increased (10.9% vs. 2.7%, adjusted OR 3.59, 95% CI 1.56-8.23).</p>	Moderate
<p>Vanderbruggen, N., Matthys, F., Van Laere, S., Zeeuws, D., Santermans, L., Van den Ameele, S., & Crunelle, C. L. (2020). Self-Reported Alcohol, Tobacco, and Cannabis Use during COVID-19 Lockdown Measures: Results from a Web-Based Survey. <i>European Addiction Research</i>. Epub ahead of print.</p>	Sep 22, 2020	Cross-sectional	Belgium	n=3,632 adults aged 18 or older; mean age 42 years	<p>Compared to pre-pandemic smoking behaviour, a survey of Belgian adults found:</p> <ul style="list-style-type: none"> • 15.4% smoked before lockdown • 1% quit smoking during lockdown • 0.9% started smoking during lockdown • 7.4% smoked more than before lockdown • 2.5% smoked less than before lockdown. <p>The average number of cigarettes smoked per day among smokers increased from 1.5 (SD: 4.5) before lockdown to 1.7 (SD: 5.5) during lockdown.</p> <p>Age was inversely associated with odds of smoking more during lockdown (OR 0.99, 95% CI 0.98, 1.00, $p = .027$). Living alone ($p < .001$), having a vocational educational level ($p = .04$), or being at home more due to technical unemployment ($p = 0.01$) were also associated with smoking more during lockdown.</p> <p>Limitations include that females and healthcare workers were overrepresented in the study sample compared to the adult Belgian population.</p>	Moderate

<p>Rolland, B., Haesebaert, F., Zante, E., Benyamina, A., Haesebaert, J., & Franck, N. (2020). Global Changes and Factors of Increase in Caloric/Salty Food Intake, Screen Use, and Substance Use During the Early COVID-19 Containment Phase in the General Population in France: Survey Study. <i>JMIR Public Health and Surveillance</i>, 6(3), e19630.</p>	<p>Sep 18, 2020</p>	<p>Cross-sectional</p>	<p>France</p>	<p>n=11,391 adults aged 16 or older; mean age 47.5 years</p>	<p>Compared to pre-pandemic smoking behavior, a survey of adults aged 16 and older in France found:</p> <ul style="list-style-type: none"> • 8.7% increased their tobacco use • 5.2% decreased their tobacco use • 10.6% had no change in tobacco use <p>Those reporting an increase in tobacco use were more likely to be female, aged older than 50 years, single, have a lower level of education, a job seeker, have lower wellbeing, have a higher level of stress and still working in the workplace.</p> <p>Limitations include the use of a convenience sample, although data were weighted by age and gender based on French census.</p>	<p>Moderate</p>
<p>Niedzwiedz, C. L., Green, M. J., Benzeval, M., Campbell, D., Craig, P., Demou, E., ... Katikireddi, S. V. (2020). Mental health and health behaviours before and during the initial phase of the COVID-19 lockdown: Longitudinal analyses of the UK Household Longitudinal Study. <i>Journal of Epidemiology and Community Health</i>. Epub ahead of print.</p>	<p>Sep 14, 2020</p>	<p>Cohort</p>	<p>UK</p>	<p>n=9,748 adults aged 18 or older; mean age 49.5 years</p>	<p>Compared to pre-pandemic smoking behaviour, an analysis of UK Household Longitudinal Study data, for adults found that current smoking one month into lockdown had decreased. This appeared to be driven by a decrease in smoking among lighter smokers.</p> <p>Longitudinal analysis showed that the risk of smoking reduced during the pandemic (RR 0.9, 95% CI 0.8,1.0, n.s.) and risk of e-cigarette smoking also reduced (RR 0.7, 95% CI 0.5,0.9). There were no significant interactions with age, gender, educational level and race/ethnicity.</p>	<p>Moderate</p>

<p>Tattan-Birch, H., Perski, O., Jackson, S., Shahab, L., West, R., & Brown, J. (2020). COVID-19, smoking, vaping and quitting: a representative population survey in England. <i>Addiction</i>. Epub ahead of print.</p>	<p>Sep 11, 2020</p>	<p>Cross-sectional</p>	<p>England</p>	<p>n=3,179 adults aged 18 or older; mean age 52.4 years</p>	<p>In a survey of cigarette and e-cigarette smokers who had attempted to quit in the previous 3 months:</p> <ul style="list-style-type: none"> • 12.2% of cigarette quit attempts were reportedly triggered by the COVID-19 pandemic • 11.2% of vaping quit attempts were triggered by the COVID-19 pandemic <p>Compared to pre-pandemic smoking behavior:</p> <ul style="list-style-type: none"> • 47.5% of smokers smoked the same number of cigarettes inside their home • 23.2% smoked fewer cigarettes inside their home • 23.9% smoked more cigarettes inside their home <p>Odds of smoking more inside the home did not differ by socioeconomic status.</p>	<p>Moderate</p>
<p>Pišot, S., Milovanović, I., Šimunič, B., Gentile, A., Bosnar, K., Prot, F., ... Drid, P. (2020). Maintaining everyday life praxis in the time of COVID-19 pandemic measures (ELP-COVID-19 survey). <i>European Journal of Public Health</i>. Epub ahead of print.</p>	<p>Sep 3, 2020</p>	<p>Cross-sectional</p>	<p>Bosnia, Herzegovina, Croatia, Greece, Kosovo, Italy, Serbia, Slovakia, Slovenia and Spain</p>	<p>n=4,108 adults aged 15 or older; mean age 32 years</p>	<p>Compared to pre-pandemic smoking behavior, a survey of adults aged 15 years and older across 9 European countries found:</p> <ul style="list-style-type: none"> • 8% increased their smoking behaviour • 14% decreased their smoking behaviour • 13% smoking behaviour stayed the same <p>The proportion of respondents who were male varied by country (from 21.1%-51.6%) but overall males made up 36.4% of the sample, limiting generalizability.</p>	<p>Low</p>
<p>Canello, R., Soranna, D., Zambra, G., Zambon, A., & Invitti, C. (2020). Determinants of the Lifestyle Changes during COVID-19 Pandemic in the Residents of Northern Italy. <i>International Journal of Environmental Research and Public Health</i>, 17(17), 6287.</p>	<p>Aug 28, 2020</p>	<p>Cross-sectional</p>	<p>Italy</p>	<p>n=272 adults aged 18 or older</p>	<p>Compared to pre-pandemic smoking behaviour, a survey of Italian adults who smoked found:</p> <ul style="list-style-type: none"> • 38% had increased cigarette consumption <p>Increased cigarette consumption was more likely in those with increased food intake and whose sleep quality either improved or worsened compared to prior to the pandemic.</p> <p>Limitations include a small sample size and lack of generalizability as a high proportion of respondents were female.</p>	<p>Low</p>

Đogaš, Z., Kalcina, L. L., Dodig, I. P., Demirović, S., Madirazza, K., Valić, M., & Pecotić, R. (2020). The effect of COVID-19 lockdown on lifestyle and mood in Croatian general population: A cross-sectional study . <i>Croatian Medical Journal</i> , 61(4), 309–318.	Aug 21, 2020	Cross-sectional	Croatia	n=3,027 adults aged 18 or older; median age 40 years	Compared to pre-pandemic smoking behaviour, a survey of Croatian adults found: <ul style="list-style-type: none"> • The average number of cigarettes smoked daily increased from 12.3 (SD: 7.8) to 14.3 (SD: 10.3), $p < .001$. However, this was primarily driven by the increase in number of cigarettes smoked daily by women: 11.8 (SD: 7.4) to 13.9 (SD: 9.8), $p < .001$. <p>Study generalizability is limited, given that 79.7% of the sample were females.</p>	Low
Bommelé, J., Hopman, P., Walters, B. H., Geboers, C., Croes, E., Fong, G. T., ... Willemsen, M. (2020). The double-edged relationship between COVID-19 stress and smoking: Implications for smoking cessation . <i>Tobacco Induced Diseases</i> , 18(July):63.	Jul 20, 2020	Cross-sectional	Netherlands	n=1,067 smokers, age not specified	Compared to pre-pandemic smoking behaviour, an online survey of smokers found: <ul style="list-style-type: none"> • 14.1% smoked less • 18.9% smoked more. • 24.7% believed quitting smoking had become more difficult, • 6.4% reported quitting smoking had become easier. <p>Stress had both positive and negative affects: <ul style="list-style-type: none"> • Severely stressed smokers were more likely to have either increased (OR 3.75; 95% CI 1.84–7.64; $p < 0.001$) or reduced (OR 3.97; 95% CI 1.70–9.28; $p < 0.001$) their smoking. </p> <p>The sample is not well described.</p>	Low
Kayhan Tetik, B., Gedik Tekinemre, I., & Taş, S. (2020). The Effect of the COVID-19 Pandemic on Smoking Cessation Success . <i>Journal of Community Health</i> . Epub ahead of print.	Jul 8, 2020	Cohort	Turkey	n=357 smokers or former smokers, age not specified	In 2 follow-up telephone calls of those who attended a smoking cessation clinic in 2018: <ul style="list-style-type: none"> • Of the 23.7% of participants that had stopped smoking one year after attending the clinic, 87.2% had resumed smoking during the COVID-19 pandemic • 46.2% of those who reported smoking at the start of the COVID-19 pandemic had quit. <p>Limitations of the study are that the sample was mostly male and only 122 participants were followed up during the COVID-19 pandemic.</p>	Low

Di Renzo, L., Gualtieri, P., Pivari, F., Soldati, L., Attinà, A., Cinelli, G., ... De Lorenzo, A. (2020). Eating habits and lifestyle changes during COVID-19 lockdown: An Italian survey . <i>Journal of Translational Medicine</i> , 18:229.	Jun 8, 2020	Cross-sectional	Italy	n=3,533 respondents aged 12 or older; mean age 36 years	An online survey of lifestyle habits during the COVID-19 pandemic lockdown found: <ul style="list-style-type: none"> • A decrease in number of smokers: 74.9% did not smoke prior to the pandemic and 78.2% did not smoke during the pandemic (p<0.001). A limitation of the study is that the sample was 76.1% female.	Moderate
Sidor, A., & Rzymiski, P. (2020). Dietary Choices and Habits during COVID-19 Lockdown: Experience from Poland . <i>Nutrients</i> , 12(6), 1657.	Jun 3, 2020	Cross-sectional	Poland	n=1,087 adults aged 18 or older; mean age 27.7 years	An online survey during the COVID-19 pandemic lockdown found: <ul style="list-style-type: none"> • 14.1% of all respondents reported smoking • 45% of smokers reported smoking more Limitations of the study is a potential lack of generalizability due to a young respondent mean age.	Moderate
Elling, J., Crutzen, R., Talhout, R., & De Vries, H. (2020). Tobacco smoking and smoking cessation in times of COVID-19 . <i>Tobacco Prevention & Cessation</i> , 6(July):39.	May 22, 2020	Cross-sectional	Netherlands	n=340 adult smokers aged 18 or older; mean age 49 years	An online survey conducted during the COVID-19 pandemic found that for adult smokers who were willing to quit smoking: <ul style="list-style-type: none"> • 67.7% reported that the COVID-19 pandemic did not influence the number of cigarettes smoked per day • 18.5% smoked fewer cigarettes • 13.8% smoked more cigarettes One-third reported more motivation to quit, which was positively associated with beliefs that: <ul style="list-style-type: none"> • COVID-19 is a serious threat, • Smokers are at higher risk of catching COVID-19 and developing severe illness than non-smokers. Limitation is that the study only included smokers who were willing to quit in the next 5 years.	Moderate

Caponnetto, P., Inguscio, L., Saitta, C., Maglia, M., Benfatto, F., & Polosa, R. (2020). Smoking behavior and psychological dynamics during covid-19 social distancing and stay-at-home policies: A survey . <i>Health Psychology Research</i> , 8(1), 68–73.	May 20, 2020	Cross-sectional	Italy	n=1,825 adults, mean age 34.7 years	<p>An online survey of changes in tobacco product use during COVID-19 lockdown found:</p> <ul style="list-style-type: none"> • 9.1% of dual users of e-cigarettes and cigarettes and 72.4% of exclusive cigarette smokers perceived decreased daily consumption; • 67.6% of exclusive cigarette smokers changed their purchasing habits, e.g., stockpiling products to avoid leaving home frequently • 64% of exclusive cigarette smokers have considered quitting. <p>Limitations include that the questionnaire was advertised elsewhere but accessed through an anti-smoking league.</p>	Moderate
Jackson, S., Brown, J., Shahab, L., Steptoe, A., & Fancourt, D. (2020). COVID-19, smoking, and inequalities: a cross-sectional survey of adults in the UK . <i>Preprint</i> .	May 5, 2020	Cross-sectional	UK	n= 55,481 adults aged 18 or older	<p>An online survey studied the relationship between smoking and stress about becoming ill with COVID-19.</p> <p>They found that those who experienced significant stress reported an increase in smoking (OR 1.84; 95% CI 1.66-2.04).</p>	Moderate PREPRINT
Oceania						
Pettigrew, S., Jun, M., Roberts, I., Bullen, C.; Nalliah, K., Rodgers, A. (2020). Preferences for Tobacco Cessation Information and Support During Covid-19 . <i>Journal of Addiction Medicine</i> . Epub ahead of print.	Sep 15, 2020	Cross-sectional	Australia and UK	n=1,204 smokers; mean age 46.5 years	<p>A survey of smokers (who were all smoking at least 1 cigarette/day) in Australia and the UK during the early stages of the pandemic found that 28.8% of respondents intended to quit within the next 2 weeks and more than half had an interest in cessation supports.</p> <p>UK respondents were more likely to prefer cessation information to come from government sources, whereas Australian respondents preferred radio news and Quitline sources.</p> <p>Limitations include a low response rate of 8% in the UK sample.</p>	

<p>Stanton, R., To, Q. G., Khaledi, S., Williams, S. L., Alley, S. J., Thwaite, T. L., ... Vandelanotte, C. (2020). Depression, Anxiety and Stress during COVID-19: Associations with Changes in Physical Activity, Sleep, Tobacco and Alcohol Use in Australian Adults. <i>International Journal of Environmental Research and Public Health</i>, 17(11), 4065.</p>	<p>Jun 5, 2020</p>	<p>Cross-sectional</p>	<p>Australia</p>	<p>n=1,491 adults aged 18 or older; mean 50.5 years</p>	<p>A web-based survey examined associations between depression, anxiety and stress and changes in health behaviors, during COVID-19 and social isolation found, regarding tobacco use:</p> <ul style="list-style-type: none"> • 88.5% were non-smokers, and 89.7% reported no change; • 6.9% reported increasing smoking frequency • 3.4% reported a decrease in smoking frequency <p>Those who reported increased smoking frequency were more likely to have higher depression (adjusted OR 1.09, 95% CI 1.04-1.13), anxiety (adjusted OR 1.12, 95% CI 1.06-1.18), and stress (adjusted OR 1.10, 95% CI 1.05-1.15) symptoms.</p> <p>Limitations to generalizability include a sample that is 67.4% female.</p>	<p>Moderate</p>
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Table 3: Single Studies of Vaping

Reference	Date Released	Study Design	Country	Population	Summary of findings	Quality Rating:
Americas						
Sharma, P., Ebbert, J. O., Rosedahl, J. K., & Philpot, L. M. (2020). Changes in substance use among young adults during a respiratory disease pandemic . <i>SAGE Open Medicine</i> . Epub ahead of print.	Oct 14, 2020	Cross-sectional	United States	n=1,018 young adults aged 18-25	<p>Compared to pre-pandemic vaping behaviour, a survey of young adults in a mixed urban/rural Midwestern USA setting found that:</p> <ul style="list-style-type: none"> • 9.6% increased and 15.1% decreased their use of vaping products <p>Substance use changes were reported (including all substances, and with change in either direction) for respondents with increasing degree of loneliness (continuous loneliness score: prevalence ratio = 1.12, 95% CI 1.01–1.25), anxiety (prevalence ratio = 1.45, 95% CI 1.14–1.85), and depression (prevalence ratio = 1.44, 95% CI 1.13–1.82).</p> <p>Limitations include low response rate (16.6%) and a reliance on self-reported data.</p>	Moderate
Berg, C. J., Callanan, R., Johnson, T. O., Schliecher, N. C., Sussman, S., Wagener, T. L., ... Henriksen, L. (2020). Vape shop and consumer activity during COVID-19 non-essential business closures in the USA . <i>Tobacco Control</i> . Epub ahead of print.	Oct 6, 2020	Cross-sectional	United States	n=3,006 young adults aged 18-34	<p>A survey of young adult clients of vaping retailers in six USA metropolitan statistical areas found:</p> <ul style="list-style-type: none"> • 20.3% stockpiled vape products • 20.3% tried to reduce use • 15.8% tried to quit <p>Limitations include reliance on self-reported data and possibly limited generalizability of population.</p>	Low

<p>Klemperer, E. M., West, J. C., Peasley-Miklus, C., & Villanti, A. C. (2020). Change in Tobacco and Electronic Cigarette Use and Motivation to Quit in Response to COVID-19. <i>Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco</i>, 22(9), 1662–1663.</p>	<p>Apr 28, 2020</p>	<p>Cross-sectional</p>	<p>United States</p>	<p>n=366 adults aged 21 or older; mean age 35.3 years</p>	<p>An online survey of current or recent dual users (tobacco and e-cigarette) who had ever made an e-cigarette quit attempt found that in April 2020, during the pandemic:</p> <ul style="list-style-type: none"> • Decreased use of e-cigarettes was reported by 24.9% • No change in use of e-cigarettes was reported by 46.0% • Increased use of e-cigarettes was reported by 29.1% • Perceived risk of harm was not associated with change in use of cigarettes or e-cigarettes. <p>Limitations include that the sample was largely white and male.</p>	<p>Low</p>
<p>Europe</p>						
<p>Tattan-Birch, H., Perski, O., Jackson, S., Shahab, L., West, R., & Brown, J. (2020). COVID-19, smoking, vaping and quitting: a representative population survey in England. <i>Addiction</i>. Epub ahead of print.</p>	<p>Sep 11, 2020</p>	<p>Cross-sectional</p>	<p>England</p>	<p>n=3,179 adults aged 18 or older; mean age 52.4 years</p>	<p>In a survey of cigarette and e-cigarette smokers who had attempted to quit in the previous 3 months:</p> <ul style="list-style-type: none"> • 11.2% of vaping quit attempts were triggered by the COVID-19 pandemic 	<p>Moderate</p>
<p>Caponnetto, P., Inguscio, L., Saitta, C., Maglia, M., Benfatto, F., & Polosa, R. (2020). Smoking behavior and psychological dynamics during covid-19 social distancing and stay-at-home policies: A survey. <i>Health Psychology Research</i>, 8(1), 68–73.</p>	<p>May 20, 2020</p>	<p>Cross-sectional</p>	<p>Italy</p>	<p>n=1,825 adults; mean age 34.7 years</p>	<p>An online survey of changes in tobacco product use during COVID-19 lockdown found:</p> <ul style="list-style-type: none"> • 9.1% of dual users of e-cigarettes and cigarettes reported decreased daily consumption; • 14.5% of exclusive e-cigarette users changed their purchasing habits, e.g., stockpiling products to avoid leaving home frequently <p>Limitations include that the questionnaire was advertised elsewhere but accessed through an anti-smoking league.</p>	<p>Moderate</p>

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