

## EVIDENCE SYNTHESIS BRIEFING NOTE

### TOPIC: THE IMPACT OF THE COVID-19 PANDEMIC ON CHRONIC DISEASE RISK FACTORS

Information finalized as of February 6, 2022.<sup>a</sup> This Briefing Note was completed by the Research, Analysis, and Evaluation Branch (Ministry of Health) based on information provided by members of the COVID-19 Evidence Synthesis Network. Please refer to the [Methods](#) section for further information.

**Purpose:** This note summarizes the scientific evidence on the impact of COVID-19 on chronic disease risk factors including nutrition, physical activity (PA), and substance use (i.e., alcohol and tobacco).

**Key Findings:**

- **Nutrition:** The COVID-19 lockdown (March 2020) both negatively and positively impacted dietary practices throughout Europe and globally. Negative dietary habits associated with the lockdown included decreases in healthy eating behaviour, weight gain, mental health issues, and limited PA. Positive dietary habits associated with the lockdown in many European countries included an increased consumption of Mediterranean food items. An overall increase in food consumption, bodyweight, body mass index (BMI), and a change in eating style was also reported because of restrictions to reduce contact during the pandemic.
  - **Food Insecurity:** Food insecurity is suggested to be more prevalent during the COVID-19 pandemic than before, particularly among low-income populations. In Canada, for example, the relationship between food insecurity and mental health was magnified among vulnerable groups (e.g., low income, people with a disability, and racialized/Indigenous peoples).
- **PA:** A decrease in PA levels and/or an increase in sedentary behaviour was associated with the COVID-19 pandemic. Studies reported decreases in PA and increases in sedentary behaviours during lockdowns across several populations, including children and patients with a variety of medical conditions (e.g., eating disorders, diabetes). Increases in sedentary time was negatively associated with a global decrease in mental health and quality of life and an increase in depression and anxiety, irrespective of age but children were affected the most.
- **Alcohol Use:** Overall, the evidence suggests an increase in alcohol use in the general population during the pandemic across international settings. Studies indicated that people who consumed alcohol in risky ways before the pandemic were more likely to increase their substance use during the pandemic. Mental health factors were noted as the most common correlates or triggers for increased use of both alcohol and other substances, including cannabis for various groups (e.g., general population, older adults, Indigenous peoples).
- **Tobacco Use:** There was no clear direction on the effect the COVID-19 pandemic has on use of tobacco or vaping products.

**Analysis for Ontario:** No information identified.

**Implementation Implications:** While lockdowns negatively affected sedentary time of all age groups, children were more negatively affected than adults or older adults, highlighting this population as a key intervention target. There is also a need for public policies to focus on alcohol use during the COVID-19 pandemic and for the strategies to include specific consideration of the needs of people with mental health problems. Future research topics currently underway include the effects of the COVID-19 pandemic on the general populations' mental health, alcohol/substance abuse and violence, and lifestyle factors (i.e., smoking, BMI, PA, and dietary habits).

<sup>a</sup> This briefing note includes current available evidence as of the noted date. It is not intended to be an exhaustive analysis, and other relevant findings may have been reported since completion.

**Supporting Evidence**

[Table 1](#) summarizes the scientific evidence on the impact of COVID-19 on the behavioural risk factors for chronic disease (i.e., nutrition, physical activity (PA), alcohol use, and tobacco use). Evidence documents include systematic reviews (SR), rapid reviews (RR), other types of reviews, and single studies. Additional details for some studies are provided in the Appendix as follows: [Table 2](#) (systematic reviews) and [Table 3](#) (single studies).

The methodological quality of some of the identified literature was rated using AMSTAR<sup>b</sup> by McMaster Health Forum (please refer to their response document listed in the Methods section). The methodological quality of all other sources identified are included where available, or are unclear as the Research, Analysis, and Evaluation Branch does not have the expertise to make such assessments.

**Table 1: The Impact of COVID-19 on the Risk Factors for Chronic Disease**

<b>Nutrition</b>	<ul style="list-style-type: none"> <li>● The research literature on the impact of the pandemic on nutrition is mixed, indicating both decreases and increases in healthy eating behaviours.             <ul style="list-style-type: none"> <li>○ Three SRs and one review reported decreases in healthy eating behaviours during the pandemic.<sup>1,2,3,4</sup> For example:                 <ul style="list-style-type: none"> <li>▪ A SR (Oct 2021) including 23 longitudinal studies concluded that during the COVID-19 pandemic adherence to healthy diets decreased with a shift towards modified eating behaviours, characterized by increased snack frequency and a preference for sweets and ultra-processed food rather than fruits, vegetables, and fresh food.<sup>5</sup></li> <li>▪ A SR (Apr 2021) found that snacking increased for a significant portion of the population examined (18.9-45.1%); whereas fast food (15.0-41.3%) and ordered food (33.9%) showed a decreasing tendency.<sup>6</sup></li> <li>▪ A SR (Apr 2021) reported an overall increase in food consumption, bodyweight (BW), Body Mass Index (BMI), and a change in eating style.<sup>7</sup></li> <li>▪ A review (Mar 2021) concluded that the COVID-19 lockdown both negatively and positively impacted dietary practices throughout Europe and globally; negative diet habits were associated with weight gain, mental health issues, and limited PA.<sup>8</sup></li> </ul> </li> <li>○ Single studies from the United States (US) and Japan also reported mixed results.<sup>9,10</sup> For example, in the US, 59.8%, 16.4%, and 23.4% of study participants reported that their eating habits likely changed, may have changed, and likely did not change, respectively. Of the participants whose dietary habits likely or may have changed, 64.1%, 16.8%, and 19% reported healthier, neither healthier nor less healthy, and less healthy eating habits, respectively.<sup>11</sup></li> </ul> </li> <li>● <u>Adherence to a Mediterranean Diet (MD)</u>: A SR (Dec 2021) concluded that changes in the intake of major food groups, apart from fish intake, were in line with the definition of a traditional MD, indicating a consistent moderate improvement of dietary habits worldwide.<sup>12</sup> Another SR (Oct 2021) found that evidence indicates that consumption of MD food items</li> </ul>
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<sup>b</sup> The methodological quality of some of the identified literature was rated using AMSTAR by McMaster Health Forum in their evidence product. These ratings are included where available. AMSTAR rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions.

	<p>increased during lockdown but evidence is heterogeneous in study design, quality, and findings.<sup>13</sup></p> <ul style="list-style-type: none"> <li>• <b>Children’s Dietary Changes:</b> A SR (Sept 2021) noted that current evidence does not allow for persuasive conclusions about changes in dietary quality for children during the pandemic so there is an urgent need for more high-quality research in this area.<sup>14</sup></li> <li>• <b>Increased BW and BMI in Adults, Adolescents, and Older Adults:</b> A SR (Apr 2021) reported an overall increase in food consumption, BW, BMI, and a change in eating style as a result of the pandemic.<sup>15</sup> Another SR and meta-analysis (Apr 2021) observed a significantly higher BW and BMI in adults and adolescents (&gt;16 years old) in the post-lockdown period (March-May 2020) compared to before lockdown. The SR reported that further studies are needed to assess potential group-specific impacts, regarding weight gain in younger people and risk of weight loss, malnutrition, and loss of muscle tissue in older adults.<sup>16,c</sup></li> <li>• <b>Increased Food Insecurity:</b><sup>d</sup> A SR (Aug 2021) found that the pandemic impacted diet quality and food security in low- and middle-income countries, raising concerns about the long-term impact on access to and affordability of nutrient-rich, healthy diets and their health implications. Women and individuals with a low socio-economic status are likely to be the most at risk of food insecurity.<sup>17</sup> A RR (Jun 2021) found that food insecurity appears to be more prevalent during the COVID-19 pandemic than before, particularly among low-income populations across studies that included comparisons to pre-pandemic levels: change in prevalence of food insecurity in the general population during the pandemic ranged from -2.8% to 4.1% in Canada and -0.7% to 26.2% in the US.<sup>18,e</sup> A Canadian study (2021) found that nearly one in five participants worried about having enough food to meet their household’s basic needs in May 2020.<sup>19</sup> <ul style="list-style-type: none"> <li>○ <b>Food Insecurity in Vulnerable Populations:</b> The RR (Jun 2021) also reported that change in the prevalence of food insecurity among low-income populations during the pandemic ranged from 10% to 47%.<sup>20</sup></li> <li>○ <b>Food Insecurity and Mental Health:</b> The Canadian study (2021) noted that the relationship between food insecurity and mental health was magnified among vulnerable groups, including those in the lowest income category, people with a disability, and racialized and Indigenous peoples. The relationship between food insecurity and mental health is well-established and has shown to be independently associated with experiences of mental distress and mental health conditions.<sup>21</sup></li> </ul> </li> </ul>
<p><b>Physical Activity (PA)</b></p>	<ul style="list-style-type: none"> <li>• Four reviews found a decrease in PA levels and/or an increase in sedentary behaviour associated with the COVID-19 pandemic.<sup>22,23,24,25</sup> For example:             <ul style="list-style-type: none"> <li>○ A SR (Jan 2021) found changes in PA reported in 64 studies, with the majority reporting decreases in PA and increases in sedentary behaviours during their respective lockdowns across several populations, including children and patients with a variety of medical conditions (e.g., eating disorders, diabetes).<sup>26</sup></li> </ul> </li> </ul>

<sup>c</sup> One study in older adults (>60 years old) notably reported a significant BW loss, suggesting a higher risk for lockdown-induced weight loss and potential malnutrition in the elderly population ([Bakaloudi et al., 2021](#)).

<sup>d</sup> Food insecurity is the inability to acquire or consume an adequate diet quality or enough food in socially acceptable ways, or the uncertainty that one will be able to do so. Household food insecurity is often linked with the household’s financial ability to access adequate food. ([Government of Canada, 2020](#))

<sup>e</sup> The overall certainty of this evidence is very low, and findings are very likely to change as more evidence accumulates ([National Collaborating Centre for Methods and Tools, 2021](#)).

	<ul style="list-style-type: none"> <li>○ A single study (May 2021) in the UK found that relative to pre-pandemic levels, participants spent half a day less per week doing <math>\geq 30</math> min of moderate to vigorous physical activity (MVPA),<sup>f</sup> but slightly increased days of strength training.<sup>27,g</sup></li> <li>● <b>Mental Health Impacts:</b> Three SRs found either an increase in sedentary time or a decrease in PA was related to poor mental health outcomes during the pandemic.<sup>28,29,30</sup> In particular:             <ul style="list-style-type: none"> <li>○ A SR and meta-analysis (Oct 2021) found increases in sedentary time were negatively correlated with global mental health, depression, anxiety and quality of life, irrespective of age.<sup>31</sup> Similarly, another SR (Dec 2020) demonstrated an association between mental health distress (e.g., stress, anxiety, depressive symptoms, social isolation, psychological distress) and PA (i.e., adults increased their sedentary time and reduced their PA levels).<sup>32</sup></li> <li>○ A rapid SR (Apr 2021) found that people who performed PA on a regular basis with higher volume and frequency and kept the PA routines stable, showed less symptoms of depression and anxiety. For instance, those reporting a higher total time spent in MVPA had 12-32% lower chances of presenting depressive symptoms and 15-34% of presenting anxiety.<sup>33</sup></li> </ul> </li> <li>● <b>Children and Adolescents:</b> A review (Oct 2021) highlighted a decrease in children and adolescent PA during the pandemic, ranging between -10.8 min/day and -91 min/day.<sup>34,h</sup> Another review (Jul 2021) that found PA in children and/or adolescents decreased during the pandemic included 18 studies mostly from Europe, but also Canada, the US, and South America. It noted that: 1) the decrease in PA was more prevalent in boys and older children and adolescents; 2) the decrease in PA was less prevalent in children who live in detached houses, houses with more space, rural areas, and with more family members; and 3) parental support and consideration of location and activity types may help children maintain or increase their PA during the pandemic.<sup>35</sup> <ul style="list-style-type: none"> <li>○ <i>Canada:</i> A Canadian survey (Apr 2020) found that only 4.8% (2.8% girls; 6.5% boys) of children and 0.6% (0.8% girls; 0.5% boys) of youth were meeting combined movement behaviour guidelines during COVID-19 restrictions.<sup>36</sup></li> <li>○ <i>Italy:</i> A study (Jan 2022) of primary school children found weekly and daily minutes time spent in MVPA significantly decreased from before to during pandemic, while the weekly time spent in sedentary behaviour increased.<sup>37</sup></li> </ul> </li> <li>● <b>University Students:</b> Two SRs found reduced PA among most university students, but mixed results for those who had been active/less sedentary after lockdown.<sup>38,39</sup> A SR (Sept 2021) found that COVID-19-related lockdowns appear to have negatively affected walking and sedentary behaviour among undergraduate students but not among graduate students. Students who were more sedentary before lockdown increased or did not change their MVPA. In contrast, those who were less sedentary before lockdown decreased their MVPA.<sup>40</sup> Another SR (Jan 2021) found that walking, moderate, vigorous, and total PA levels have been reduced during the COVID-19 pandemic confinements in university students of different countries.</li> </ul>
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<sup>f</sup> Children and youth should get at least 60 minutes per day of MVPA involving a variety of aerobic activities. Adults and seniors should accumulate at least 150 minutes of MVPA per week ([Government of Canada, 2021](#)).

<sup>g</sup> Participant recruitment in this study targeted: 1) those with a physical high-risk health condition for COVID-19; 2) those living in a high deprivation area; and 3) those with a self-reported mental health issue ([Naughton et al., 2021](#)).

<sup>h</sup> The authors noted that if an increase was detected, it related to unstructured and outdoor activities. The main determinants of children's PA during the pandemic were age, gender, socioeconomic background, and the outdoor environment ([Rossi et al., 2021](#)).

	<p>Despite the reductions, those who met the current minimum PA recommendations before the lockdown generally met the recommendations also during the confinements.<sup>41</sup></p> <ul style="list-style-type: none"> <li>● <b>People with Chronic Disease (CD):</b> Two SRs and one RR demonstrated reduced PA with people who already experience barriers to PA because of a chronic condition (i.e., those with physical disabilities and/or chronic disease/conditions) across various jurisdictions.<sup>42,43,44</sup> <ul style="list-style-type: none"> <li>○ A SR (Jun 2021) in Italy found most studies highlighted a significant reduction in the amount of performed PA compared to before lockdown, in both the general population and in individuals with chronic conditions. This outcome had negative consequences on both general health, in terms of increased body mass, and on specific chronic conditions, especially obesity and neurological diseases.<sup>45</sup></li> <li>○ A SR (Nov 2021) that included studies from Saudi Arabia, Brazil, Israel, Spain and the Republic of Macedonia demonstrated that PA levels during the COVID-19 pandemic were reduced with respect to previous levels of PA in patients with CD. Some included studies showed an increase of sedentary behaviour during the pandemic, an increment in time spent on social media, a deterioration in mental health and healthy behaviours such as vegetable consumption, and the feeling that in general, people were eating more compared to pre-pandemic levels.<sup>46</sup></li> <li>○ A RR (Jun 2021) including 29 studies from 21 different countries (e.g., Italy, India, US, Belgium, China, France, the Netherlands) found that almost all studies reported negative impacts on PA and well-being (e.g., increases in stress, anxiety, depression) in people with health conditions or chronic diseases (e.g., diabetes, Parkinson’s, cardiovascular disease [CVD], cystic fibrosis) during the first wave of the pandemic.<sup>47</sup></li> </ul> </li> <li>● <b>Professional Athletes:</b> A SR (Sept 2021) on the PA, mental state, and quality of life of professional athletes found a decrease in overall physical fitness and number of days and hours of training, as well as an increase in the occurrence of negative emotions (stress, fatigue, and depression) and a decrease in sleep quality. Women were more likely to experience negative emotions compared to men.<sup>48</sup></li> </ul>
<p><b>Substance Use</b></p>	<p>Most of the information identified on the impact of the pandemic on substance use focused on alcohol and tobacco.</p> <ul style="list-style-type: none"> <li>● <b>Alcohol Use:</b> Overall, the evidence from three SRs, one review, and one study showed an increase in alcohol consumption during the pandemic.<sup>49,50,51,52,53</sup> For example, one SR (Oct 2021) found increased alcohol consumption reported among different countries (e.g., China, Japan, UK).<sup>54</sup> Another SR (Dec 2021) noted an overall trend towards increased alcohol consumption during the pandemic with the proportion of people consuming alcohol ranging from 21.7% to 72.9% in general population samples.<sup>55</sup> <ul style="list-style-type: none"> <li>○ <i>Canada:</i> A RR (Jun 2020) noted that low quality evidence from studies conducted in Canada suggests that more people have increased their alcohol intake during the pandemic rather than decreased, particularly in younger people aged 18-34 years. For example, a study from the Canadian Centre on Substance Use and Addiction found that compared to pre-pandemic alcohol intake, a survey of adults (n=1,009) in Canada aged 18 years and older who reported staying home more during the pandemic found: 20% reported an increase in alcohol intake; 10% reported a decrease; and 47% reported no change in alcohol intake.<sup>56</sup></li> <li>○ <i>Alcohol Use and Mental Health:</i> A SR (Dec 2021) noted that mental health factors were the most common correlates or triggers for increased use of both alcohol and other substances, including cannabis.<sup>57</sup> Further, a SR (Nov 2021) noted that the clearest negative substance use outcomes in the context of COVID-19 are among people who have a history of problems</li> </ul> </li> </ul>



	<p>related to their substance use and concurrent disorders. For example, studies indicated that people who already drank in risky ways before the pandemic were more likely to increase their substance use during the pandemic.<sup>58</sup> International single studies also reported similar findings:</p> <ul style="list-style-type: none"> <li>▪ <u>Canada</u>: A survey (Nov 2021) of Canadian adults found that 16.2% of women and 15.2% of men self-reported an increase in their alcohol consumption from September to December 2020. During the same period, 4.9% of women and 5.8% of men self-reported an increase in their cannabis consumption. For men and women, screening positive for symptoms of depression was significantly associated with higher odds of increased alcohol and cannabis use.<sup>59</sup> Another survey (Aug 2021) of Canadian adults also found that changes in alcohol consumption were positively associated with anxiety, feeling depressed, and loneliness. People with mild to moderate or severe anxiety had greater odds of increased drinking than did people with no to low levels of anxiety.<sup>60</sup></li> <li>▪ <u>Australia, UK, and US</u>: Two single studies from the US, one from Australia, and one from the UK found increased alcohol use in adults in the spring of 2020 and that was associated with mental health outcomes.<sup>61,62,63,64</sup> For example, one in ten US adults over the age of 55 (717/6,548; 11%) reported an increase in their alcohol consumption in the past week compared to their usual pre-COVID-19 drinking, which was associated with depression, anxiety, and loneliness.<sup>65</sup> In the UK, of 691 adults, 17% reported increased alcohol consumption after lockdown with a higher proportion being those aged 18-34 years of age. There was also a significant association between increased alcohol consumption and poor overall mental health (e.g., depressive symptoms, mental wellbeing).<sup>66</sup></li> <li>○ <u>Indigenous People</u>: A nationally representative Canadian survey (Apr 2021) on self-reported mental health during the first wave of COVID-19 found that within the overall sample, 19.5% indicated that their use of alcohol had increased because of the pandemic, and the group most likely to report increased alcohol use was Indigenous people (24.4%).<sup>67</sup> Similarly, a study (Nov 2021) from British Columbia on marginalized groups (including Indigenous peoples) found increased alcohol use relative to pre-pandemic levels, with women reporting a greater increase than men.<sup>68</sup></li> <li>● <u>Tobacco Use</u>: A RR (Nov 2020) found there was no clear direction of effect of the COVID-19 pandemic on use of tobacco or vaping products. Most studies reported a mixed result: 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 RR also reported that there was no clear effect of the COVID-19 pandemic on cessation or cessation attempts.<sup>69,i</sup> Similarly, a SR (Mar 2021) found that while two studies reported that tobacco users have successfully quit during lockdown period, three studies suggested that users have become more addictive to smoking due to psychological stress experienced during the pandemic.<sup>70</sup></li> <li>○ <u>British Columbia</u>: A study (Nov 2021) on marginalized groups (including Indigenous peoples) found increased cannabis use relative to pre-pandemic levels, with women reporting a greater increase than men.<sup>71</sup></li> <li>○ <u>Iceland</u>: In a study (Aug 2021) of adolescents, cigarette smoking, and e-cigarette use declined among 15-18 year olds during COVID-19, possibly due to an unintended benefit of isolation. The study also found an increase in depressive symptoms and worsened mental</li> </ul>
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<sup>i</sup> The overall certainty of this evidence is very low, and findings are very likely to change as more evidence accumulates ([National Collaborating Centre for Methods and Tools, 2020](#)).

	<p>wellbeing across all age groups during the pandemic compared with same-aged peers before COVID-19. These outcomes were significantly worse in adolescent girls compared with boys.<sup>72</sup></p>
<p><b>Future Research</b></p>	<ul style="list-style-type: none"> <li>• Protocols for SRs currently underway include topics such as the effects of the COVID-19 pandemic on the general populations' mental health, alcohol/substance abuse and violence,<sup>73</sup> and lifestyle factors (i.e., smoking, BMI, PA, and dietary habits) and COVID-19.<sup>74</sup> For a list of other protocols on related topics, see Al-Khateeb et al. (2022).<sup>75</sup></li> </ul>

## **Methods**

The COVID-19 Evidence Synthesis Network is comprised of groups specializing in evidence synthesis and knowledge translation. The group has committed to provide their expertise to provide high-quality, relevant, and timely synthesized research evidence about COVID-19 to inform decision makers as the pandemic continues. The contents of this Evidence Synthesis Briefing Note are not intended to serve as guidance, but rather reflect the available evidence at the time of writing. The following members of the Network provided evidence synthesis products that were used to develop this Evidence Synthesis Briefing Note:

- Al-Khateeb S, Bain T, Mansilla C, Lavis JN, Wilson MG. [COVID-END in Canada existing resource response #14: How has the COVID-19 pandemic \(e.g., public-health measures, such as lockdowns\) impacted risk factors for chronic disease?](#) Hamilton: McMaster Health Forum, COVID-END in Canada, 6 February 2022.
- Evidence Synthesis Unit, Research Analysis and Evaluation Branch, Ministry of Health. January 31, 2022.

For more information, please contact the [Research, Analysis and Evaluation Branch \(Ministry of Health\)](#).



**APPENDIX**

**Table 2: Systematic Reviews and Other Types of Reviews on the Impact of the COVID-19 Pandemic on Chronic Disease Risk Factors**

Topic	Study Description	Key Findings	Reference
<b>Nutrition</b>			
	<ul style="list-style-type: none"> <li>• <b>Objective:</b> To evaluate the impact of national lockdowns on adherence to the Mediterranean Diet (MD). Studies published until May 2021 were included.</li> <li>• <b>Population Studied:</b> The study sample comprised 2,566 questionnaires of which 1,647 were completed by females (64.2%) and 919 by males (35.8%). More than half of the population had 18-30 years old (n=1,397; 54.4%), was unmarried or single (n=1,500; 58.5%) and had a university degree (n=1,364; 53.2%).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Results:</b> Forty-two studies were retrieved. After screening, 12 studies met inclusion criteria and were included in the review, of which four (33%) were longitudinal studies. Six (85.7%) of the seven studies that measured changes in MD adherence before-during lockdown reported an increase (rate of change of high-adherence to MD ranged between +3.3% and +21.9%).               <ul style="list-style-type: none"> <li>○ Evidence indicates that consumption of MD food items increased during lockdown but is heterogeneous in study design, quality, and findings.</li> </ul> </li> </ul>	<p>Della Valle PG, Mosconi G, Nucci D, Vigezzi GP, Gentile L, Gianfredi V, Bonaccio M, Gianfagna F, Signorelli C, Iacoviello L, Odone A. <a href="#">Adherence to the Mediterranean Diet during the COVID-19 national lockdowns: a systematic review of observational studies</a>. Acta Biomedica. 2021 Oct 19;92(S6):e2021440.</p>
	<ul style="list-style-type: none"> <li>• <b>Objective:</b> The study objective was to evaluate the current evidence about the impact that preventive measures of physical contact restriction causes in healthy nutrition.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Results:</b> Seven studies met the selection criteria and reported an overall increase in food consumption, weight, Body Mass Index (BMI), and a change in eating style. Findings suggest that healthy nutrition is affected by preventive measures to restrict physical contact because of the COVID-19 pandemic.</li> </ul>	<p>Neira C, Godinho R, Rincón F, Mardones R, Pedrosa J. <a href="#">Consequences of the COVID-19 Syndemic for Nutritional Health: A Systematic Review</a>. Nutrients. 2021 Apr 1;13(4):1168.</p>
	<ul style="list-style-type: none"> <li>• <b>Objective:</b> To investigate changes in food intake, eating behaviours, and diet quality during the lockdown as compared to before.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Results:</b> Results indicated improved diet quality in Europe, especially among Mediterranean countries, except for France, while a switching to poor nutrient patterns was observed in Colombia and Saudi Arabia. Analyses of eating behaviours suggest an increase in food intake, number of daily meals, and snacking. In conclusion, changes in intake of major food groups, apart from fish intake, were in line with the definition of a traditional Mediterranean diet, indicating a consistent moderate improvement of dietary habits worldwide.</li> </ul>	<p>Mignogna C, Costanzo S, Ghulam A, Cerletti C, Donati MB, de Gaetano G, Iacoviello L, Bonaccio M. <a href="#">Impact of Nationwide Lockdowns Resulting from The First Wave of the COVID-19 Pandemic on Food Intake, Eating Behaviours and Diet Quality: A Systematic Review</a>. Advances in Nutrition. 2021 Dec 30:nmab130.</p>
	<ul style="list-style-type: none"> <li>• <b>Objective:</b> The aim of this review was to assess dietary changes during the first lockdown. Themes and patterns were considered and associations with other lifestyle factors were assessed.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Results:</b> 23 final full-text papers were included. Four themes were identified: dietary patterns, dietary habits (favourable), dietary habits (unfavourable), and other (includes physical activity levels, weight gain).</li> </ul>	<p>Bennett G, Young E, Butler I, Coe S. <a href="#">The Impact of Lockdown During the COVID-19 Outbreak on Dietary Habits in Various Population Groups: A</a></p>

Topic	Study Description	Key Findings	Reference
		<ul style="list-style-type: none"> <li>• <b>Conclusion:</b> The effect of COVID-19 lockdown both negatively and positively impacted dietary practices throughout Europe and globally, and negative diet habits were associated with other poor lifestyle outcomes including weight gain, mental health issues, and limited physical activity. Both in the short-term and if sustained in the long-term, these changes may have significant impacts on the health of the population.</li> </ul>	<a href="#">Scoping Review</a> . Frontiers in Nutrition. 2021 Mar 4;8:626432.
<b>Substance Use</b>			
	<ul style="list-style-type: none"> <li>• <b>Objective:</b> This systematic review was carried out to document and interpret the frequency and severity of alcohol and other substance use during the COVID-19 pandemic and their relationship to demographic and mental health variables that may suggest further clinical implications.</li> <li>• <b>Methods:</b> Peer reviewed articles were searched from December 2019 until November 2020.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Alcohol Use:</b> The evidence suggests a mixed findings for alcohol use. Overall, there was a trend towards increased alcohol consumption. The proportion of people consuming alcohol during the pandemic ranged from 21.7% to 72.9% in general population samples.</li> <li>• <b>Drugs Use including Cannabis:</b> Unlike alcohol use, there was a clear trend towards increased use of other substances use during the COVID-19 pandemic. The proportion of people consuming other substances during the pandemic ranged from 3.6% to 17.5% in the general population.</li> <li>• <b>Factors:</b> Mental health factors were the most common correlates or triggers for increased use of both alcohol and other substances.</li> </ul>	Roberts A, Rogers J, Mason R, Siriwardena AN, Hogue T, Whitley GA, Law GR. (December 2021). <a href="#">Alcohol and other substance use during the COVID-19 pandemic: A systematic review</a> . Drug and Alcohol Dependence. 2021 Dec 1;229(Pt A):109150.
	<ul style="list-style-type: none"> <li>• <b>Objective:</b> The goal of this review was to identify how COVID-19 impacted the distribution of substance use-related risks and behaviours. The study identified 53 studies published by March 2021 that described the early impacts of COVID-19 on substance use at a population level.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Alcohol and Substance Use:</b> The review found evidence of increased frequency, quantity, and severity of substance use, particularly alcohol use, among certain segments of the population in certain countries. However, in many countries there were more people decreasing than increasing their use.               <ul style="list-style-type: none"> <li>○ The clearest negative substance use outcomes in the context of COVID-19 are among people who have history of problems related to their substance use and concurrent disorders. For example, studies indicated that people who already drank in risky ways before the pandemic were more likely to increase their substance use during the pandemic.</li> </ul> </li> </ul>	Schmidt RA, Genois R, Jin J, Vigo D, Rehm J, Rush B. (November 2021). <a href="#">The early impact of COVID-19 on the incidence, prevalence, and severity of alcohol use and other drugs: A systematic review</a> . Drug and Alcohol Dependence. 2021 Nov 1; 228:109065.
<b>Physical Activity</b>			
	<ul style="list-style-type: none"> <li>• <b>Objective:</b> The aim of this review was to summarize literature that investigated differences in physical activity (PA) and sedentary behaviour before versus during the COVID-19 lockdown.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Findings:</b> Changes in PA were reported in 64 studies, with most studies reporting decreases in PA and increases in sedentary behaviours during their respective lockdowns across several</li> </ul>	Stockwell, S., Trott, M., Tully, M., Shin, J., Barnett, Y., Butler, L., McDermott, D., Schuch, F., & Smith, L. (2021). <a href="#">Changes in physical activity</a>

Topic	Study Description	Key Findings	Reference
	<ul style="list-style-type: none"> <li><b>Method:</b> Electronic databases were searched from November 2019 to October 2020.</li> </ul>	<p>populations, including children and patients with a variety of medical conditions.</p>	<p><a href="#">and sedentary behaviours from before to during the COVID-19 pandemic lockdown: a systematic review</a>. <i>BMJ Open Sport &amp; Exercise Medicine</i>, 7(1), e000960.</p>
	<ul style="list-style-type: none"> <li><b>Objective:</b> The aim was to review the research related to PA levels before and during the COVID-19 pandemic in people with chronic disease (CD).</li> <li><b>Method:</b> Five studies (as of January 2021) were included. Only three studies were included in the meta-analysis.</li> </ul>	<ul style="list-style-type: none"> <li><b>PA and Chronic Disease During the Pandemic:</b> The results of this systematic review suggest that the COVID-19 pandemic has had negative consequences for people with chronic diseases. During the COVID-19 pandemic, a decrease in PA levels compared to pre-pandemic levels has been found in all the studies. The meta-analysis showed a significant reduction in PA levels during the pandemic (Standardized Mean Difference = -0.29, 95% CI = -0.40 to -0.18, <math>p &lt; 0.00001</math>). <ul style="list-style-type: none"> <li><b>Other Factors Including Diet:</b> Some studies included in the review showed an increase of sedentary behaviour during the pandemic, an increment in time spent on social media, a deterioration in mental health and health behaviours such as vegetable consumption, and the feeling that in general, people were eating more compared to pre-pandemic levels.</li> </ul> </li> </ul>	<p>Pérez-Gisbert L, Torres-Sánchez I, Ortiz-Rubio A, Calvache-Mateo A, López-López L, Cabrera-Martos I, Valenza MC. <a href="#">Effects of the COVID-19 Pandemic on Physical Activity in Chronic Diseases: A Systematic Review and Meta-Analysis</a>. <i>International Journal of Environmental Research and Public Health</i>. 2021 Nov 23;18(23):12278.</p>
	<ul style="list-style-type: none"> <li><b>Objective:</b> The aim of this meta-analysis was to quantify the change in sedentary time during the COVID-19 pandemic and its effect on health outcomes in the general population.</li> </ul>	<ul style="list-style-type: none"> <li><b>Sedentary Time:</b> Children were most affected, increasing their sedentary time by <math>159.5 \pm 142.6</math> min day<sup>-1</sup>, followed by adults (<math>+126.9 \pm 42.2</math> min day<sup>-1</sup>) and older adults (<math>+46.9 \pm 22.0</math> min day<sup>-1</sup>). There were no sex differences in any age group. <ul style="list-style-type: none"> <li><b>Screen time</b> was the only consistently measured behaviour and accounted for 46.8% and 57.2% of total sedentary time in children and adults, respectively.</li> <li><b>Mental Health:</b> Increases in sedentary time were negatively correlated with global mental health, depression, anxiety, and quality of life, irrespective of age.</li> </ul> </li> <li><b>Conclusion:</b> While the lockdown negatively affected all age groups, children were more negatively affected than adults or older adults, highlighting this population as a key intervention target.</li> </ul>	<p>Runacres A, Mackintosh KA, Knight RL, Sheeran L, Thatcher R, Shelley J, McNarry MA. <a href="#">Impact of the COVID-19 Pandemic on Sedentary Time and Behaviour in Children and Adults: A Systematic Review and Meta-Analysis</a>. <i>International Journal of Environmental Research and Public Health</i>. 2021 Oct 27;18(21):11286.</p>
	<ul style="list-style-type: none"> <li><b>Objective:</b> To investigate the impact of COVID-19-induced lockdowns on university student physical</li> </ul>	<ul style="list-style-type: none"> <li><b>Findings:</b> Overall, most studies reported a significant decrease in mild PA (i.e., walking) among undergraduate students but not among graduate students. Consistently, most studies reported a significant</li> </ul>	<p>Rivera PA, Nys BL, Fiestas F. <a href="#">Impact of COVID-19 induced lockdown on physical activity and sedentary</a></p>

Topic	Study Description	Key Findings	Reference
	<p>activity and sedentary behaviour, as these relate to physical and mental well-being.</p> <ul style="list-style-type: none"> <li>○ Studies included from the United States, Spain, Italy, China, and United Kingdom</li> </ul>	<p>increase in sedentary time (i.e., sitting time on weekdays) in undergraduate students but not in graduate students. It was observed that students who were more sedentary before lockdown, increased or did not change their moderate and/or vigorous PA. In contrast, those who were less sedentary before lockdown decreased their moderate and/or vigorous PA.</p>	<p><a href="#">behavior among university students: A systematic review</a>. Medwave. 2021 Sep 2;21(8):e8456.</p>
	<ul style="list-style-type: none"> <li>● <b>Objective:</b> The aim was to provide a systematic overview of the literature with regard to associations between PA and depression and anxiety during the COVID-19 pandemic.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Results:</b> The early evidence suggests that people who performed PA on a regular basis with higher volume and frequency and kept the PA routines stable, showed less symptoms of depression and anxiety. For instance, those reporting a higher total time spent in moderate to vigorous PA had 12-32% lower chances of presenting depressive symptoms and 15-34% of presenting anxiety.</li> </ul>	<p>Wolf S, Seiffer B, Zeibig JM, Welkerling J, Brokmeier L, Atrott B, Ehring T, Schuch FB. <a href="#">Is Physical Activity Associated with Less Depression and Anxiety During the COVID-19 Pandemic? A Rapid Systematic Review</a>. Sports Med. 2021 Aug;51(8):1771-1783.</p>
	<ul style="list-style-type: none"> <li>● <b>Objective:</b> The objective of this literature review was to analyze the extent to which engaging in PA during the COVID-19 pandemic impacts psychological health in the adult population.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Results:</b> The review showed an association between mental health distress (e.g., stress, anxiety, depressive symptoms, social isolation, psychological distress) and PA. This research concludes that the COVID-19 pandemic and the lockdown measures caused psychological distress. Those studies that analyzed PA showed that, during quarantine, adults increased their sedentary time and reduced their PA levels, showing controversial psychological outcomes.</li> </ul>	<p>Violant-Holz V, Gallego-Jiménez MG, González-González CS, Muñoz-Violant S, Rodríguez MJ, Sansano-Nadal O, Guerra-Balic M. <a href="#">Psychological Health and Physical Activity Levels during the COVID-19 Pandemic: A Systematic Review</a>. International Journal of Environmental Research and Public Health. 2020 Dec 15;17(24):9419.</p>
	<ul style="list-style-type: none"> <li>● <b>Objective:</b> This study explored the international literature on PA, sedentary behaviour, and well-being in adults with physical disabilities and/or chronic diseases during the first wave of the pandemic.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Context:</b> In comparison with their peers without disabilities or diseases, adults with physical disabilities or chronic diseases experience generally higher levels of social isolation and loneliness and a lower level of perceived social support and social connectedness, and many already did so before the pandemic. People with physical disabilities also experience both personal (e.g., impaired mobility, fatigue, and pain) as well as environmental barriers (e.g., lack of possibilities, lack of accessibility and transport) to sport or PA.</li> <li>● <b>Chronic Disease and PA:</b> Included in this study were 29 studies involving 11 different types of disabilities or health conditions from 21 different countries. Twenty-six studies reported on PA, of which one</li> </ul>	<p>de Boer DR, Hoekstra F, Huetink KIM, Hoekstra T, Krops LA, Hettinga FJ. <a href="#">Physical Activity, Sedentary Behavior and Well-Being of Adults with Physical Disabilities and/or Chronic Diseases during the First Wave of the COVID-19 Pandemic: A Rapid Review</a>. International Journal of Environmental Research and Public Health. 2021 Jun 11;18(12):6342.</p>

Topic	Study Description	Key Findings	Reference
		<p>reported an increase during the COVID-19 pandemic, four studies reported no difference, and 21 studies reported a decrease. Thirteen studies reported a decline in well-being. Only one study measured sedentary behaviour, reporting an increase.</p> <ul style="list-style-type: none"> <li>○ The majority of the studies assessed the self-reported difference in the degree of PA between the situation before the pandemic compared with the situation during lockdown.</li> <li>● <b>Conclusion:</b> Despite the variety in methods used, almost all studies reported negative impacts on PA and well-being in people with physical disabilities and/or chronic disease during the first wave of the pandemic. These findings highlight the importance of supporting this population, especially in times of crisis.</li> </ul>	
	<ul style="list-style-type: none"> <li>● <b>Objective:</b> The aim of the rapid review was to investigate, whether COVID-19 lockdown influences modifiable cardiovascular risk factors (i.e., physical inactivity, sedentary behaviour, smoking, alcohol use, unhealthy diet, obesity, bad blood lipids, and hypertension) in the general population. Medline and EMBASE were searched until March 2021.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>PA During COVID-19:</b> Findings show that PA decreased, and sedentary behaviour increased among all age groups during the COVID-19 lockdown.</li> <li>● <b>Alcohol Use and Food Intake:</b> Among adults, alcohol consumption increased, dietary quality worsened, and the amount of food intake increased. Some adults reported weight gain. Studies on children and adolescents were sparse.</li> <li>● This rapid review found a high number of epidemiological studies on the impact of COVID-19 lockdown measures on modifiable cardiovascular risk factors, but only a few used probability sampling methods.<sup>j</sup></li> </ul>	<p>Freiberg A, Schubert M, Romero Starke K, Hegewald J, Seidler A. <a href="#">A Rapid Review on the Influence of COVID-19 Lockdown and Quarantine Measures on Modifiable Cardiovascular Risk Factors in the General Population</a>. International Journal of Environmental Research and Public Health. 2021 Aug 13;18(16):8567.</p>
	<ul style="list-style-type: none"> <li>● <b>Objective:</b> The aim of the present study is to review the evidence on the effects of COVID-19 restrictions on children's PA and their determinants.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>PA of Children:</b> The results highlighted a decrease in children and adolescent PA during the pandemic, ranging between -10.8 min/day and -91 min/day. If an increase was detected, it related to unstructured and outdoor activities. The main determinants of children's PA during the pandemic were age, gender, socioeconomic background, and the outdoor environment.</li> <li>● <b>Conclusion:</b> The results imply that governments need to consider the negative effects that restrictive measures have on children's PA and act to ensure high levels of PA.</li> </ul>	<p>Rossi L, Behme N, Breuer C. <a href="#">Physical Activity of Children and Adolescents during the COVID-19 Pandemic-A Scoping Review</a>. International Journal of Environmental Research and Public Health. 2021 Oct 30;18(21):11440.</p>

<sup>j</sup> Probability sampling refers to the selection of a sample from a population based on the principle of randomization. When units from the population are randomly selected and each unit's selection probability can be calculated, reliable estimates can be produced and statistical inferences can be made about the population ([Statistics Canada, 2021](#)).

**Table 3: Single Studies on the Impact of COVID-19 on Chronic Disease Risk Factors**

Topic / Jurisdiction	Study Description	Key Findings	Reference
<b>Nutrition</b>			
<b>United States (US)</b>	<ul style="list-style-type: none"> <li><b>Objective:</b> This study included analyses of lifestyle and dietary healthfulness changes using 958 survey responses from US primary household food purchasers. Information was collected related to demographics, COVID-19-related household changes, and health-related habits before and during the pandemic.</li> </ul>	<ul style="list-style-type: none"> <li><b>Results:</b> Overall, 59.8%, 16.4%, and 23.4% of participants reported that their eating habits likely changed, may have changed, and likely did not change, respectively.               <ul style="list-style-type: none"> <li>Of the participants whose dietary habits likely or may have changed, 64.1%, 16.8%, and 19% reported healthier, neither healthier nor less healthy, and less healthy eating habits, respectively.<sup>76</sup></li> <li>COVID-19-related income loss, more meals consumed with household members in front of the television, an increase in food advertisement exposure, increased perceived stress, and better perceived current health were significant predictors of a perceived increase in dietary healthfulness.</li> <li>Overall, dietary habits were perceived to become healthier during the pandemic. The predictors of perceived improvement in dietary healthfulness were surprising and indicate the need for further study of these factors in crisis and noncrisis situations.</li> </ul> </li> </ul>	<p>Cosgrove K, Wharton C. <a href="#">Predictors of COVID-19-Related Perceived Improvements in Dietary Health: Results from a US Cross-Sectional Study</a>. <i>Nutrients</i>. 2021 Jun 19;13(6):2097.</p>
<b>Japan</b>	<ul style="list-style-type: none"> <li><b>Objective:</b> An online cross-sectional questionnaire survey was conducted in November 2020 among 6,000 Japanese adults (aged 20-64 years) registered with a research company and gathered data on demographics, socioeconomic factors, medical history, COVID-19 status of the respondent's family and neighbors, fear of COVID-19, and changes in lifestyle and dietary habits since the COVID-19 outbreak.</li> </ul>	<ul style="list-style-type: none"> <li><b>Results:</b> To the question "Have you made healthier changes to your dietary habits compared with the dietary habits before the spread of COVID-19 (one year ago, November 2019)?: 1,215 (20.3%), 491 (8.2%), and 4,294 (71.6%) participants answered that their dietary habits were healthier, unhealthier, and unchanged, respectively.<sup>77</sup> <ul style="list-style-type: none"> <li>Healthier and unhealthier dietary habits were associated with greater fear of COVID-19, altered exercise and sleep times, and smoking.</li> <li>Unhealthy habits were positively associated with living alone, decreasing household income, colleagues with COVID-19, stress, and weight loss/gain. Annual household income, changing household income, COVID-19 in friends, health literacy, exercise frequency, weight loss, and starting smoking were positively associated with healthier dietary changes.</li> </ul> </li> </ul>	<p>Shimpo M, Akamatsu R, Kojima Y, Yokoyama T, Okuhara T, Chiba T. <a href="#">Factors Associated with Dietary Change since the Outbreak of COVID-19 in Japan</a>. <i>Nutrients</i>. 2021 Jun 14;13(6):2039.</p>
<b>Substance Use</b>			
<b>Canada</b>	<ul style="list-style-type: none"> <li><b>Objective:</b> To examine whether changes in alcohol consumption in Canada since the</li> </ul>	<ul style="list-style-type: none"> <li><b>Alcohol Use and Mental Health:</b> Changes in alcohol consumption were positively associated with anxiety, feeling depressed and loneliness. In particular, people</li> </ul>	<p>Shield KD, Chrystoja BR, Ali S, Sohi I, Rehm J, Nigatu YT, Elton-Marshall T, Hamilton H,</p>



Topic / Jurisdiction	Study Description	Key Findings	Reference
	<p>start of the COVID-19 pandemic are associated with feelings of anxiety, depression, loneliness and/or with changes in employment due to COVID-19.</p> <ul style="list-style-type: none"> <li>• <b>Methods:</b> Data collection occurred between May 29, 2020 and March 23, 2021 via a web panel, which sampled 5,892 adults (≥18 years of age). Data were collected on changes in alcohol consumption compared to before the pandemic, anxiety, self-perceived depression, self-perceived loneliness, changes in employment status due to COVID-19 and socio-demographic variables (age, gender, living situation, household income and urban vs rural residence).<sup>k</sup></li> </ul>	<p>with mild to moderate (ordered Odds Ratio (OR):1.23, 95% Confidence Interval (CI):1.07, 1.62) or severe anxiety (ordered OR:1.49, 95% CI:1.15, 1.93) had a greater odds of increased drinking than did people with no to low levels of anxiety.</p> <ul style="list-style-type: none"> <li>○ Gender, age, household income, living situation and survey wave<sup>l</sup> were also associated with changes in drinking. No effect modifications by gender were observed.</li> <li>○ Changes in alcohol consumption were not significantly associated with changes in employment status, location of residence (urban, suburban or rural) or the number of days in the past week a person felt hopeful about the future.</li> <li>• <b>Conclusion:</b> Given the health harms caused by alcohol use, public health practitioners and primary care physicians should focus health messaging to identify and support individuals at risk of increased alcohol consumption, especially people experiencing depression, loneliness, or anxiety.</li> </ul>	<p>Jankowicz D, Wells S. <a href="#">Changes in Alcohol Consumption in Canada During the COVID-19 Pandemic: Associations With Anxiety and Self-Perception of Depression and Loneliness.</a> Alcohol and Alcoholism. 2021 Aug 13;agab055.</p>
Canada	<ul style="list-style-type: none"> <li>• <b>Objective:</b> To apply a gendered lens to self-reported changes in alcohol and cannabis consumption during the second wave of the pandemic in Canada (September to December 2020).</li> <li>• <b>Period of the Pandemic:</b> Wave 2</li> <li>• <b>Methods:</b> The survey was administered from September 11, 2020 to December 4, 2020 to 30,000 dwellings in the 10 provinces and capital cities of the three territories in Canada, which resulted in a sample of</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Alcohol and Cannabis Use:</b> <ul style="list-style-type: none"> <li>○ Between September and December 2020, 16.2% of women and 15.2% of men self-reported an increase in their alcohol consumption. During the same period, 4.9% of women and 5.8% of men self-reported an increase in their cannabis consumption.</li> <li>○ Overall, the factors associated with alcohol and cannabis use in gender-specific regression models were similar.</li> <li>○ For women, higher education was significantly associated with self-reported increased alcohol use.</li> <li>○ Men who were parents/legal guardians were significantly less likely to report increased cannabis use.</li> </ul> </li> </ul>	<p>Hill MacEachern K, Venugopal J, Varin M, Weeks M, Hussain N, Baker MM. <a href="#">Applying a gendered lens to understanding self-reported changes in alcohol and cannabis consumption during the second wave of the COVID-19 pandemic in Canada, September to December 2020.</a> Health Promotion and Chronic</p>

<sup>k</sup> Note that Indigenous populations were not identified in this study.

<sup>l</sup> Cross-sectional data used in analysis were collected from May 29 to June 1, 2020 (Wave 2), June 19 to 23 (Wave 3), July 10 to 14 (Wave 4), September 18 to 22 (Wave 5), November 27 to December 1 (Wave 6) and March 19 to 23, 2021 (Wave 7). Data from Wave 1 (8 to 12 May 2020) were excluded from this study since changes in alcohol consumption were not measured for people who did not report drinking in the past week in this wave's survey ([Shield et al., 2021](#)).

Topic / Jurisdiction	Study Description	Key Findings	Reference
	14,689 participants aged 18 years and older. <sup>m</sup>	<ul style="list-style-type: none"> <li>○ For men and women, screening positive for symptoms of depression was significantly associated with higher odds of increased alcohol and cannabis use.</li> <li>● <b>Conclusion:</b> Sociodemographic factors, as well as depression and anxiety, were similarly associated with increased alcohol and cannabis use for both men and women in the second wave of the pandemic.</li> </ul>	Disease Prevention Canada. 2021 Nov 10;41(11):331-339.
<b>Canada</b>	<ul style="list-style-type: none"> <li>● <b>Objective:</b> This monitoring study highlights the differential mental health impacts of the pandemic for those who experience health, social, and structural inequities.</li> <li>● <b>Period of the Pandemic:</b> Wave one</li> <li>● <b>Methods:</b> A cross-sectional monitoring survey was developed in collaboration with academic researchers from the University of British Columbia, the Canadian Mental Health Association, and the Mental Health Foundation, a national UK mental health organization. The online survey was deployed May 2020 across all Canadian provinces and territories stratified by Canadian Census-informed socioeconomic characteristics (age, gender household income, region).<sup>n</sup></li> </ul>	<ul style="list-style-type: none"> <li>● <b>Overview:</b> While results focused on self-reported mental health during COVID-19 including sources of stress and coping, respondents were also asked about: <ul style="list-style-type: none"> <li>○ <b>Substance Use:</b> Within the overall sample, 19.5% (95% CI 18.1–20.1) indicated that their use of alcohol had increased because of the pandemic. <ul style="list-style-type: none"> <li>▪ <b>Indigenous People:</b> The group most likely to report increased alcohol use was Indigenous peoples (24.4%, 95% CI 16.0–34.6).</li> </ul> </li> <li>○ <b>Cannabis Use:</b> In terms of cannabis and prescription medication use, those with a pre-existing mental health condition endorsed the greatest levels of increased use at 13.2% (95% CI 10.5–16.3) and 8.1% (95% CI 6.0–10.7) respectively, versus 5.8% (95% CI 4.9–6.8) and 2.5% (95% CI 1.9–3.2) among those without a mental health condition.</li> <li>○ <b>Tobacco Use:</b> Reports of increased use of tobacco and other psychoactive substances were less common.</li> </ul> </li> <li>● In addition to findings directly examining mental health impacts, this study identified several concerning outcomes that place populations at increased risk for poor mental health. <ul style="list-style-type: none"> <li>○ <b>Food insecurity for vulnerable groups:</b> Nearly one in five participants identified worry about having enough food to meet their household's basic needs. This was further magnified among vulnerable groups, including those in the lowest income category, people with a disability, and racialized and Indigenous peoples. The relationship between food insecurity and mental health is well-established and has shown to be independently associated with experiences of mental distress and mental health conditions.</li> </ul> </li> </ul>	Jenkins, E. K., McAuliffe, C., Hirani, S., Richardson, C., Thomson, K. C., McGuinness, L., ... & Gadermann, A. (2021). <a href="#">A portrait of the early and differential mental health impacts of the COVID-19 pandemic in Canada: findings from the first wave of a nationally representative cross-sectional survey</a> . <i>Preventive Medicine</i> , 145, 106333.

<sup>m</sup> Of the initial sample, 84% agreed to share their data with the Public Health Agency of Canada, which resulted in a sample size of 12,344 for the analyses. Those excluded from survey coverage included individuals living on reserves or other Indigenous settlements, full-time members of the Canadian Armed Forces and individuals in institutions.

<sup>n</sup> The total number of respondents was 3,000 of which those of Indigenous origins represented 2.9% (n=87).

Topic / Jurisdiction	Study Description	Key Findings	Reference
<p><b>British Columbia (BC)</b></p>	<ul style="list-style-type: none"> <li>• <b>Objective:</b> This study used a gender-based analysis to determine the prevalence of psychosocial symptoms and substance use (i.e., alcohol and cannabis) by age, ethnicity, income, rurality, education level, Indigenous status, and sexual orientation.</li> <li>• <b>Method:</b> Participants, aged 25–69 years (n=6,076), were invited to participate in this study from previously established cohorts from research teams at the Women’s Health Research Institute, representing both general and priority populations of BC who had consented to being contacted for future research (e.g., women living with HIV/AIDS, men and women living with a complex chronic disease). Those who agreed to participate were asked to self-report symptoms of depression, anxiety, pandemic stress, loneliness, alcohol use, and cannabis use across five phases of the pandemic as well as retrospectively before the pandemic.<sup>o</sup></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Mental Health:</b> For all psychosocial outcomes, there was a significant effect of time with all five phases<sup>p</sup> of the pandemic being associated with more symptoms of depression, anxiety, stress, and loneliness relative to pre-COVID levels (<math>p &lt; .0001</math>). Gender was significantly associated with all outcomes (<math>p &lt; .0001</math>) with men exhibiting lower scores (i.e., fewer symptoms) than women and gender diverse participants, and women exhibiting lower scores than the gender diverse group. Other significant predictors were age (younger populations experiencing more symptoms, <math>p &lt; .0001</math>), ethnicity (Chinese/Taiwanese individuals experiencing fewer symptoms, <math>p = .005</math>), and Indigenous status (Indigenous individuals experiencing more symptoms, <math>p &lt; .0001</math>).</li> <li>• <b>Indigenous Mental Health:</b> It was found that those who self-identified as Indigenous had significantly more psychosocial symptoms than non-Indigenous participants across all four scales for all phases of the pandemic in BC. Importantly, there was no difference in psychosocial outcomes between Indigenous and non-indigenous groups pre-COVID, which underscores the disproportionate impact of the pandemic on this community. <ul style="list-style-type: none"> <li>• Alcohol use and cannabis use increased relative to pre-pandemic levels, and women reported a greater increase in cannabis use than men (<math>p &lt; .0001</math>).</li> </ul> </li> <li>• <b>Conclusions:</b> The findings highlight the need for policy makers and leaders to prioritize women, gender-diverse individuals, and young people when tailoring public health measures for future pandemics.</li> </ul>	<p>Brotto LA, Chankasingh K, Baaske A, Albert A, Booth A, Kaida A, Smith LW, Racey S, Gottschlich A, Murray MCM, Sadarangani M, Ogilvie GS, Galea L. <a href="#">The influence of sex, gender, age, and ethnicity on psychosocial factors and substance use throughout phases of the COVID-19 pandemic</a>. PLoS One. 2021 Nov 22;16(11):e0259676</p>
<p><b>US</b></p>	<ul style="list-style-type: none"> <li>• <b>Objective:</b> This cross-sectional study examines mental health and economic stressors early in the COVID-19 pandemic which may be associated with heavy alcohol use and increased alcohol use.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Alcohol Use:</b> Among participants, 10% (n = 222) reported high-risk drinking, and 36% (n = 775) reported increased alcohol consumption.<sup>q</sup></li> <li>• <b>Factors:</b> In multivariable analysis, high-risk drinking was significantly associated with household job loss (OR = 1.41, 95%CI = [1.06, 1.88]) and depressive symptoms (OR = 1.05, 95% CI = [1.02, 1.07]), and women had higher odds of high-risk drinking than men (OR = 2.37, 95% CI = [1.32, 4.69]). Previous mental</li> </ul>	<p>Nesoff ED, Gutkind S, Sirota S, McKowen AL, Veldhuis CB. <a href="#">Mental health and economic stressors associated with high-risk drinking and increased alcohol consumption early in the</a></p>

<sup>o</sup> Pre-COVID: Prior to mid-March 2020; Phase 1: Mid-March 2020 to mid-May 2020; Phase 2/3: Mid-May 2020 to November 2020; Phase 2/3\_2: Mid-May 2020 to August 2020; Phase 4: September 2020 to October 2020; Phase 5: November 2020 to March 1, 2021.

<sup>p</sup> In BC, the five phases are defined as: 1) Phase 1: mid-March 2020 to mid-May 2020; 2) Phase 2: mid-May 2020 to mid-June 2020; 3) Phase 3: mid-June 2020 until the end of November 2020; 4) Phase 4: September 2020 to the end of October 2020; and Phase 5: November 2020 to March 1, 2021) ([Brotto et al., 2021](#)).

<sup>q</sup> High-risk drinking was defined by the World Health Organization as a daily average of  $\geq 4$  drinks for men and  $\geq 3$  drinks for women ([Nesoff et al., 2021](#)).

Topic / Jurisdiction	Study Description	Key Findings	Reference
	<ul style="list-style-type: none"> <li><b>Method:</b> An online survey of US adults (n=2,175) via social media April 5 to May 5, 2020. Participants reported retrospective assessments of increased alcohol use if their past-week alcohol consumption exceeded their past-year average weekly alcohol consumption.</li> </ul>	<p>health diagnosis was not significantly associated with high-risk drinking during the pandemic (OR = 1.31, 95% CI = [0.98, 1.76]) in univariable analysis. High-risk drinkers were almost six times as likely to report retrospective assessments of increased alcohol consumption, controlling for mental health and economic stressors (OR = 5.97, 95% CI = [4.35, 8.32]).</p> <ul style="list-style-type: none"> <li><b>Conclusion:</b> Findings suggest a need for targeted interventions to address the complex mental health and economic stressors that may increase alcohol consumption and high-risk drinking during and after the pandemic.</li> </ul>	<p><a href="#">COVID-19 pandemic in the United States</a>. Preventive Medicine. 2021 Dec;153:106854.</p>
US	<ul style="list-style-type: none"> <li><b>Objective:</b> To investigate the relationships between mental health symptomatology and self-reported changes in alcohol consumption at the onset of the pandemic.</li> <li><b>Method:</b> Data were from the nationwide COVID-19 Coping Study of US adults aged ≥55 in April and May 2020 (n = 6,548).</li> </ul>	<ul style="list-style-type: none"> <li><b>Alcohol Use:</b> One in 10 adults (717/6,548; 11%) reported an increase in their alcohol consumption in the past week compared to their usual pre-COVID-19 drinking.</li> <li><b>Mental Health:</b> Mental health symptomatology was associated with increased drinking since the pandemic onset (depression: OR = 2.66, 95% CI: 1.99-3.56; anxiety: OR = 1.80, 95% CI: 1.34-2.42; loneliness: OR = 2.45, 95% CI: 1.83-3.28). <ul style="list-style-type: none"> <li>Participants who screened positive for all three mental health outcomes were substantially more likely to report increased alcohol consumption since the onset of the pandemic (OR = 3.87, 95% CI: 2.52-5.96, vs. no mental health outcomes).</li> </ul> </li> <li>This study demonstrates potentially harmful changes in alcohol intake among middle-to-older aged adults experiencing mental health symptomatology during the early months of the COVID-19 pandemic.</li> </ul>	<p>Eastman MR, Finlay JM, Kobayashi LC. <a href="#">Alcohol Use and Mental Health among Older American Adults during the Early Months of the COVID-19 Pandemic</a>. International Journal of Environmental Research and Public Health. 2021 Apr 16;18(8):4222.</p>
Australia	<ul style="list-style-type: none"> <li><b>Objective:</b> To estimate the population prevalence of people with changes in their usual patterns of alcohol use during the early stages of the COVID-19 pandemic in Australia; to assess the association between mental health status and changes in alcohol use during the pandemic; and to examine if the associations were modified by gender and age.</li> </ul>	<ul style="list-style-type: none"> <li><b>Alcohol Use:</b> Overall, about one in five adults reported that they had been drinking more alcohol since the COVID-19 pandemic began than they used to.</li> <li><b>Mental Health:</b> People were more likely to be drinking alcohol more than they used to if they had more severe symptoms of depression or anxiety. The associations between depressive and anxiety symptoms and increased alcohol use since the COVID-19 pandemic began were consistent between females and males.</li> <li><b>Conclusion:</b> These data indicate that there is a need for public policies focused on alcohol use during the COVID-19 pandemic and the strategies should include specific consideration of the needs of people with mental health problems.</li> </ul>	<p>Tran TD, Hammarberg K, Kirkman M, Nguyen HTM, Fisher J. <a href="#">Alcohol use and mental health status during the first months of COVID-19 pandemic in Australia</a>. Journal of Affective Disorders. 2020 Dec 1;277:810-813.</p>

Topic / Jurisdiction	Study Description	Key Findings	Reference
	<ul style="list-style-type: none"> <li>• <b>Method:</b> Online survey (n=13,829)<sup>†</sup></li> </ul>		
<b>Iceland</b>	<ul style="list-style-type: none"> <li>• <b>Objective:</b> To investigate the effect of the COVID-19 pandemic on mental health and substance use of adolescents.</li> <li>• <b>Method:</b> In this longitudinal, population-based study, surveys were administered to a nationwide sample (n=59,701) of 13 to 18-year-olds in Iceland in October or February in 2016 and 2018, and in October, 2020 (during the COVID-19 pandemic).</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Mental Health:</b> An increase in depressive symptoms (<math>\beta</math> 0.57, 95% CI 0.53 to 0.60) and worsened mental wellbeing (<math>\beta</math> -0.46, 95% CI -0.49 to -0.42) were observed across all age groups during the pandemic compared with same-aged peers before COVID-19. These outcomes were significantly worse in adolescent girls compared with boys (<math>\beta</math> 4.16, 95% CI 4.05 to 4.28, and <math>\beta</math> -1.13, 95% CI -1.23 to -1.03, respectively).</li> <li>• <b>Alcohol and Tobacco Use:</b> Cigarette smoking (OR 2.61, 95% CI 2.59 to 2.66), e-cigarette use (OR 2.61, 95% CI 2.59 to 2.64), and alcohol intoxication (OR 2.59, 95% CI 2.56 to 2.64) declined among 15-18-year-olds during COVID-19, with no similar gender differences.</li> <li>• <b>Conclusions:</b> The results suggest that COVID-19 has significantly impaired adolescent mental health. However, the decrease observed in substance use during the pandemic might be an unintended benefit of isolation, and might serve as a protective factor against future substance use disorders and dependence. Population-level prevention efforts, especially for girls, are warranted.</li> </ul>	<p>Thorisdottir IE, Asgeirsdottir BB, Kristjansson AL, Valdimarsdottir HB, Jonsdottir Tolgyes EM, Sigfusson J, Allegrante JP, Sigfusdottir ID, Halldorsdottir T. <a href="#">Depressive symptoms, mental wellbeing, and substance use among adolescents before and during the COVID-19 pandemic in Iceland: a longitudinal, population-based study.</a> Lancet Psychiatry. 2021 Aug;8(8):663-672.</p>
<b>United Kingdom (UK)</b>	<ul style="list-style-type: none"> <li>• <b>Objective:</b> To examine the correlates of increased alcohol consumption during the COVID-19 pandemic-related restrictions that were implemented in a sample of UK adults.</li> <li>• <b>Method:</b> a cross-sectional epidemiological study, administered through an online survey. The study was launched on March 17, 2020.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Alcohol Use:</b> Of 691 adults, 17% reported increased alcohol consumption after lockdown. A higher proportion of those aged 18–34-year reported increased alcohol consumption compared to older groups.</li> <li>• <b>Mental Health:</b> The prevalence of poor overall mental health was significantly higher in individuals with increased alcohol consumption (vs. no increase) (45.4% versus 32.7%; p-value = 0.01). There was a significant association between increased alcohol consumption and poor overall mental health (OR = 1.64; 95% CI = 1.01, 2.66), depressive symptoms (unstandardized beta = 2.93; 95% CI = 0.91, 4.95) and mental wellbeing (unstandardized beta=-1.38; 95% CI=-2.38, -0.39).</li> <li>• <b>Conclusion:</b> More than one in six UK adults increased their alcohol consumption during lockdown and a higher proportion of these were younger adults. Increased alcohol consumption was independently associated with poor overall mental health, increased depressive symptoms and lower mental wellbeing.</li> </ul>	<p>Jacob L, Smith L, Armstrong NC, Yakkundi A, Barnett Y, Butler L, McDermott DT, Koyanagi A, Shin JI, Meyer J, Firth J, Remes O, López-Sánchez GF, Tully MA. <a href="#">Alcohol use and mental health during COVID-19 lockdown: A cross-sectional study in a sample of UK adults.</a> Drug and Alcohol Dependence. 2021 Feb 1;219:108488.</p>

<sup>†</sup> Survey respondents were from all Australian states and territories and socioeconomic positions, diverse living situations, genders, and ages, including an accurate proportion (10% of the sample) of people aged at least 70 years.



Topic / Jurisdiction	Study Description	Key Findings	Reference
		These findings highlight the importance of planning targeted support as we emerge from lockdown and plan for potential second and subsequent waves.	
<b>Physical Activity</b>			
<b>Canada</b>	<ul style="list-style-type: none"> <li>• <b>Objective:</b> A national sample of Canadian parents (n = 1,472) of children (5-11 years) or youth (12-17 years) (54% girls) completed an online (in April 2020) of the pandemic survey that assessed immediate changes in child movement and play behaviours during the COVID-19 outbreak.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Results:</b> Only 4.8% (2.8% girls, 6.5% boys) of children and 0.6% (0.8% girls, 0.5% boys) of youth were meeting combined movement behaviour guidelines during COVID-19 restrictions. Children and youth had lower PA levels, less outside time, higher sedentary behaviours (SB) (including leisure screen time), and more sleep during the outbreak. Parental encouragement and support, parental engagement in PA, and family dog ownership were positively associated with healthy movement behaviours. Although families spent less time in PA and more time in SB, several parents reported adopting new hobbies or accessing new resources.</li> </ul>	Moore SA, Faulkner G, Rhodes RE, Brussoni M, Chulak-Bozzer T, Ferguson LJ, Mitra R, O'Reilly N, Spence JC, Vanderloo LM, Tremblay MS. <a href="#">Impact of the COVID-19 virus outbreak on movement and play behaviours of Canadian children and youth: A national survey</a> . International Journal of Behavioral Nutrition and Physical Activity. 2020 Jul 6;17(1):85.
<b>Italy</b>	<ul style="list-style-type: none"> <li>• <b>Objective:</b> The study aimed to analyze the impact of COVID-19 on the PA of an Italian sample of primary school children by comparing it before and during COVID-19 considering gender differences.</li> <li>• <b>Method:</b> A pre-post analysis (October 2019-January 2021) was conducted using a randomized sample (N = 77) from the I-MOVE study settled in an Italian primary school. Both objective (Actigraph accelerometers) and self-reported (PAQ-c questionnaires) assessments of PA were performed.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Results:</b> Weekly and daily minutes time spent in moderate to vigorous PA significantly decreased respectively by <math>- 30.59 \pm 120.87</math> and <math>- 15.32 \pm 16.21</math> from before to during pandemic while the weekly time spent in sedentary behaviour increased (<math>+ 1196.01 \pm 381.49</math>). PAQ-c scores followed the same negative trend (<math>- 0.87 \pm 0.72</math>). Boys seem to have suffered more than girls from the imposed restrictions. <ul style="list-style-type: none"> <li>○ These findings outline the need for strategies to promote PA and reduce sedentary behaviours in children to prevent COVID-19 restriction long-term effects.</li> </ul> </li> </ul>	Dallolio L, Marini S, Masini A, Toselli S, Stagni R, Bisi MC, Gori D, Tessari A, Sansavini A, Lanari M, Bragonzoni L, Cecilian A. <a href="#">The impact of COVID-19 on physical activity behaviour in Italian primary school children: a comparison before and during pandemic considering gender differences</a> . BMC Public Health. 2022 Jan 8;22(1):52.



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