

# Changes in the food and drink consumption patterns of Australian women during the COVID-19 pandemic

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As of 26 May 2022, 7,152,007 cases of Coronavirus Disease (COVID-19), caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2) virus, had been recorded in Australia. There had been 8,374 confirmed deaths from COVID-19, with 20-39 year olds being the most infected population group, but with approximately 93% of total deaths occurring in people aged 60 years and over.<sup>1</sup>

However, the health impacts of the pandemic are not limited to the effects of the infection, but also on health behaviours. To date, there is little evidence on changes in food consumption since the start of 2020. The CSIRO's survey from the Total Wellbeing Diet database shows that one third of participants reported their diet becoming worse during the pandemic, with a third of participants reporting an increase in snacking, despite half of all participants reporting a decrease in takeaway consumption and a quarter of all participants reporting more vegetable consumption.<sup>2</sup> Further, a study conducted on the changes experienced by Western Australian people during and after the COVID-19 lockdown showed varying changes in dietary behaviours, including more frequent cooking, takeaway and home delivery, and less frequent consumption of healthy food and eating out among different participants.<sup>3</sup>

To predict future health outcomes moving forward and to prepare for future pandemics, it is important to understand and learn from

## Abstract

**Objective:** This paper uses data from the seventh fortnightly Coronavirus (COVID-19) Survey sent to women in the Australian Longitudinal Study on Women's Health to investigate the relationship between the COVID-19 pandemic and the food and drink consumption of women born in 1946-51, 1973-78 and 1989-95.

**Methods:** A survey about changes in fruit, vegetable, discretionary food, takeaway and sugary drink consumption during the pandemic was emailed on 22 July 2020 to 28,709 women in three cohorts of the Australian Longitudinal Study on Women's Health. Thematic qualitative analysis was conducted on comments about changes in consumption, and basic quantitative analysis was included for context.

**Results:** There were significant associations between age and all categories of food and drink consumption. Women wrote of lifestyle changes and choices during lockdowns, comfort and emotional eating, and access to food and drink changing their consumption behaviours.

**Conclusions:** The COVID-19 pandemic and interventions had both positive and negative impacts on the food and drink consumption behaviours of Australian women.

**Implications for public health:** These findings can be used to directly influence practice around healthy food and drink consumption, highlighting enablers, including being at home, and barriers, including mental health, that should be considered.

**Key words:** COVID-19, food consumption, drink consumption, women, Australia

the impact of the current pandemic on healthy eating. It is also important to look specifically at the impacts experienced by different population groups. For example, the Western Australian study also found gendered impacts, with approximately double the amount of male-identifying participants reporting no changes in their diet during lockdown than female-identifying participants.<sup>3</sup>

The Australian Longitudinal Study on Women's Health (ALSWH) launched a COVID-19 Survey project in April to

understand women's experiences, health and wellbeing throughout the pandemic.<sup>4</sup> The seventh of a series of short fortnightly surveys focused on food and drink consumption behaviours, and the responses to this survey were collected from 22 July to 5 August 2020. The COVID-19 situation varied across the country at this time, with Victoria in strict lockdown and other parts of the country with eased restrictions.<sup>5</sup> This survey therefore provides a broad spectrum of experiences from people no longer in lockdown to people still in or going back into lockdown.

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This paper uses data from the seventh survey to investigate the relationship between the COVID-19 pandemic and food and drink consumption patterns of Australian women, particularly from the experiences of women born in 1946-51, 1973-78 and 1989-95, through thematic qualitative analysis and basic quantitative analysis. At the time this survey was conducted, women in these cohorts were aged 68-74, 41-47, and 24-31 years respectively.

## Methods

The ALSWH is a nationally representative study that regularly collects data from over 57,000 women from across Australia. Women born in 1921-26, 1946-51 and 1973-78 first provided data in 1996 and have been surveyed roughly every three years since then, and with the oldest women now surveyed every six months. Women born 1989-95 first participated in 2012-13, and were surveyed yearly until 2017, and then again in 2019. In 2020 there was no scheduled survey for any of the cohorts, except the six-monthly surveys of the 1921-26 cohort. Not wanting to miss the immediate impacts of the pandemic on the women's lives, the study team implemented two-weekly rapid surveys for a six-month period from April to October 2020.

Each survey focused on a specific topic, with the seventh survey focusing on perceived changes in food and drink consumption that had occurred during the pandemic. The questions included in this study were: changes in fruit and vegetable intake; change in intake of the discretionary foods of pastries, chips, biscuits, icecream, cakes and confectionary; change in consuming takeaway food; and change in sugary drink consumption. Response options for all items were "less than before the pandemic", "same as before the pandemic", and "more than before the pandemic".

At the end of the survey, women were provided with a free-text box where they could comment on changes in diet or any aspects of their lives as they may have been affected by COVID-19 in response to the question "Is there anything you would like to add?".

The surveys were approved by the Ethics Committees of the University of Newcastle (approval numbers H-076-0795 and H-2012-0256) and the University of Queensland (HE000224 and HE000950).

## Data analysis

Quantitative analysis of the frequency dietary questions for each cohort was conducted using Microsoft Excel.<sup>6</sup> The chi-squared test of independence was conducted using jamovi.<sup>7</sup> These were performed to contextualise the qualitative analysis.

The free-text data were analysed using Microsoft Excel.<sup>6</sup> Thematic analysis following the procedure described by Nowell, Norris, White and Moules, following the procedure of familiarisation with the data, initial code generation, theme search, theme review, theme labelling and result reporting.<sup>8</sup> Prior to analysis, comments were grouped for each food and drink consumption behaviour according to women's survey responses "less than before" and "more than before". Comments were analysed separately for women aged 68-74, 41-47 and 24-31 years, as well as overall. In addition, during the data familiarisation process, comments were searched for the key words 'eat', 'food', 'diet', 'fruit', 'veg', 'past' for pastry/ies, 'chip' for chip/s, 'biscuit' for biscuit/s, 'ice' for ice-cream, 'cake' for cake/s, 'confectionary', 'junk', 'health' for healthy and unhealthy, 'snack', 'discretionary', 'consum' for consume/consumption, 'take' for takeaway, 'drink', 'sugar', 'soft', 'juice', 'sweet', 'wine', 'cordial', 'energy' for energy drink and 'milk' for flavoured milk to obtain relevant comments to inform the initial findings on the emerging themes.

In total, 2,622 comments were analysed to examine how the women's food and drink consumption patterns were affected by the pandemic, what women were saying about their dietary behaviours and what was triggering those behaviours. Comments were read and re-read and subjected to thematic content analysis. Comments relating to different themes were coded to denote the themes and sub-themes, and grouped and summarised accordingly.

## Results

COVID-19 Survey 7 was deployed on Wednesday 22 July 2020. Email invitations were sent to 28,709 women, and surveys were returned by 2,092/13,946 (15%) from the 1989-95 cohort, 2,594/8,503 (31%) from the 1973-78 cohort, and 2,884/6,260 (46%) from the 1946-51 cohort.

Overall, increased discretionary food consumption was the biggest change in food and drink consumption patterns of

women. Women aged 24-31 years had the highest percentage of reported increase in discretionary (52%), takeaway (42.5%) and sugary drinks (22.2%), alongside the highest percentage of reported decrease in fruit (22%) and vegetable (19%) consumption. Women aged 41-47 years had the highest percentage of reported decrease in discretionary food (13.3%) and takeaway (22.7%) consumption. Finally, women aged 68-74 had the highest percentage reporting increased fruit (22%) and vegetable (22%) consumption, and decreased sugary drinks consumption (14.2%). Table 1 shows the quantitative data on the food consumption behaviours of women through the pandemic up to the survey date.

Chi-square tests of independence showed that there were significant associations ( $p < 0.05$ ) between age group and self-reported changes in fruit, vegetable, discretionary food, takeaway food and sugary drink consumption. Table 2 shows the results of the analysis.

The results of the thematic analysis are divided into three themes, 'Lifestyle changes and choices', 'Health and mental wellbeing' and 'Availability and accessibility', then further divided into nine subthemes. The themes and subthemes are shown in Table 3.

### Theme 1: Lifestyle changes and choices

More time at home during lockdowns had a large impact across all cohorts, categories and amounts of food and drink. Across cohorts, some participants reported that because of this increased time, they had more time to cook, leading to healthier meals, an increase in overall food consumption and changes in takeaway and sugary drinks consumption. However, takeaway consumption was also increased for some participants due to the decision to support local businesses. Further, being at home was also reported with more accessibility to food more often, time to eat and snacking across cohorts. Snacks ranged from fruit and nuts to sweets and biscuits, however, most women that mentioned snacking only mentioned the frequency of their snacking. Working from home also affected food consumption patterns, with some participants reporting that it enhanced their healthy eating behaviours by having more time to prepare food or not buying lunch out, and others reporting that the closer proximity to food was contributing

to behaviours including more snacking. For some women, changed workloads during the pandemic lead to eating foods that were convenient.

A few participants reported using food, cooking and baking for social connection with family and friends, particularly by women aged 41-47 and 68-74 years. This was done through cooking with the household in lockdown, exchanging foods through delivery, and friends cooking the same recipe as a separate but shared experience. This was mainly reported with an increase in discretionary food consumption. Particularly for women aged 24-31 years, changed living situations such as moving back in with family were reported to change food consumption patterns, however, there was no consistent trend on what changed in categories or amount of food. Finally, the pandemic also prompted or facilitated women, particularly those aged 41-47 and 24-31, to consciously improve their health and diet, specifically increasing fruit and vegetable consumption, and decreasing discretionary, takeaway and sugary drinks consumption. The women reported that this was mostly due to prior lockdown experiences and having more time to be able to prepare healthier meals. The following quotes exemplify this theme across the three age groups, and show how the changes and choices changed their food consumption patterns.

**Quotes for age 68-74 years:**

*More time at home, more cooking and more eating. Difficult to stop snacking and get back to smaller portions.* – Reported more discretionary food and less fruit and vegetable consumption

*Eaten more being home more.* – Reported more fruit, vegetable and discretionary food, and less takeaway and sugary drinks

**Quote for age 41-47 years:**

*I think eating same foods just more of them when working from home as easier to grab meals/snacks.* – Reported more discretionary food consumption

**Quote for age 24-31 years:**

*Not leaving the house often has allowed for me to spend more time on planning, cooking and enjoying home cooked food and treats (many treats).* – Reported more fruit, vegetable and discretionary food consumption

**Table 1: Self-reported changes in food and drink consumption patterns of women during the COVID-19 pandemic across cohorts from the 7th Australian Longitudinal Study on Women's Health COVID-19 Survey. This table shows the frequency of responses.**

Cohort age at COVID-19 S7	% More than before	% No change	% Less than before
<b>Discretionary food consumption<sup>a</sup></b>			
68-74 (n=2,884)	25.4	64.2	10.4
41-47 (n=2,594)	42.4	44.3	13.3
24-31 (n=2,091)	51.7	39.1	9.2
<b>Takeaway food consumption</b>			
68-74 (n=2,884)	4	74.2	21.8
41-47 (n=2,594)	22	55.3	22.7
24-31 (n=2,091)	42.5	36.8	20.7
<b>Fruit consumption</b>			
68-74 (n=2,884)	21.7	71.8	6.5
41-47 (n=2,594)	12	69.7	18.3
24-31 (n=2,091)	16.4	61.6	22
<b>Vegetable consumption</b>			
68-74 (n=2,884)	21.5	73.6	4.9
41-47 (n=2,594)	14.5	72.7	12.8
24-31 (n=2,091)	17.6	63.9	18.5
<b>Sugary drink consumption</b>			
68-74 (n=2,884)	3.1	82.7	14.2
41-47 (n=2,594)	11.6	78.3	10.1
24-31 (n=2,091)	22.2	65	12.8

Note:

a: Pastries, chips, biscuits, ice-cream, cakes or confectionary

**Table 2: Chi-square tests of independence analysis on self-reported changes in food and drink consumption patterns of women during the COVID-19 pandemic across cohorts from the 7th Australian Longitudinal Study on Women's Health COVID-19 Survey. This table shows the statistically significant associations between age group and self-reported change in food or drink consumption.**

Age group and self-reported change in consumption	$\chi^2$	df	N	p
Fruit	12.083	4	300	0.01674
Vegetable	9.928	4	300	0.04166
Discretionary food	16.875	4	300	0.00204
Takeaway food	45.213	4	300	<0.00001
Sugary drink	17.846	4	300	0.00132

**Theme 2: Health and mental wellbeing**

Comfort and emotional eating, specifically due to feelings of stress, anxiety, sadness, tiredness, worry, loneliness and isolation during the pandemic was cited as causing changes in food and drink consumption patterns across cohorts. Out of the comments mentioning emotions, the number of participants specifically reporting comfort or emotional eating decreases from women aged 24-31 years (54%) to women aged 68-74 (20%). Participants also reported eating food as a way to 'treat' themselves, take care of themselves or to cope during this time particularly when in lockdown. An increase in discretionary food, takeaway and/or sugary drinks consumption was reported alongside comfort or emotional eating

across cohorts. The most reported specific feelings were stress or anxiety (particularly for the 24-31 years age group). Boredom was another factor reported to be contributing to increased food consumption.

Self-reported disordered eating was mentioned a few times, particularly from women aged 24-31 years, with increased issues due to COVID-19. Most of the changes affected increased consumption of discretionary items and less consumption of vegetables, however, changes in all categories were reported by these participants with self-reported disordered eating.

The following quotes exemplify this theme across the three age groups, and show how changes in health and mental wellbeing during the pandemic changed food consumption patterns.

**Quote for age 68-74 years:**

*Since the advent of COVID-19, I have eaten more comfort food and tend to graze throughout the afternoon and evening.* – Reported more discretionary food and takeaway, and less vegetable consumption

**Quote for age 41-47 years:**

*The stress, isolation and worry about life and what might happen next is driving my unhealthy eating. I'm aware of it – just struggling to get a handle on it.* – Reported more discretionary food and takeaway consumption

**Quote for age 24-31 years:**

*When the world feels so broken WHY NOT have a biscuit? Food is something I find a lot of comfort in!* – Reported more vegetable, discretionary food and takeaway, and less fruit consumption

**Theme 3: Food availability and accessibility**

Concerns, fears and stress about shopping in person regarding virus exposure were reported by some participants across all three cohorts. Restricting shopping and changing shopping habits, particularly among women aged 68-74 years, were also reported. For participants who reported using food delivery and online ordering, these services were said to be useful and helpful. However, a few women expressed concerns about available options and accessibility to certain

fresh foods. Food shortages, restrictions on purchasing, cost and shop inaccessibility were also reported by some participants across all cohorts, with these issues reportedly affecting food and drink consumption patterns. The following quotes exemplify this theme across the three age groups, and show how the changes in access to food changed food consumption patterns.

**Quote for age 68-74 years:**

*We decided to go with [meal delivery service] for a while as it was easier than thinking about meals and less time in the supermarket.* – Reported less fruit consumption

**Quote for age 41-47 years:**

*Purchasing food has become a stressful and more involved process. This has impacted our family consumption.* – Reported more discretionary food, takeaway and sugary drinks consumption

**Quote for age 24-31 years:**

*It was difficult to maintain a healthy diet without being able to go to the shops all the time. It was also hard not knowing when we'd be able to go back to the shop and what foods would be left on the shelf.* – Reported more discretionary food and less vegetable consumption

**Discussion**

There were significant associations between age and self-reported changes across all food

categories. An increase in fruit and vegetable consumption was reported the most by women aged 68-74 years, and in increase in discretionary food, takeaway and sugary drink consumption was reported the most by women aged 24-31 years. A decrease in fruit and vegetable consumption was reported the most by women aged 24-31 years, and a decrease in sugary drink consumption was reported the most by women aged 68-74 years. Further, a decrease in discretionary food and takeaway consumption was reported the most by women aged 41-47 years.

Lifestyle changes and choices, including increased time at home, finding ways to connect socially, changed living situations and life reflection, were reported by women across cohorts to change food consumption, as well as health and mental wellbeing, including engaging in comfort or emotional eating, and self-reported disordered eating. Finally, women across cohorts also reported that availability and accessibility, including concerns and changed shopping behaviours, ordering and delivery, and access to, presence of and restrictions on food and drinks, changed their food consumption behaviours.

**Theme 1: Lifestyle changes and choices**

Reportedly due to having more time to eat and easier accessibility to food from being at home more, an increase in snacking was reported across cohorts. These snacks

**Table 3: Summary of the themes and subthemes of the food and drink consumption behaviours of Australian women during the COVID-19 pandemic found through the thematic analysis of the 7th Australian Longitudinal Study on Women's Health COVID-19 Survey free text comments.**

Themes	Lifestyle changes and choices	Health and mental wellbeing	Availability and accessibility
Subthemes	<p>More time at home</p> <ul style="list-style-type: none"> <li>• Cooking and baking</li> <li>• Proximity to food</li> </ul> <p><i>"Healthier diet because more time to shop for healthy foods and cook healthy meals."</i> – Age 24-31, reported more fruit and vegetable, and less takeaway food consumption</p>	<p>Comfort and emotional eating and drinking</p> <ul style="list-style-type: none"> <li>• Stress</li> <li>• Anxiety/worry</li> <li>• Sadness/depression</li> <li>• Loneliness/isolation</li> </ul> <p><i>"If I get really stressed I get a bit of a knot in my stomach and I eat less. If I just feel a little bit down I tend to comfort eat and eat more!"</i> – Age 68-74, reported more fruit and vegetable, and less discretionary food, takeaway and sugary drinks consumption</p>	<p>Shopping In-Person Concerns and Behavioural Adaptation</p> <p><i>"I usually shop for fruit and vegetables at the market. It hasn't seemed safe to go to the market during covid 19, and because vegetables at the supermarket are significantly more expensive and poorer quality, I have been buying and consuming fewer vegetables."</i> – Age 24-31, reported more discretionary food and less vegetable consumption</p>
Subthemes	<p>Social connection and living situations</p> <p><i>"With kids at home, baking &amp; cooking is the go &amp; very tempting to eat!"</i> – Age 41-47, reported more discretionary food consumption</p>	<p>Self-reported disordered eating</p> <p><i>"My eating disorder has really intensified."</i> – Age 24-31, reported more fruit and less vegetable consumption</p>	<p>Online ordering and delivery</p> <p><i>"The main reason for less fruit was because I was ordering online and had less choice."</i> – Age 68-74, reported more discretionary food and less fruit consumption</p>
Subthemes	<p>COVID-19 prompted diet improvement</p> <p><i>"It has given me time to reflect on some of my habits including eating habits and with additional time at home I have been more inspired to cook healthier meals and explore new recipes."</i> – Age 41-47, reported more fruit and vegetable, and less discretionary food, takeaway and sugary drinks consumption</p>		<p>Presence, access and restrictions on food and drinks</p> <p><i>"I have limited access to fresh fruit and vegetables as I am doing shopping that stretches for longer periods of time."</i> – Age 41-47, reported less fruit, vegetable and takeaway consumption</p>

ranged from healthier snacks to unhealthier snacks, however, mostly just the frequency of snacking was reported. This is similar to what has been found internationally, with snacking found to be significantly increased during the pandemic.<sup>9,10</sup> One international systematic review found that frequency of snacking on sugary and salty foods, particularly with high amounts of calories and low amounts of nutrients, significantly increased<sup>9</sup> and an international survey found an increase in snacking in-between meals and late at night during COVID-19 lockdowns.<sup>10</sup>

Some participants across cohorts also reported having more time to be able to prepare and eat healthier meals, which led to decreases in takeaway consumption. The aforementioned international systematic review also found that fast food and ordered food consumption decreased, matching the findings in this study except for the youngest cohort, who had increased takeaway food consumption,<sup>9</sup> highlighting the need to view the impact of the pandemic with a generational lens. For the women across the cohorts that reported an increase in takeaway consumption, one reason for this was that they were eating takeaway to support small and local businesses. There are currently gaps in the literature on other topics emerging from this theme.

### **Theme 2: Health and mental wellbeing**

Comfort or emotional eating can be described as not eating for hunger and nutrient intake but in response to other conditions such as negative moods, including depression or sadness, anxiety or stress.<sup>11</sup> It is also linked to feelings of boredom.<sup>12</sup> However, emotions such as these may also lead to a decrease in food consumption. Both of these responses have been found in this study. There are gaps in the literature on mental health and food consumption during the pandemic, therefore more research needs to be done in this area.

Anxiety was one of the highest reported emotions that influenced food consumption in this study. An anonymous Australian survey on dietary behaviours during April-May 2020 found that 53.6% of people surveyed were troubled by their poor appetite or overeating behaviours, and that increased likelihood of having these behaviours was associated with high general anxiety levels among other things.<sup>13</sup> Finally, the comments

on self-reported disordered eating are consistent with an initial study on people with eating disorders in Australia throughout the pandemic, with the COVID-19 situation prompting or exacerbating eating disorders.<sup>14</sup>

### **Theme 3: Food availability and accessibility**

For some participants across cohorts, concerns and stress about going shopping for food were highlighted. The uncertainty surrounding COVID-19 drove an increase in purchases of food, causing disruptions and shortages of basic food items.<sup>15</sup> This was highlighted in other issues that arose from a few participants responses, including shop inaccessibility, food shortages, purchasing restrictions, limited options and cost, all influencing consumption behaviours negatively by, for example, increasing discretionary or takeaway food consumption. There are also gaps in the literature on topics emerging from this theme that need to be addressed through further research.

### **Limitations**

This analysis was conducted on survey data from the Australian Longitudinal Study on Women's Health, therefore the results found in this study may not be generalisable to Australians of other sexes. The data are also from a subset of the study participants who responded to Survey 7 of the COVID survey series. The respondents may not be fully representative of all women in the ALSWH. This survey also asked about stress, weight loss, appetite, and other food consumption items including red meat, poultry and fish consumption, not strictly about differences in the specified categories of food and drink consumption reported here. The variables included in this study were chosen to focus on the major food groups that can affect dietary health positively or negatively depending on if too little (e.g. fruit and vegetables) or too much (e.g. discretionary food items) is consumed. Also, the optional free-text open question at the end of the survey did not target questions about food and drink consumption. Therefore, many comments were not related to the food and drink consumption patterns studied in this paper. Focusing on particular topics, including food and drink accessibility and eating disorders, and further segregating food consumption data by other factors including socioeconomic status and geographical

location, to examine the impact of these factors on food and drink consumption during the pandemic will also help to address limitations of this study.

### **Conclusion and Implications for public health**

These findings highlight the complexity of the changes in people's lives caused by COVID-19. Changes that were positive for some participants in helping them have healthy food and drink consumption behaviours were negative and unhelpful for others. Therefore, 'one-size-fits-all' approaches to encouraging and supporting people to have a healthier diet may not be helpful, but rather taking diverse approaches that specifically target different subpopulations and their needs may be more useful.

Targeting strategies for younger women will be imperative given the substantial impacts of the pandemic particularly felt by this group. Considerations for now and for future pandemics include addressing the mental health impacts and ensuring availability and accessibility of food, both of which can become barriers to people having healthy food and drink consumption habits. Recommended actions for mental health may include the provision of financial resources, practical support, high quality information and access to effective mental health services via technology, alongside other evidence-based actions.<sup>16</sup> Various strategies have been proposed to improve food accessibility and availability, such as implementing policies that target factors such as sufficient income and stable employment, as well as creating food environments in both urban and rural areas that are resilient to factors that can influence security such as pandemics.<sup>17</sup> However, more research needs to be conducted to find the best practices and interventions to address these factors now and for future pandemics.

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### Data sharing and data accessibility

ALSWH survey data are owned by the Australian Government Department of Health and due to the personal nature of the data collected, release by ALSWH is subject to strict contractual and ethical restrictions. Ethical review of ALSWH is by the Human Research Ethics Committees at The University of Queensland and The University of Newcastle. De-identified data are available to collaborating researchers where a formal request to make use of the material has been approved by the ALSWH Data Access Committee. The committee is receptive of requests for datasets required to replicate results. Information on applying for ALSWH data is available from <https://alswh.org.au/for-data-users/applying-for-data/>

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