Impact of COVID-19 on Consumer Behavior and Attitude of University Students Pre- and Post-
Food Safety Training.

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ABSTRACT

This study is based on an online survey taken by California State Polytechnic University, Pomona students during the COVID-19 pandemic. The online survey assesses the students’ attitudes about their pre- and post-food safety training. To see if students are more likely to use commercial foodservice safety preparations. To summarize, the paper investigates the attitudes and behavior of Cal Poly Pomona students regarding their foodservice safety training and as a consumer during a deadly pandemic. The results highlighted an increased awareness on the impact of COVID-19 on food safety post-training.

INTRODUCTION

When the pandemic began, not much was known about the Coronavirus (COVID-19 virus). There was limited information regarding the virus’ life expectancy on surfaces, especially on the surface of food and food packages (Olaimat et al., 2020). In addition, since many cases of food borne illnesses are related to the mishandling of food, the uncertain survivability of COVID-19 on food surfaces and food packages raises concerns of the virus spreading via food or packages containing food (Knight et al., 2009). The transmission of the virus guides the question concerning the pandemic’s impact on consumer behavior and attitude. As a pilot study using university students’ responses, the purpose of the current study is to research consumer behavior and attitude pre- and post-food safety training during a pandemic.

BACKGROUND

COVID-19 AND ITS IMPACT

The COVID-19 pandemic has disrupted many lives around the world and changed the way people purchase and consume food. Under these difficult times many restaurants have
closed or resorted to take out only. Especially with this disruptive outbreak, commercial food services and supply chains must take extra precaution against the virus. As a direct result of panic buying, food and supply chains snowballed into shortages (Ben Hassen et al., 2020). Stockpiling presented issues of accessing healthy food, as consumers were more prone to purchasing nonperishable items such as canned or frozen foods (Ben Hassen et al., 2020). Additionally, consumers diminish the need for perishable items consequentially leading to an excess of food waste. The lack of food variety and increased consumption of processed foods increases the risk of malnutrition and weight gains. Social distancing can induce emotional eating that also contribute to a decrease in the quality of one’s diet. Huge contributors to a poor diet during quarantine is the ordering fast foods or comfort foods to ease one’s stress or anxiety. With a virus this impactful to our overall health, food safety practices are a critical precursor to safe food and an essential to healthy eating. Accordingly, restaurants must uphold and maintain safe food practices, following requirements provided by the CDC and FDA, for consumers ordering online, particularly during a pandemic.

**CONSUMER BEHAVIOR**

Foodborne illnesses are harmful and inconvenient to businesses and consumers. A study found a significant number of restaurants that have poor food safety practices largely contribute to foodborne illness (Knight et al., 2009). While the study did not occur during the pandemic, it provides significant background for investigating the importance of food safety practices. Specifically, during the pandemic, there were 7,496 publications relating to “COVID-19” (Laguna et al., 2020). Of those publications, at the beginning of April 2020, 4,382 publications utilized the term “food” (Laguna et al., 2020). About 58% of the publications were food related
signifying that food is a pertinent aspect during the pandemic. Whether the search was about restaurants going out of business, commercial food services, preventing the spread through safe food practices, or about functional foods as a prevention against the virus; the pandemic has shown a huge impact on consumer behavior. Prior to COVID-19, studies on consumer behavior and food safety perceptions at restaurants suggested consumers are less likely to return to a restaurant with prior food safety concerns (Baker & Crosbie, 1994; Röhr et al., 2005). The studies also found that consumers are willing to pay for more if the consumable is perceived as safer (Baker & Crosbie, 1994; Röhr et al., 2005). Rimal et al. (2001) claimed that the gap between consumers’ level of concern for food safety and food consumption is related to consumers’ knowledge of food safety and trust in food services. A study conducted in Brazil noted that food handlers who practice proper food safety procedures in a well-structured workplace have higher job satisfaction (de Andrade et al., 2020). Consumers with adequate food safety knowledge and food handlers in a healthy work environment can contribute to reducing the level of concern for food safety and food consumption.

CONSUMER BEHAVIOR IN RELATION TO COVID-19

According to Olaimat et al. (2020), transmission of COVID-19 does not occur through consuming foods. However, the virus stays on strawberries and lettuce at 4°C up to ten days in which raises a window of transmission concerning the virus via surfaces (Olaimat et al., 2020). As of October 2020, research has found that the virus can remain infectious on a surface between four hours to seven days, depending on: viral load, environmental factors, and type of surface (Hasan et al., 2020). According to the CDC, “COVID-19 has not been shown to survive on surfaces longer than” seven days or more (U S Department of Labor Occupational Safety and Health Administration, 2020).
Health Administration, 2021). Hence, sanitation practices and following safe food practices are extremely crucial. Precautionary measures include proper hand washing with soap and warm water, usage of hand sanitizers, appropriate personal protective equipment, and maintaining a 6 feet working distance (Olaimat et al., 2020).

Due to social distancing and foodservice restrictions, many consumers have turned towards online food deliveries, resulting in an increased spending of online food delivery services by 70% (Cai & Leung, 2020). It was also noted that participants in the Cai & Leung (2020) study would order online food delivery services more often if there were promotions for using the service. While consumers spend more on food deliveries, consumers in America spend more time preparing and cooking at home as well (Ben Hassen et al., 2020). Cooking at home may be healthier than eating out or take out, but many home kitchens are very different compared to commercial food service kitchens. Many home kitchens serve as a multipurpose area for all sorts of non-produce and produce washing, cooked and uncooked produce, and non-produce and produce storage places while commercial food service kitchens are strictly used for preparing foods and separately storing cooked and uncooked foods (Byrd-Bredbenner et al., 2013).

RESEARCH QUESTION

This research focuses on how the pandemic has impacted the consumer behavior and attitude of university students who are learning about food safety. Recently, a lot of research has been conducted on COVID-19 in hopes of preventing the spread and finding solutions to the virus. The topic of “food” was widely researched in relation to the virus and food safety. Practicing proper food safety procedures limit the spread of diseases, considering consumers are
more likely to intervene when witnessing food safety violations (Harris et al., 2020). Although
during the pandemic, consumers are not able to witness food safety violations in person,
restaurants resorting to online food delivery must uphold their level of food safety practices. In a
noncommercial setting, such as cooking at home, practicing proper food safety habits will help
decrease food borne illnesses. Overall, food safety provides consumers with the precautions
pivotal to better and safer food, especially in a pandemic.

**Methodology**

This online survey, using Qualtrics, was administered to four different nutrition and food
science courses at Cal Poly Pomona. These classes were chosen because they include food safety
as part of or all the courses. The questions were adapted from Knight et al. (2009)’s study on
“Dining for Safety: Consumer Perceptions of Food Safety and Eating Out”. After IRB approval
(IRB-20-222), student participants were recruited through email in a three week window during
the Spring 2021 Semester. Of the 236 possible participants across the four classes, 16% (38) of
the students responded.

The survey contain questions related to the university students’ consumer behavior and
their attitudes pre- and post-food safety training, with special attention to the impact of COVID-
19 on these decisions. The survey consists of multiple choice and sliding scale formats that are
structured into three sections: sociodemographic (five questions): gender, student status, living
distance from school, age, and ethnicity; pre-food safety training (five questions): spending per
week on food service, concern of contracting COVID-19, concern of foodborne illness exposure,
restaurant safety performance, and thoughts about food safety; and post-food safety training (five
questions): the same as pre-food safety training. Of the 38 participants, 80.6% were female, 50%
were junior status, 55.6% live more than 20 miles away from the Pomona area but within California, 28.6% were between the ages of 21 and 23, and 36.8% were Latinx (Table 1).

Upon completion of data, sociodemographic and pre- and post-food safety training responses were analyzed with SPSS 25.0. Paired sample $t$-tests were used to compare the pre- and post-consumer questions.

Table 1. Sociodemographic characteristics ($n=38$)

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>16.7</td>
</tr>
<tr>
<td>Female</td>
<td>29</td>
<td>80.6</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>2.8</td>
</tr>
<tr>
<td><strong>Student status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate - Freshman (0-30 credits)</td>
<td>3</td>
<td>8.3</td>
</tr>
<tr>
<td>Undergraduate - Sophomore (31-60 credits)</td>
<td>2</td>
<td>5.6</td>
</tr>
<tr>
<td>Undergraduate - Junior (61-90 credits)</td>
<td>18</td>
<td>50</td>
</tr>
<tr>
<td>Undergraduate - Senior (&gt;90 credits)</td>
<td>13</td>
<td>36.1</td>
</tr>
<tr>
<td><strong>Living distance from school</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Off campus, in or around the greater Pomona area</td>
<td>13</td>
<td>36.1</td>
</tr>
<tr>
<td>More than 20 miles away from the Pomona area, but within California</td>
<td>20</td>
<td>55.6</td>
</tr>
<tr>
<td>Outside of California</td>
<td>3</td>
<td>8.3</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-20</td>
<td>6</td>
<td>17.2</td>
</tr>
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RESULTS

The results regarding post-food safety training compared to pre-food safety training suggest an increased awareness of food safety. Table 2 highlights the differences of pre- and post-food safety training. Post-training, participants thought about food safety more often (several times a week) compared to before training (once in a while). The participants also spent more per week on commercial food services prior to training (mean = 1.88). Post-training, participants spent less per week on commercial food services (mean = 1.74). These means correspond with the participants' thoughts on restaurant safety performances. Pre-training, participants thought restaurants did a good job of making the food you eat safe. However post-training, participants thought restaurants did neither a good nor poor job of making the food consumers eat safe. Additionally, the level of concern regarding foodborne illness exposure (mean = 3.84 to mean = 6.06) and contracting COVID-19 increased post-training (mean = 5 to mean = 5.58).

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Pre-Training</th>
<th>Post-Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Spending per week</td>
<td>1.88</td>
<td>0.91</td>
</tr>
</tbody>
</table>
Levels of concern exposure to foodborne illness  
3.84  2.54  6.06  2.77  -4.92  31  0.001
Concern of contracting COVID-19  
(1 = little, 10 = lots, sliding scale)
5  3.15  5.58  3.12  -1.17  32  0.249
Restaurant performance  
(1 = very good, 5 = very poor)
2.09  0.79  2.5  1.02  -2.8  33  0.008
Think about food safety  
(1 = never, 5 = everyday)
3.29  0.87  4.15  0.7  -5.37  33  0.001

**DISCUSSION AND IMPLICATIONS**

**SPENDING PER WEEK**

Spending per week decreased after training (mean = 1.74) and the data provided no significant change. Spending per week was expected to decrease because during quarantine less people went out to eat, therefore decreased their spending (Ben Hassen et al., 2020). Although take out or food delivery are alternatives, many consumers started cooking at home (Ben Hassen et al., 2020). Spending per week’s data could have been improved by adjusting the scale to five dollar increments rather than ten dollar increments.

**LEVELS OF CONCERN EXPOSURE OF FOODBORNE ILLNESS**

There was a significant increase in concern about exposure to foodborne illness from before and after food safety training. Prior to training, participants reported less concern about the exposure to foodborne illnesses (mean = 3.84). However, after training the participants’ concern about exposure to foodborne illness almost doubled (mean = 6.06). As seen in Rimal et al. (2001), the results implicate an association between consumers’ knowledge of food safety and the consumers’ level of concern about the exposure of foodborne illness. In addition to
consumers’ knowledge, the consumers’ trust in food services influences the consumers’ level of concern. With high trust in food services, consumers are more likely to return and potentially increase spending.

Awareness heightened regarding the transmission of the virus because this study was conducted during the pandemic. As consumers’ awareness increased, participants’ concern about exposure to foodborne illness simultaneously increased. Due to the severity of the quarantine, participants could have associated the increased concern of the virus to food.

RESTAURANT PERFORMANCE

Participants had a statistically significant different rating of restaurants’ safety preparations before and after training. Prior to training participants thought restaurants did a good job of preparing food safe and well (mean = 2.09), while after training participants approximately thought restaurants did neither good nor poor (mean = 2.5). According to de Andrade et al. (2020), food handlers in Brazil who work in a well-structured environment have a higher job satisfaction and practice proper food safety procedures. Though it is difficult for consumers to gauge a worker’s job satisfaction, especially in the pandemic, the data after training suggests participants thought restaurants’ safety preparations were neither good nor poor. To increase consumers’ trust in restaurants’ safety preparations, restaurants could present more visible cleaning practices. In addition, both the consumers and food services should be aware of the safety requirements provided by the CDC and FDA to ensure safe standards for everyone.

THINKING ABOUT FOOD SAFETY
Prior to training, participants thought about food safety “once in a while” (mean = 3.29). Compared to after training, participants thought about food safety “several times a week” (mean = 4.15), which was a statistically significant difference. It is understandable that the students would be thinking about food safety more often as they are enrolled in courses that teach food safety. There is also the possibility that the respondents are thinking more often about food safety due to the pandemic, as not much was known about the virus. Especially as of October 2020, researchers have found that COVID-19 can stay on surfaces up to seven days (Hasan et al., 2020). Disinfecting surfaces can help reduce transmission and keep people safer.

LIMITATIONS AND FUTURE RESEARCH

As with all research, this study has limitations that must be addressed. The response rate was relatively low (16%). Data may differentiate from participants with no background in nutrition or food science. Additionally, participants were drawn from the same university with a majority response rate from females. Future research could be expanded to participants from other universities and include more males. Participants may have previously enrolled in courses the Co-PI and PI have taught that may contribute minor bias. However, there is no collection of any identifiable information of the participants. Due to the pandemic every part of this survey was done virtually. Future studies should retest the same participants several months to a year from the present study to assess and changes.

CONCLUSION

Overall, this research assesses the attitudes and behaviors of students pre- and post-food safety training in relation to their use of commercial foodservice operations, especially
considering COVID-19. The findings of the study found a statistically significant increase of awareness towards foodborne illness, restaurant performance, and food safety considerations. With increased awareness, it is important to practice proper food safety habits to stay healthy and safe. Future food service operations can use this study to improve their food safety practices, as well as create a safer environment for their consumers and workers.

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REFERENCES


