



Short Communication

COVID-19 impact on hygiene practices for food safety in South Korea

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ABSTRACT

Objectives: This study examined the influence of COVID-19 on the perception and behaviours of hygiene practices for food safety in South Korea.

Study design: This study employed COVID-19 status (i.e. before or after the outbreak), gender and age groups as independent variables, and perceived relevance and behaviour frequency of hygiene practices for food safety as dependent variables.

Methods: Respondents were asked to answer questions about the perceived relevance and behaviour frequency of hygiene practices before and after the COVID-19 outbreak in an online survey with a structured questionnaire.

Results: Respondents' perceived relevance and behaviour frequency of hygiene practices increased after the COVID-19 outbreak. This trend was seen in both genders and across all age groups. In addition, the enhanced perception that hygiene practices are related to food safety had a strong relationship with following hygiene practices.

Conclusions: The findings of this study indicate that COVID-19 made people more aware of maintaining personal hygiene, leading to a noticeable change in the food safety environment, and subsequently prevention of viral transmission. In particular, the COVID-19 outbreak has influenced the communal eating culture by highlighting good hygiene practices, such as taking individual servings of food from communal dishes and using personal plates.

It has been approximately 20 months since the coronavirus disease (COVID-19) outbreak was first reported in December 2019.[1] However, the disease remains prevalent with 4 million recorded deaths due to COVID-19 worldwide.[2] Because of its severity and ease of transmission, countries restricted national and international movements and announced various quarantine policies.[3] Fortunately, due to the successful control of COVID-19 in South Korea, a complete lockdown of the entire country has been avoided.[4] Nevertheless, COVID-19 has changed the daily lives of Korean citizens.

One of the biggest pandemic-related changes in Korean society concerns mealtime. Despite the announcement that handling and eating food do not mainly contribute to the viral spread,[5] Korean society's communal eating culture became a cause of concern for many people who were worried about viral transmission. Unlike the individualised meals in the West, Koreans tend to share dishes with family and friends. A typical Korean table consists of a main course and various side dishes, all served communally.[6] Because all dishes are shared and people tend to take the food directly without using personal plates,[7] 'double

dipping' and frequent physical contact at the meal table increase the risk of COVID-19 transmission. These eating habits, which expose individuals to infection, became one of the biggest issues in preventing the spread of COVID-19 in South Korea. In order to prevent COVID-19 transmission during mealtimes, the Korean government not only restricted the operation of mass dining restaurants and cafeterias,[8] but also promoted a change in eating habits for food safety.[6] The government's campaigns for food safety highlighted not only the common rules of infectious disease prevention, such as hand washing, keeping distance from others, and cleaning and disinfecting kitchen items, but also new practices such as taking individual servings of food from communal dishes and using personal plates. This study aimed to analyse the perception and behaviour changes in hygiene practices for food safety after the COVID-19 outbreak.

1. Data collection and analysis

A research company, EMBRAIN, conducted an online survey, for

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Table 1
Perceived relevance and behaviour frequency of hygiene practices for food safety before and after the COVID-19 outbreak.

Hygiene practices	Before/After COVID-19 outbreak	Total	Gender		Age				
			Male	Female	20's	30's	40's	50's	60's or over
			M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Perceived relevance									
Hand washing ^a	Before	4.01 (0.85)	3.95 (0.88)	4.06 (0.82)	4.04 (0.86)	4.05 (0.82)	4.00 (0.88)	4.03 (0.80)	3.90 (0.92)
	After	4.63 (0.55)	4.51 (0.60)	4.76 (0.46)	4.57 (0.60)	4.65 (0.54)	4.63 (0.57)	4.59 (0.54)	4.73 (0.49)
Keeping distance from others when eating ^b	Before	3.64 (1.01)	3.60 (0.96)	3.68 (1.06)	3.43 (1.08)	3.66 (0.99)	3.65 (1.02)	3.77 (0.97)	3.65 (0.98)
	After	4.49 (0.63)	4.35 (0.66)	4.64 (0.55)	4.40 (0.71)	4.56 (0.57)	4.52 (0.63)	4.46 (0.62)	4.53 (0.57)
Cleaning and disinfecting kitchen items ^c	Before	3.26 (1.22)	3.29 (1.22)	3.23 (1.23)	3.02 (1.25)	3.25 (1.22)	3.31 (1.24)	3.42 (1.16)	3.24 (1.22)
	After	4.52 (0.65)	4.39 (0.70)	4.65 (0.56)	4.41 (0.77)	4.59 (0.60)	4.53 (0.63)	4.50 (0.62)	4.52 (0.60)
Taking individual servings of food from communal dishes ^d	Before	3.67 (0.98)	3.62 (0.95)	3.72 (1.01)	3.55 (1.01)	3.63 (1.04)	3.67 (0.99)	3.79 (0.90)	3.68 (0.97)
	After	4.40 (0.63)	4.37 (0.67)	4.65 (0.55)	4.40 (0.75)	4.59 (0.55)	4.52 (0.62)	4.50 (0.60)	4.52 (0.61)
Using personal plates ^e	Before	3.77 (0.92)	3.68 (0.90)	3.85 (0.93)	3.73 (0.98)	3.81 (0.90)	3.71 (0.93)	3.82 (0.90)	3.76 (0.90)
	After	4.37 (0.69)	4.24 (0.72)	4.51 (0.64)	4.33 (0.74)	4.41 (0.71)	4.33 (0.73)	4.37 (0.64)	4.44 (0.65)
Behaviour frequency									
Hand washing ^f	Before	4.01 (0.78)	3.89 (0.76)	4.14 (0.78)	4.01 (0.84)	4.07 (0.80)	3.98 (0.79)	3.96 (0.74)	4.04 (0.74)
	After	4.53 (0.62)	4.42 (0.65)	4.66 (0.56)	4.50 (0.69)	4.61 (0.60)	4.49 (0.62)	4.47 (0.61)	4.65 (0.56)
Keeping distance from others when eating ^g	Before	3.53 (0.93)	3.45 (0.90)	3.60 (0.96)	3.43 (1.01)	3.45 (0.95)	3.49 (0.94)	3.64 (0.88)	3.61 (0.87)
	After	4.37 (0.67)	4.23 (0.70)	4.51 (0.62)	4.19 (0.83)	4.43 (0.62)	4.33 (0.64)	4.38 (0.65)	4.53 (0.67)
Cleaning and disinfecting kitchen items ^h	Before	3.07 (1.05)	3.05 (1.03)	3.10 (1.07)	2.94 (1.16)	2.97 (1.00)	3.04 (1.03)	3.22 (1.01)	3.15 (1.04)
	After	4.32 (0.71)	4.20 (0.74)	4.44 (0.65)	4.17 (0.82)	4.34 (0.69)	4.30 (0.66)	4.34 (0.69)	4.46 (0.66)
Taking individual servings of food from communal dishes ⁱ	Before	3.63 (0.87)	3.55 (0.85)	3.72 (0.88)	3.53 (0.97)	3.59 (0.90)	3.59 (0.86)	3.73 (0.79)	3.71 (0.82)
	After	4.40 (0.66)	4.26 (0.69)	4.54 (0.60)	4.29 (0.74)	4.43 (0.68)	4.38 (0.62)	4.38 (0.63)	4.53 (0.61)
Using personal plates ^j	Before	3.66 (0.85)	3.57 (0.84)	3.75 (0.85)	3.73 (0.88)	3.57 (0.86)	3.57 (0.84)	3.69 (0.83)	3.74 (0.82)
	After	4.21 (0.75)	4.09 (0.76)	4.33 (0.73)	4.16 (0.82)	4.21 (0.76)	4.11 (0.77)	4.22 (0.71)	4.36 (0.70)

Note: ^a to ^j indicate statistical values of each hygiene practice by gender and age groups.

^a Gender: male F(1, 1190) = 285.24, female F(1, 1190) = 429.92, Age: 20's F(1, 1190) = 95.48, 30's F(1, 1190) = 121.96, 40's F(1, 1190) = 159.40, 50's F(1, 1190) = 128.95, 60's or over F(1, 1190) = 218.17.

^b Gender: male F(1, 1190) = 338.48, female F(1, 1190) = 554.19, Age: 20's F(1, 1190) = 211.06, 30's F(1, 1190) = 182.71, 40's F(1, 1190) = 202.25, 50's F(1, 1190) = 130.70, 60's or over F(1, 1190) = 160.80.

^c Gender: male F(1, 1190) = 451.45, female F(1, 1190) = 744.55, Age: 20's F(1, 1190) = 270.70, 30's F(1, 1190) = 246.71, 40's F(1, 1190) = 243.88, 50's F(1, 1190) = 198.77, 60's or over F(1, 1190) = 223.69.

^d Gender: male F(1, 1190) = 360.17, female F(1, 1190) = 548.39, Age: 20's F(1, 1190) = 175.35, 30's F(1, 1190) = 221.65, 40's F(1, 1190) = 205.48, 50's F(1, 1190) = 147.39, 60's or over F(1, 1190) = 157.76.

^e Gender: male F(1, 1190) = 280.65, female F(1, 1190) = 382.91, Age: 20's F(1, 1190) = 119.24, 30's F(1, 1190) = 120.98, 40's F(1, 1190) = 151.94, 50's F(1, 1190) = 128.78, 60's or over F(1, 1190) = 144.10.

^f Gender: male F(1, 1190) = 307.72, female F(1, 1190) = 298.78, Age: 20's F(1, 1190) = 93.94, 30's F(1, 1190) = 118.99, 40's F(1, 1190) = 123.96, 50's F(1, 1190) = 131.57, 60's or over F(1, 1190) = 143.43.

^g Gender: male F(1, 1190) = 421.74, female F(1, 1190) = 560.93, Age: 20's F(1, 1190) = 148.54, 30's F(1, 1190) = 245.09, 40's F(1, 1190) = 216.94, 50's F(1, 1190) = 172.70, 60's or over F(1, 1190) = 205.25.

^h Gender: male F(1, 1190) = 621.98, female F(1, 1190) = 828.54, Age: 20's F(1, 1190) = 261.71, 30's F(1, 1190) = 321.81, 40's F(1, 1190) = 326.03, 50's F(1, 1190) = 265.80, 60's or over F(1, 1190) = 278.19.

ⁱ Gender: male F(1, 1190) = 433.90, female F(1, 1190) = 575.21, Age: 20's F(1, 1190) = 181.85, 30's F(1, 1190) = 222.01, 40's F(1, 1190) = 237.15, 50's F(1, 1190) = 167.47, 60's or over F(1, 1190) = 203.23.

^j Gender: male F(1, 1190) = 274.61, female F(1, 1190) = 338.82, Age: 20's F(1, 1190) = 71.67, 30's F(1, 1190) = 150.02, 40's F(1, 1190) = 132.94, 50's F(1, 1190) = 132.95, 60's or over F(1, 1190) = 134.66.

which 1,200 adult responses were gathered using a stratified random sampling based on the proportion of gender, age, and residence area in comparison to the total population. Of the respondents, 50.9% (n = 611) were male and 49.1% (n = 589) were female. The average age was 44.39 years (SD = 13.56), ranging from 19 to 81 years. Residences in the Seoul metropolitan area comprised 51.2% (n = 615) of the respondents and those in non-metropolitan areas comprised 48.8% (n = 585).

Respondents were asked to rate the perceived relevance (1 = 'very low' to 5 = 'very high') and behaviour frequency (1 = 'not at all' to 5 = 'always') of five hygiene practices for food safety before and after the COVID-19 outbreak.

Repeated Analyses of Variance (ANOVAs) were employed to examine the influence of COVID-19 on hygiene practices for food safety. After calculating the changes in perception and behaviours based on answers before and after the COVID-19 outbreak, the relationships between perceived relevance and behaviour changes were evaluated using correlation analyses.

2. Results

2.1. Impact on perceived relevance of hygiene practices for food safety

Respondents' perceived relevance of hand washing (F(1, 1190) = 709.04, p < 0.001), keeping distance from others when eating (F(1, 1190) = 881.35, p < 0.001), cleaning and disinfecting kitchen items (F(1, 1190) = 1180.38, p < 0.001), taking individual servings from communal dishes (F(1, 1190) = 900.37, p < 0.001) and using personal plates (F(1, 1190) = 660.48, p < 0.001) for food safety increased after the COVID-19 outbreak. This trend continued regardless of gender or age group at the 0.001 statistical significance level (see Table 1).

2.2. Impact on behaviour frequency of hygiene practices for food safety

Respondents were more likely to wash hands (F(1, 1190) = 606.34, p < 0.001), keep distance from others when eating (F(1, 1190) = 978.91, p < 0.001), clean and disinfect kitchen items (F(1, 1190) = 1444.92, p < 0.001), take individual servings from communal dishes (F(1, 1190) = 1005.36, p < 0.001) and use personal plates (F(1, 1190) = 612.28, p < 0.001) after the COVID-19 outbreak. All age and gender

groups showed an increased frequency of good hygiene behaviours regarding food safety after the outbreak. The results were statistically significant at the 0.001 level (see Table 1).

2.3. Relationship between the changes of perceived relevance and hygiene practice behaviours

The results indicated that the change in perceived relevance was positively related to the change in behaviours in terms of hand washing ($r = 0.50$, $p < 0.001$), keeping distance from others when eating ($r = 0.55$, $p < 0.001$), cleaning and disinfecting kitchen items ($r = 0.62$, $p < 0.001$), taking individual servings from communal dishes ($r = 0.54$, $p < 0.001$) and using personal plates ($r = 0.48$, $p < 0.001$).

3. Discussion

This study analysed the changes in perceived relevance and behaviour of hygiene practices for food safety due to the COVID-19 outbreak. The findings of this study showed that COVID-19 strengthened citizen's perceptions and behaviours of hygiene practices for food safety. These results indicated that people have become more aware of their personal hygiene, even related to their food consumption, during the COVID-19 pandemic. In addition to hand washing and keeping social distance, which are employed for the prevention of COVID-19 transmission worldwide, taking individual servings and using personal plates might increase the personal hygiene of food consumption and reduce the spread of COVID-19 through the communal eating culture in South Korea. This finding showed that, to successfully prevent widespread infection, considerable use could be made of general prevention practices as well as culture- or society-specific strategies. The findings of this study also illustrate that enhanced perception and behaviours were seen in all gender and age groups. Older generations and males were less likely to have good personal hygiene practices; [9] however, continuous and robust public communication may be effective in altering the perceptions and behaviours in such population groups.

This study also shows that the positive relationship between perception and behaviour highlights the importance of public communication in risk situations. The government and other organisations have employed public campaigns to announce their support in resolving social issues. After the COVID-19 outbreak, the central and local South Korean governments endeavoured to deliver pandemic restriction policies, including the change in communal eating habits. For a public campaign to be successful, it must contribute to changing behaviours, such as endorsing hygiene practices in COVID-19 prevention. Based on the findings of this study, government campaigns have played a pivotal role in changing eating habits, which have contributed to the effective prevention of COVID-19 transmission. However, the government must also show continuous commitment to successfully incorporating the newly introduced hygiene practices for food safety, such as taking individual servings of food and using personal plates, in Korean society in the post-COVID-19 period.

Despite the significance of this study's findings in relation to COVID-19 and change in eating habits, this study has a limitation - the origin of hygiene practices for food safety could not be decisively determined because of the simultaneous launching of multiple public campaigns. Examining the effectiveness of a specific campaign is necessary for the development of improved communication strategies for future campaigns.

Despite worldwide efforts to eliminate COVID-19, this disease might not be going away anytime soon. The ongoing COVID-19 pandemic provides an opportunity to consider the risks of communal eating culture. For Koreans, a meal has various meanings, such as a close relationship and social bonding, [10] beyond just eating food. Due to their social values, Korean individuals may be hesitant to adjust their eating habits. However, the prolonged COVID-19 pandemic resulted in hygiene practices for food safety being a priority and has changed a long-established eating culture. Korean society needs to change risky eating habits, which expose individuals to infection; however, the authors hope that COVID-19 does not damage the social values that a communal eating culture provides. This study in South Korea provides examples of COVID-19 prevention strategies that may be relevant to other countries with a communal eating culture.

Ethical approval

The study was approved by the institutional review board of Sejong University, South Korea.

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Declaration of competing interest

There is no conflict of interest.

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