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## Research Paper

# Exploring Food Safety Messages in an Era of COVID-19: Analysis of YouTube Video Content

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## ABSTRACT

Although severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is not a proven foodborne pathogen, the COVID-19 pandemic has put the food system on alert, and food safety has been identified as an important pillar in mitigating the crisis. Therefore, an understanding of how popular media are used as a vital disseminator of food safety and health information for the public is more important than ever. YouTube deserves particular attention as one of the most highly trafficked Web sites on the Internet, especially because YouTube has been blamed during the pandemic for spreading misleading or untrustworthy information that contradicts validated information. This study was conducted to evaluate the food safety information and practices circulating on YouTube during the COVID-19 pandemic and the alignment of these practices with recommendations from government agencies. A search for videos on YouTube was conducted using the key words “food and COVID-19,” “food safety and COVID-19,” and “groceries and COVID-19.” After applying a series of inclusive and exclusive criteria, 85 videos from the United States and Canada were evaluated. More than half (69%) of the videos presented hand washing procedures, 26% showed kitchen disinfection, and most (86%) showed take-out food or grocery store practices. Multiple produce washing procedures were also shown throughout videos. Food was not considered hazardous in 39% of the videos, but 24% mentioned that food packaging is potentially hazardous. Most videos cited government agencies and had a host or guest who was a health care professional, professor, or expert. Three videos were not aligned with a government agency’s guideline or information cited; two were presented by a health care professional. These findings reveal the need to develop educational interventions that increase YouTube video host and guest awareness of social media use as a tool for food safety dissemination and the need to provide trustworthy information.

## HIGHLIGHTS

- YouTube is a key platform for disseminating food safety and COVID-19 information.
- Misinformation about food safety during COVID-19 has been spread on YouTube.
- Many of the video hosts and guests were health care professionals or scientific experts.
- A food safety knowledge gap exists in the health care field.
- Experts can use YouTube to spread important information during future health events.

Key words: Content analysis; COVID-19; Food safety; Social media; YouTube

COVID-19 was first detected in late 2019 and has become a worldwide pandemic and public health emergency. COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and is transmitted via person-to-person contact and by touching contaminated surfaces or objects (24). As of 3 September 2020, over 6 million cases and 194,000 deaths have been reported in the United States and Canada (9, 30). Countries throughout the world have implemented strict lockdown procedures, closing down restaurants, bars, retail stores, and other

public venues. At the time of this writing, no universally recognized cure, treatment, or vaccine has been made available.

Although COVID-19 has not been considered a foodborne illness and there is no current evidence of foodborne transmission, food safety is one of four factors identified as important for the food industry during the COVID-19 pandemic (9, 27). COVID-19 can be transmitted via person-to-person contact between retailers and customers in the food sector. During the pandemic, consumers may be looking to various resources, including on-line sources, for food safety information.

Popular media, including movies, television, and the Internet, are vital disseminators of food safety and health

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information to the public. For example, television celebrity chefs are viewed as role models, and consumers often practice behaviors of such role models; however, poor food safety practices used by celebrity chefs could increase the risk of foodborne illness among viewers (47, 73). In a compliance study, among 39 episodes of 10 television cooking shows only 13% of episodes mentioned food safety practices (22). Popular recipe blogs may also be a source of food safety information. A trend involving soaking almonds as shown in many popular blogs and videos promoted dangerous food safety practices, including unsafe times and temperatures that contribute to pathogen growth (25). A similar content analysis study revealed that on-line recipes had major food safety implications for flour handling (3). College students had a better perception of food safety skills after listening to an intervention lecture on Facebook (48).

YouTube is one of the most highly trafficked Web sites on the Internet. As of August 2020, data from Amazon's Alexa indicate that YouTube was the second most-visited site behind Google (1). By using both audio and visual communication, closed captioning, and other inclusive technology, YouTube is easily and freely available to a wide demographic. However, YouTube videos also can contain misleading or untrustworthy information that contradicts public health standards (36, 46). During the 2016 Zika virus infection outbreak, researchers found that nearly 25% of YouTube videos surveyed contained misleading information about the Zika virus (5). In a similar study during the Ebola virus disease outbreak beginning in 2013, >26% of videos were classified as misleading (55). In a recent study of YouTube videos for COVID-19 health information, 27.5% of videos contained nonfactual information, and those videos accounting for 24.1% of total viewership (64 million views). Researchers also found that videos from professional or governmental organizations provided the highest quality content, but these videos were underrepresented among the total views (45). Authorship also plays an important role in dissemination of information on YouTube. Independent users who posted COVID-19 content were seven times less likely to upload useful information than were academic institutions or hospitals (44). Because previous studies have indicated that false information had a significant impact on miscommunication of public health issues, the accuracy of food safety information on YouTube should be assessed, especially during the COVID-19 pandemic. The objective of this study was to assess the type of food safety information, the quality of this information, government citations, and professions of the people delivering this information in YouTube videos during the COVID-19 pandemic.

## MATERIALS AND METHODS

**Selection of YouTube videos for content analysis.** With more than 2 billion users, YouTube is a popular Web site among internauts (75). In previous studies, researchers have used this video sharing Web site to gather public viewing data about public health emergencies (5, 53, 55) and food safety topics (3, 25). In the present study, a YouTube search was conducted on 8 June 2020 using the key words "food and COVID-19," "food safety and COVID-19," and "groceries and COVID-19." For each key word, videos were

sorted by view count as a measure of video popularity. A sample of videos meeting all the specified inclusion criteria was listed on an Excel 2020 spreadsheet (Microsoft, Redmond, WA): (i) English speaking, (ii) >500 views, (iii) video specified as from the United States or Canada, and (iv) <20 min long. The location for each video was found in the "About" section of the video author's channel. The author was defined as the person or organization that posted the video. When the location was unspecified, the video was excluded from the study. Descriptive information from the videos was collected, including title, URL, author, length, posting date, current views, number of likes and dislikes, number of subscribers to the channel, publishing category, number of viewer-contributed comments, and top five comments that viewers "liked." Two researchers independently reviewed 386 collected videos to determine exclusions. Some videos were duplicated or triplicated because they were found under more than one key word. These videos were counted as a single video to proceed with the selection of the videos for data collection. The exclusion criteria were (i) the author used another channel's video, (ii) absence of food safety and COVID-19 information, and (iii) upload date before 12 February 2020. When a video met one or more of the exclusion criteria, it was not included in the study. The upload date cutoff was chosen as the day after COVID-19 was named officially. According to the World Health Organization, the name COVID-19 (previously referred to as 2019 novel coronavirus) was given to the coronavirus disease on 11 February 2020 (74). Hence, the research team allowed a cushion of 1 day for the spread of the official name. A third researcher checked the exclusion process and listed the videos on a spreadsheet for data collection. The 85 videos, including some duplicates that were counted as a single video, that met the selection criteria were screen recorded for data collection on 23 June 2020 (Fig. 1).

**Coding system for video content analysis.** The coding system used for this study was adapted from previous content analyses of YouTube videos and cooking blogs (3, 25, 50). The focus of the coding system was to assess the quality of food safety information and safe handling of food in YouTube videos in relation to the COVID-19 pandemic. The topics that were coded in the selected videos include people in the video (hosts and guests), government agency citations (United States and Canada), hand washing procedures, package handling procedures, kitchen sanitation, fruit and vegetable washing procedures, mentions of hazardous foods, food utensils or food packages, and take-out and grocery store practices. Food and utensils were coded as hazardous when the video mentioned that ingestion of those foods or use of those utensils can cause consumers to contract COVID-19. Specific information posed for each topic was carefully coded and analyzed. For example, government citations were further analyzed to identify miscitations. At the time of this study, food safety information during the COVID-19 pandemic had already been posted by the Centers for Disease Control and Prevention (CDC) (12), the U.S. Food and Drug Administration (FDA) (67), the U.S. Department of Agriculture (USDA) (59), the National Institutes of Health (NIH) (51), and the Government of Canada (including the Canadian Food Inspection Agency and Health Canada) (31), which helped validate the information addressed in the video coding system. This food safety information was saved as a record for subsequent analysis of data.

Another Excel spreadsheet was used to introduce the coding system and to record quantitative and qualitative information. For this study, hosts were defined as people who led and spoke as authorities in the video, and guests were defined as people who were invited and interviewed by the host. The hosts could also be but were not always the authors of the videos. The professions of

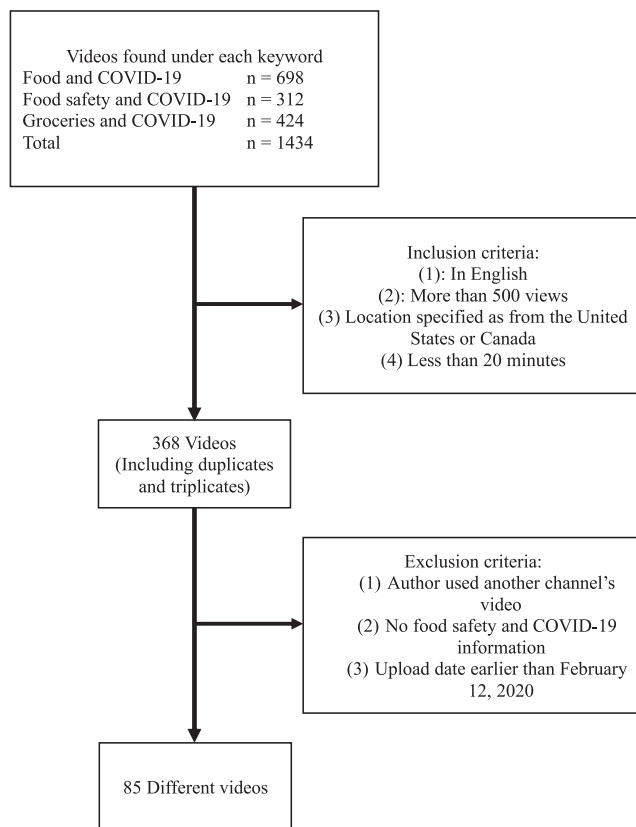


FIGURE 1. Flowchart of YouTube video selection process. Duplicates and triplicates are the same videos that were found with more than one keyword.

the guests and hosts were recorded for further analysis of the accuracy of the information given, as suggested in previous studies (3, 44, 45). Researchers evaluated host and guest self-presentation, the host's presentation of guests, and any label or caption presented on the video to address the professions. For the food safety procedures, when a video showed or mentioned the procedure, a written description was required. When a topic from the coding system was not found in the videos, the reviewers marked it as "not applicable" to move forward with the coding.

The research team developed and reached a consensus on the coding system. Before starting the coding process, all researchers were trained to become familiar with each coding item. Two researchers independently coded the 85 screen-recorded videos, and any discrepancies during coding were reviewed by a third researcher to reach consensus. The data were collected from groups of 10 videos by the two independent reviewers to assure consistency of the data collected and to reduce reviewer fatigue.

**Statistical analysis.** The YouTube video content was analyzed both quantitatively and qualitatively. A descriptive analysis was conducted with Statistics for Windows (ver. 25.0, SPSS, IBM, Armonk, NY) for quantitative analysis of frequencies such as government agency food safety citations, number of people presented, and the occurrence of procedures that were coded in the videos. This data analysis procedure was adapted from that of Barrett and Feng (3) to fit the codes and information in this study. The qualitative analysis portion included analysis of citations from government agencies and analysis of procedures and practices for take-out food and grocery stores. Government agency citations were classified into seven categories (Supple-

mental Table S1) and analyzed for miscitations. Government agency miscitations were checked using currently available information from the government agency that was cited. A cross-reference analysis was conducted to assess possible connections between descriptive information (people in the video and number of views) from the videos, government agency citations, and food safety procedures that were coded.

## RESULTS

**Description of videos.** Table S2 provides descriptions of the 85 videos selected for analysis. The majority (89%) of videos were produced in the United States, and the rest were produced in Canada. Many videos were retrieved under multiple key words: 52% were found under "food safety and COVID-19," 48% were found under "groceries and COVID-19," and 35% were found under "food and COVID-19." As of June 2020, the video titled *PSA Grocery Shopping Tips in COVID-19* (see important notes below) [www.DrJeffVW.com](http://www.DrJeffVW.com) had the most views, and *More than 800 Cases of COVID-19 at 19 NC Food and Meat Processing Plants* had the least views. Videos posted earlier (around March 2020) typically had a higher number of views than did those posted later (e.g., May 2020) for both the most-viewed and the least-viewed videos.

**Hand washing and produce washing procedures.** Different types of information related to COVID-19 and food safety were presented in each video (Table 1). More than half (69%) presented hand washing procedures, but only 41% used soap and even fewer (31%) displayed or mentioned the use of hand sanitizer.

Various fruit and vegetable washing procedures were also presented throughout the videos. The most common washing procedure was using water only (27%), as recommended by the CDC and FDA (13, 63). However, a high percentage of videos suggested washing procedures that were not recommended: 16% presented the use of soap, and 12% showed washing fruits and vegetables with other solutions, including homemade cleaners, and washing in a dishwasher (Table 1).

**Grocery store and take-out food practices.** Most of the videos (86%) discussed take-out food practices, grocery store practices, or both and suggested to the viewers some procedures and practices that they could follow to reduce the risk of contracting COVID-19 associated with these practices (Table S3). Some videos focused on safe food handling practices. In videos mentioning take-out food, suggestions included changing containers (59%) and heating or reheating food (30%). Among those videos mentioning heating or reheating food, the use of a microwave was recommended, but only one video offered a specific temperature (149°F [65°C]) and time (3 min) for that action, which was below the USDA recommendation for reheating (60). Among grocery store practices videos, 28% mentioned the need to purchase or commit to the items you touched, and only one video suggested separating raw meat from ready-to-eat foods. Another video advised viewers to "stick to food that can be cooked, peeled, or

TABLE 1. Information gathered from 85 videos

Information type	% (no.) of videos
Government agencies	
Centers for Disease Control and Prevention	24 (20)
U.S. Food and Drug Administration	15 (13)
U.S. Department of Agriculture	12 (10)
Government of Canada <sup>a</sup>	2 (2)
National Institutes of Health	5 (4)
U.S. Environmental Protection Agency	2 (2)
National Science Foundation	1 (1)
Health care professional, professor, expert	60 (51)
Hand washing procedures	69 (59)
Soap used for hand washing	41 (35)
Hand sanitizer used	31 (26)
Fruit and vegetable washing procedures	
Water only	27 (23)
Soap and water	16 (14)
Scrub surfaces	9 (8)
Commercial produce disinfectant	5 (4)
Other <sup>b</sup>	12 (10)
Kitchen disinfection	26 (22)
Package handling procedures	55 (47)
Grocery store practices	54 (46)
Take-out food procedures	32 (27)
Hazardous food <sup>c</sup>	
Food that you share	1 (1)
Food plated and cooled	1 (1)
Frozen food	2 (2)
Take-out food	2 (2)
Produce	8 (7)
No food	39 (33)
Hazardous food packaging	24 (20)
Hazardous food utensils	2 (2)

<sup>a</sup> Government of Canada includes agencies such as the Canadian Food Inspection Agency and Health Canada. Videos did not mention specific agencies.

<sup>b</sup> Including use of homemade cleaners and, in one instance, a dishwasher.

<sup>c</sup> Food and utensils were coded as hazardous when the video mentioned that ingestion of those foods or use of those utensils can cause consumers to contract COVID-19.

washed.” Other practices from videos mentioning grocery stores or take-out foods referred to cleaning surfaces, hand washing, and other practices to protect viewers from getting COVID-19 (Table S3).

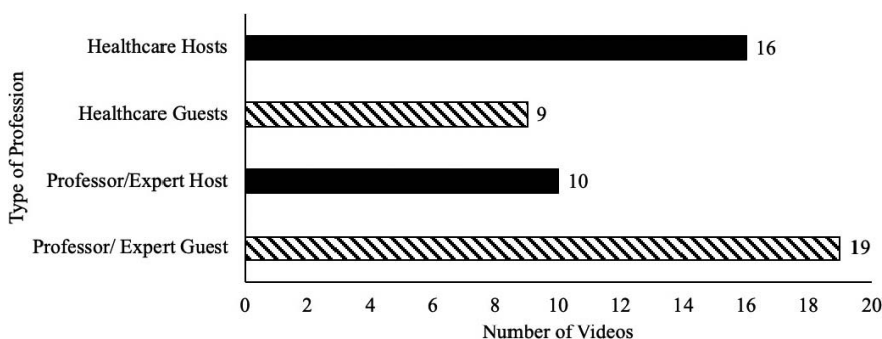


FIGURE 2. Professions of hosts (solid bars) and guests (hatched bars) in the videos.

**Profession of host and guest.** Video hosts and guests came from a variety of scientific and health care backgrounds. Backgrounds were divided into two groups: (i) health care professionals and (ii) professors or experts in various fields of study. Figure 2 displays the number of videos containing hosts and/or guests from each background group. The majority of videos (68%) featured a guest professor or expert, and 32% featured a health care professional guest. More videos had health care professionals (62%) than professors or experts (38%) as hosts (Table S4).

**Citations and miscitations.** In 38% of the videos, at least one government agency guideline or recommendation was cited. The top three government agencies cited were the CDC (24%), the FDA (15%), and the USDA (12%). Over half of the videos that cited a government agency (60%) cited more than one agency. Those that cited a government agency from Canada referred to it with the umbrella term “Government of Canada” and did not specify which agency. The citations in those videos addressed seven specific topics used as categories to identify all the citations (Table S1). Seventy citations were collected among the videos with a government agency citation: 37% were for hazardous foods or food packages, 17% were for sanitizing surfaces, 14% were for washing fruits and vegetables, and 10% were for survival on surfaces (Table S1). Of the overall citations, only three were not aligned with the guideline or information given by the government agency cited and were scored as miscitations (Table S5). The miscitations incorrectly cited the NIH, FDA, and CDC and were categorized as hazardous food or food packages and grocery store practices. The first miscitation stated, “Following the logic of the National Institute of Health, we could keep those groceries in our garage or porch for 3 days” (health care professional). The other two were in the same category and stated, “There is no clear guidance from either the CDC or the FDA [groceries handling]” (health care professional), and “Safety tips for shopping: Throw out plastic bags, cardboard” (profession not mentioned). In contrast to the claims in these videos, government agencies did develop basic guidelines or information for different practices during the COVID-19 pandemic (Fig. 3).

**DISCUSSION**

**Government agency roles.** Government agencies play a vital role in the dissemination of information about

FIGURE 3. *Basic guidelines for food safety measures during the COVID-19 pandemic. Guidelines were created for the public by government organizations in the United States and Canada.*

Handwashing	Fruits and vegetable washing	Take-out/Online food shopping	Food preparation	Surface disinfection	Grocery store practices
Wash hands with soap and water for at least 20 seconds, then rinse and dry hands. Use the cleanest water possible. Use an alcohol-based hand rub (check FDA list) that contains 60% alcohol if soap and water are not available.	Wash Fruits and vegetables under running water, even if the peel is not going to be consumed (unless the produce package says it is pre-washed or ready-to-eat). Use a clean produce brush to scrub firm produce.	(1) Use contactless payment. (2) Ask for contactless delivery. (3) Examine the box packaging; make sure the company uses insulated packaging. (4) Make sure the food was delivered at a safe temperature. (5) Refrigerate or freeze the delivery. (6) Wash hands after handling delivery.	There is no evidence of food or food packaging being associated with the transmission of COVID-19. Always follow safe food handling and hygiene practices. Clean - Separate - Cook - Chill	Clean first, and then disinfect surfaces. Use EPA-registered disinfectant list (United States) and list of hard-surface disinfectants (Canada). Always wear skin protection, ensure adequate ventilation, and follow the instructions on the disinfectant label.	(1) Stay home if sick. (2) If possible, order online or use curbside pickup. If going to the store, prepare a shopping list. (3) Protect oneself while shopping. (4) Practice hand hygiene. (5) Unpack safely at home, and do not use disinfectant designed for hard surfaces. – There is no evidence of food or food packaging being associated with the transmission of COVID-19. (6) Follow safe food handling practices.
					
(15, 33, 68)	(13, 31)	(20, 31, 64)	(12, 31, 69)	(11, 32, 69)	(16, 31)

COVID-19. More than one-third of videos included in this study cited a government agency; the top three were the CDC, the FDA, and the USDA. Because social media and YouTube are pervasive, government agency public health information should be abundantly available on those platforms. In a previous study, less intrusive public health government interventions were more effective than intrusive interventions (23). YouTube, which is a form of casual entertainment, is not intrusive in that it does not require any physical activity except viewing videos. At the time of publication, the FDA had posted 10 videos related to COVID-19 to YouTube, and 2 of those videos were related to food. Of those two videos, only one mentioned food safety.

Table S5 provides a list of government citations in the videos. Of 70 government citations, 3 miscitations were found. The first miscitation was found in video code 1: the author stated that groceries must be kept in the garage or porch for at least 3 days because the NIH said the virus could live on surfaces for up to 3 days. Although a study was conducted on the survival of SARS-CoV-2 on various surfaces (70), no current evidence supports the survival and transmission of the virus from food or food packaging. The second miscitation was found in video code 28, where the host mentions that there is “no clear guidance” from the

CDC or FDA on grocery shopping, even though both agencies operate on-line Web sites with resources for grocery shopping (12, 67). The final miscitation occurs in video code 58, in which the author suggests disposing of plastic and cardboard grocery packaging. This miscitation is similar to the first one; no government agency had suggested disposing of food packaging to avoid transmission. These miscitations indicate a disconnect between what government agencies advise and how the consumer is receiving information.

**Role of scientists, experts, and medical professionals.** In the present study, many of the guests and/or hosts were professors and experts in infectious disease, food microbiology and safety, public health, and environmental science. The CDC has stated that scientists and experts, such as epidemiologists and microbiologists, are key players in an outbreak response (8). Scientific experts and microbiologists have also been key players in major previous health events (7, 34, 42). As for the COVID-19 pandemic, during the 2003 SARS outbreak scientists used their expertise to provide information that affected medical treatments, travel restrictions, political decisions, and trade policy (34). With this combination of food safety and health expertise, scientific experts play a critical role during a

pandemic. However, the rapid spread of the pandemic, emerging research projects around the world, reactive emergency policy changes, and media demand for eye-catching stories have put scientific experts under pressure. Intentional and unintentional misquotations and misinterpretations have led to confusing and contradictory information, which may also have led consumers to use risky food safety practices to avoid getting COVID-19 from food (54).

Health care professionals have also been a crucial part of this frontline fight (10, 52, 66). Given their experience in dealing with SARS-CoV-2, people may look to health care professionals for information, including information on food safety. During the COVID-19 pandemic, possible transmission via food may be a consumer concern; 85% of Americans made some changes in the food they ate or how they prepared it (39). Past studies indicate that very few health care providers delivered food safety information to their patients, and some were not confident of their knowledge about foodborne illness (21, 72). Chen et al. (21) explored the attitudes and practices of health professionals in China, Peru, and the United States and found that although food safety concerns differ between countries, almost all the health professionals recognized the need to provide food safety education. However, not all professionals actually delivered this information. The lack of food safety knowledge disseminated by health professionals may cause consumers to adopt improper food handling practices, such as washing produce with soap and water as suggested by some of the videos in the present study. In the present study, one health care professional was the author and host of two videos at different times, and after consulting food scientists and microbiologists he corrected his statement about washing fruits and vegetables in soapy water by telling viewers to use just water. Because of the risk that produce could absorb harmful chemicals, soap, disinfectant, or commercial products are not recommended for washing fruits and vegetables; plain water and a vegetable brush if necessary should be used (31, 63). Although his second video contains “revised” in the title, the first video was still available to the public at the time of data collection. This mixed message can cause confusion among consumers; some might watch the first video without watching the second video.

**Trust in the experts and in science.** Because a majority of the videos contained health care professionals, professors, or experts as hosts or guests, consumer trust in these figures should be explored. According to a 2018 food and health survey from the International Food Information Council Foundation, consumers reported that they consider health professionals the most trustworthy sources of food safety information (40). The Foundation survey also revealed that 38% of consumer respondents trusted government agencies, including the USDA, Environmental Protection Agency, CDC, and FDA, for food and nutrition information. Evidence from previous health events also indicates that trust is important in times of infectious disease outbreaks (57). The level of trust that consumers have in

these experts can influence how much consumers will practice behaviors that the experts promote (2).

In addition to trust in experts, trust in science may be an influencing factor for the spread of information. According to the Johns Hopkins COVID-19 Civic Life and Public Health national opinion survey (41), a split in trust of science exists: 54% of respondents reported trusting science “a lot,” and 46% trusted science “some,” “not much,” or “not at all.” Researchers concluded that this split might be the reason misinformation has spread so quickly during the COVID-19 pandemic (4). Despite this mistrust, Americans’ trust in medical scientists has grown since the outbreak began (26). Plohl and Musil (56) found that people who had a greater trust in science and scientists were more likely to follow COVID-19 guidelines. With this increased trust in scientific material, food safety guidelines may be more likely to be followed now than before the pandemic. Experts must provide accurate and consistent food safety guidelines to avoid a decrease in public trust of experts and science.

**Food safety and social media.** Today’s consumers regularly seek out information from social media or YouTube, especially for news and safety practices. Social media health interventions have been effective in the short and long term and among disadvantaged populations (38, 71). Because social media content can be easily created by almost anyone, consumers may be exposed to incorrect or dangerous misinformation.

Video hosts and authors have a responsibility to provide the most accurate information available at the time. They must also disseminate it to a broad audience in the most appropriate way considering the opposition they could face from proponents of alternative health care approaches, such as those against western medical practices (58). Although many videos in this study contained correct information on food safety practices, some did not. Over half of the YouTube videos contained hand washing instructions, but only 41% showed soap being used (Table 1). In 16% of videos, produce washing was mentioned or shown, but the produce was washed with soap and water, which contradicts USDA guidelines for washing produce (61). Consumers can conflate hand washing with produce washing; most health authorities agree that a 20-s hand scrub with soap and water is the best way to prevent transfer of virus particles from the hands to the face, but this same method has not been shown to prevent transfer of virus particles from produce to the face (14). No current evidence supports the transmission of COVID-19 via food, and use of detergents to wash produce may result in gastrointestinal distress (61, 67).

Many videos also mentioned virus survival on grocery items, including plastic packaging, metal cans, and cardboard boxes. Video authors frequently inferred that the 3-day survival rate on plastic and stainless steel would also apply to food packaging, citing a study published in the *New England Journal of Medicine* in April 2020 (70). In that study, the survival of SARS-Cov-2 on plastic and stainless steel was tested, but food products were not tested. Scant evidence supports the video authors’ claims that

groceries should be left unattended for up to 3 days to prevent virus transmission.

**How to use social media for dissemination of food safety information.** The present study explored the use of YouTube as a platform to spread food safety information, although other platforms such as Facebook and Twitter have also been key players in spreading information during the COVID-19 pandemic (29). With the vast and increasing use of the Internet, social media have become quick and inexpensive ways to spread disaster and public health information to consumers (28, 37). However, the chaotic use of social media by consumers during disaster events can lead to the dissemination of false or inconsistent information (43). Because of the power of social media, government agencies and institutions have taken advantage of these platforms to help spread correct information about COVID-19 by providing posts tailored to different types of social media platforms (19, 51, 65). These agencies also have their own posts and graphics with reliable food safety information that the public can share (17, 18, 62). With the use of such reliable materials, social media can be a resourceful way of reaching consumers and delivering food safety messages.

In the present study, authors who had a high number of subscribers or are experts in their field could be considered authority figures, such as health care professionals (individuals), scientists (individuals), and government agencies (entities). Those individuals and entities in these positions must be aware that people who watch their videos are likely to follow their advice. For all social media platforms, content creators with thousands of followers and scientific experts have some power to influence their followers. In a famous experiment, Milgram (49) concluded that ordinary people are likely to follow orders given by an authority figure. Other researchers have corroborated this finding (6, 35). People in positions of authority must provide accurate food safety information to help their followers avoid harmful practices.

Although this study was designed carefully, some limitations remained. Because of the size of the project, this study focused on videos produced in only the United States and Canada. The COVID-19 pandemic has been a global event; thus, some videos from other countries may contain food safety information related to COVID-19 and may be available for watching in the United States and Canada. Another limitation is the existence of more videos that could have been accessed with other key words; only three key words were used here. A third limitation is the fact that YouTube videos can be added, deleted, or updated even after publication of the original video. Videos displaying accurate or inaccurate practices or videos that were edited after the data capture date were not included in this study.

The following are recommendations for YouTube hosts, guests, and food safety educators.

(i) Along with regular content creators, health care professionals and scientific experts utilized YouTube to spread food safety information during COVID-19. Those in

these professional and scientific fields must be aware that consumers are likely to follow their guidance because of their positions in society and relevance to pandemic issues. Past studies have indicated that those in authoritative positions have the power to influence others to practice certain behaviors (49). Providing reliable and scientifically sound material will mitigate the risk of consumers using poor food safety practices.

(ii) Food safety educators should be aware of YouTube as a means to spread food safety information. Some YouTube hosts and guests presented helpful information, but others suggested practices that could be harmful to consumers. Food safety awareness of YouTube hosts and guests should be promoted through educational interventions. Educators can also utilize this medium to spread more accurate information and avoid the chaotic spread of misinformation, especially during health events such as the COVID-19 pandemic.

(iii) Food safety educators can also provide food safety materials to health care professionals. Various studies have revealed a food safety knowledge gap in the health care field that must be addressed (21, 72). Educators can also view updated food safety materials and assist in incorporating these materials into medical program curricula.

In conclusion, with the novel status of the SARS-Cov-2, consumers may be searching for information that can help keep them safe. Although COVID-19 has not been identified as a foodborne illness, some consumers are now more aware of food safety recommendations than before the pandemic and are concerned about contracting the disease from their foods. Social media can be used as an inexpensive and rapid way to reach consumers with food safety information. Platforms such as YouTube have been key players in the spread of information related to COVID-19 and food safety. With the accessibility of YouTube, anyone can post videos regardless of their expertise or knowledge of food safety practices. Some videos pose risks to consumers because the authors transmit (and implicitly recommend) food safety practices without scientific support, presenting viewers with false information regarding food safety. The findings of this study highlight the need for educational interventions to improve the food safety knowledge of YouTube authors and the importance of using this platform during major health events such as COVID-19.

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## SUPPLEMENTAL MATERIAL

Supplemental material associated with this article can be found online at: <https://doi.org/10.4315/JFP-20-463.s1>

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