Protection Motivation Theory and consumers' food safety behaviour in response to COVID-19

Abstract

The threat of COVID-19 has altered consumers shopping behaviour and increased consumers' willingness to purchase food using online food delivery services. Consumers were more likely to practice strict hand hygiene measures and were concerned with food safety. Such behaviours were likely driven by the fear and threat of contracting COVID-19. This study aims to use Protective Motivation Theory (PMT) to investigate how COVID-19 affects food shopping and food safety behaviour. An online, cross-sectional study was conducted in Indonesia and Malaysia to determine the protective motivation to engage in three food shopping and hygiene practices such as i) Safe food shopping behaviour; ii) Hand hygiene and avoiding cross contamination; and iii) Use of online food delivery services. Data were analysed using descriptive statistics, Spearman rho's correlation and binary logistic regression. A total of 1,180 responses were received of which 1,129 were valid. Gender was identified as a significant predictor across all food safety behaviours during COVID-19. Response efficacy and self-efficacy were significant predictors for food shopping behaviour while perceived severity significantly predicted hand hygiene practices after shopping. Age, frequency of food preparation and shopping, perceived severity, perceived vulnerability, response efficacy and self-efficacy were significant predictors for use of online food delivery services. Our findings suggest that women were more likely to engage in protective measures during food shopping, carry out hand hygiene practices after shopping and use online food delivery services during COVID-19. Participants with higher response and self-efficacy scores were more likely to shop from markets or shops with high hygiene standards while participants who perceived COVID-19 as a serious threat were more likely to clean and sanitise their hands after shopping. Participants also believed that the use of online food delivery services helps to reduce the risk of COVID-19 infection. However, foods should be purchased from trusted restaurants or takeaways. This is the first study to use Protection Motivation Theory to explore consumers' food shopping, hand hygiene and online food delivery practices during COVID-19.

Keywords: food safety practices; hand hygiene; online delivery; perceived severity; perceived vulnerability; self-efficacy; shopping; response efficacy

Highlights:

- Gender was a significant predictor across all food safety behaviours during COVID-19.
- Women were more likely to engage in protective measures.
- Response efficacy and self-efficacy were significant predictors for food shopping behaviour.
- Perceived severity significantly predicted hand hygiene practices after shopping.
- Threat and coping appraisals significantly predicted intention to use online food delivery services.

Introduction

The supply and demand for food were significantly affected by COVID-19. Outbreaks of COVID-19 have closed multiple food production sites and disrupted food supply chains (Middleton, 2020; Saitone et al., 2021). To prevent the spread of COVID-19, individuals have changed their work, dietary and shopping behaviours. The change in consumer behaviour during shopping and food handling practices during the COVID-19 pandemic were largely driven by fear for health (Eger et al., 2021), stress and anxiety (Haas et al., 2020; Soon et al., 2021). This has increased precautions in grocery shopping, handwashing and sanitation behaviours. For example, the fear of COVID-19

increased consumers' willingness to use online food delivery services (Gavilan et al., 2021). Consumers were less willing to shop indoors (Grashuis et al., 2020) and exhibited unusual retail consumer behaviour such as hoarding toilet paper, disinfectant and cleaning products, water and food (Kirk & Rifkin, 2020; Laato et al., 2020). A study by Rodrigues et al. (2021) revealed that Brazilians were buying a greater amount of food and more than half of the respondents reduced their shopping trips to markets. Consumers were also more concerned with food safety and hygienic practices, as 40% of the respondents do not trust the food safety of packaged food sold in markets (Rodrigues et al., 2021). More than 70% of respondents in Malaysia would sanitise the surfaces such as shopping trolleys or basket handles prior to using them and shop as quickly as possible to minimise contact with others (Soon et al., 2021).

The pandemic has altered consumers' food safety practices, some to the extent of using disinfectants to clean fresh fruits and vegetables. A large number of consumers in Lebanon and Jordan used vinegar and soap whilst a high proportion of Tunisians used chlorine bleach solution to clean fresh fruits and vegetables. There was also a significant increase in reported handwashing practices, especially after returning home and after touching food packages and shopping bag (Faour-Klingbeil et al. 2021a). There is no evidence suggesting that SARS-CoV-2 is transmitted through food or food packaging (EFSA, 2020; WHO, 2020a). Although FAO and WHO (2020a) proposed that touching food packages or containers contaminated with SARS-CoV-2 could transmit the virus to the mouth, eyes, or nostril, but this is not the main route for transmission. Studies had evaluated the survival of SARS-CoV-2 on different surfaces and found that the virus could remain for hours or days depending on the physical characteristics of the surfaces. The virus was found to remain viable up to 72 hours on plastic or stainless-steel surfaces, up to 24 hours on cardboard and four hours on copper (Kampf et al., 2020; van Doremalen et al., 2020).

Studies also revealed that consumers in the U.S. used online food deliveries (OFD) more frequently during the COVID-19 pandemic. The number of consumers who used OFD more than once a week has increased while those who used OFD services once a month or less has decreased (Hong et al., 2021). Features of online food delivery services such as non-cash transactions and less physical visits to brick and mortar stores are highly important. Researchers reported that during the COVID-19 pandemic, OFD has been widely utilised in Brazil (Rodriques et al., 2021; Zanetta et al., 2021), Indonesia (Prasetyo et al., 2021), Pakistan (Ali et al., 2021) and Malaysia (Kamel, 2021). For example, GrabFood which is one of the main OFD in Malaysia recorded a 25% increase in revenue and more than 8,000 restaurants signed up to the platform (Kamel, 2021). This contradicts the findings from Faour-Klingbeil et al. (2021a) who revealed that reliance on home delivery for food and groceries were uncommon despite reduced shopping frequency in physical stores.

Protection motivation theory (PMT) originally describes the effects of fear appeals on health threats and how it motivates individuals to react in a self-protective way (Rogers, 1975). PMT was further expanded to provide general persuasive messages and cognitive mediating processes (Norman et al., 2015; Rogers, 1983). Broadly, PMT is divided into threat and coping appraisal. Threat appraisal focuses on the severity and vulnerability to risk while coping appraisal refers to the individual's consideration of the recommended behaviour in response to threat (response efficacy) and their ability to implement the recommendations (self-efficacy) (Norman et al., 2015). PMT has been applied in multiple areas especially to study the effects of health and safety risks (Bui et al., 2013; Lin & Chang, 2021; Ong et al., 2021) and more recently motivation for COVID-19 vaccination and protective behaviour against COVID-19 (Eberhardt & Ling, 2021; Kim et al., 2021). PMT has been used to investigate food safety-related topics in several studies, such as how employees in food services react to food safety threats (Harris et al., 2021), reaction of diners towards a food safety violation in a restaurant (Harris et al., 2020), safe food handling behaviour (Choi et al., 2019; Mullan et al., 2016) and the public's behavioural intentions for safe food choices (Chen, 2016). To date there is no study that explores PMT on how COVID-19 affects food shopping and food safety behaviour. This study aims to use the PMT model to determine consumers' food shopping, food safety and online food delivery practices during COVID-19.

Methodology

Study design

A cross-sectional study was employed in Indonesia and Malaysia to determine the protection motivation to engage in three food shopping and hygiene practices such as i) Safe food shopping behaviour; ii) Hand hygiene and avoiding cross contamination; and iii) Use of online food delivery services.

Questionnaire Development

The questionnaire was divided into six sections i.e. demographics and food preparation & shopping practices (6 questions); perceived severity (5 questions); perceived vulnerability (5 questions); response efficacy (5 questions); self-efficacy (5 questions) and protection motivation (3 questions). Demographics information included age, gender, frequency of food shopping & preparation and use of online food delivery services. The measurement scales were developed based on the constructs of the PMT model (Rogers, 1983) and related food safety topics such as hand hygiene (Dwipayanti et al., 2021; Olaimat et al., 2020), safe food handling behaviour (Mullan et al., 2016), food shopping (Faour-Klingbeil et al., 2021a; Soon et al., 2021) and use of online food delivery services during COVID-19 (Hong et al., 2021; Olaimat et al., 2020). Our study adapted the constructs and measurement scales developed by Mullan et al. (2016). We define perceived severity as how seriously an individual believes that COVID-19 will be a threat during food shopping and food handling. Perceived vulnerability is how susceptible an individual feels to the threat of COVID-19 during food

shopping and food handling. Self-efficacy refers to the perceptions of respondents' own abilities to carry out recommended protective actions. Response efficacy refers to the perceptions or beliefs in the efficacy of the recommended practices. Respondents were asked to indicate the extent to which they agree with each statement for each construct (i.e., perceived severity, perceived vulnerability, self-efficacy and response efficacy) on a seven-point Likert scale, where 1=strongly disagree; 7=strongly agree. The questionnaire was translated into Bahasa Indonesia (Indonesian language) and Bahasa Malaysia (Malay language) by the second and third authors and back translated into English. We sent the questionnaire to four food safety experts for content validity. The questionnaire was pilot tested among 50 undergraduate students from Indonesia and Malaysia to ensure clarity and if revision was required. The Cronbach's alpha for each construct was as follow: perceived severity (0.793), perceived vulnerability (0.832), response efficacy (0.818) and self-efficacy (0.809), all of which are above the 0.60 threshold and indicates high reliability (Hair et al., 2009).

Perceived severity

To measure the perceived severity of three food shopping and hygiene practices, participants were asked to what extent they agreed with the statements. Perceived severity for food shopping practices were measured using two items: i) 'Risks of COVID-19 infection seriously influence my choice of shopping in market or shops' and ii) 'The risk from shopping in person makes me anxious'. Hand hygiene and handling practices were measured using two items: i) 'Not washing my hands after returning home from shopping makes me anxious' and ii) 'Not wiping or disposing food packaging after shopping makes me feel at risk'. While measurement of using OFD was based on one item i.e. 'Using OFD makes me less anxious'.

Perceived vulnerability

Perceived vulnerability of food shopping was measured using two items i) 'If I shop in person at markets or shops, I feel my health is at risk'; and ii) 'If I see other people who don't follow hygiene measures while shopping, I feel vulnerable to COVID-19'. Two items such as i) 'I wipe food packaging as I feel my health is at risk if the packaging has been contaminated with coronavirus' and ii) 'I wash my hands before preparing food as I feel my health is at risk if cross contamination happens'. OFD was measured using the statement: 'I choose trusted restaurants if I order online delivery, as it's less risky'.

Response efficacy

Response efficacy on food shopping was based on two items i.e. i) 'Shopping from clean markets or shops helps to reduce the risk of COVID-19 infection' and ii) 'Avoiding shops at busy times helps to reduce the risk of COVID-19 infection'. Hygienic practices were based on i) 'Cross contamination of raw and cooked food should be avoided to reduce health risk' and ii) 'Cleaning and sanitising hands

helps to reduce risk of COVID-19 infection'. OFD was measured using the statement: 'Buying take-outs online helps to reduce the risk of COVID-19 infection'.

Self-efficacy

i) 'I know which markets or shops that maintain high hygiene standard' and ii) 'I know the best time to shop to avoid crowds' were used to measure self-efficacy of food shopping. To measure self-efficacy of hygiene practices, the following items were used: i) 'I feel confident cooking fresh food bought from clean markets or shops' and ii) 'I am confident my cleaning and sanitising practices at home helps to reduce the risk of COVID-19 infection'. Self-efficacy of OFD was measured using 'I feel confident eating take-outs ordered online.'

Protection Motivation

Protection motivation were measured using three questions i.e. 'Due to the pandemic…. i) I intend to shop from markets or shops with high hygiene standards'; ii) 'I intend to clean and sanitise my hands after shopping'; and iii) 'I intend to order food using online food delivery services more frequently'.

Online Survey

An online survey (https://admin.onlinesurveys.ac.uk/) was conducted among consumers who currently reside in Indonesia or Malaysia and were involved in food shopping and preparation of food. Convenience and snowball sampling were used. Online consent was obtained prior to completing the survey. All responses were anonymised.

Statistical Analysis

Descriptive statistics, Spearman rho's correlation and three binary logistic regression analyses were conducted using IBM SPSS 28.0 to determine the protection motivation on food shopping practices, hand hygiene & cross contamination and online food delivery services during COVID-19. P value < 0.05 was considered statistically significant.

Results

A total of 1,180 responses were received of which 1,129 were valid. Table 1 shows the demographics characteristics of the participants from both countries. More than 55% of the participants prepared food at home daily and 37.6% carried out food shopping 2–3 times/week during the pandemic. GrabFood (available in Indonesia and Malaysia), GoFood or Golek (available in Indonesia) and FoodPanda (available in Malaysia) were the most common food delivery apps used by the respondents (Table 1). Such delivery apps are often used to purchase takeaway cooked food or meals.

Insert Table 1

Tables 2–4 show the correlation between perceived severity, perceived vulnerability, response efficacy and self-efficacy when shopping for food or groceries, carrying out hygienic practices and using online food delivery services. Significant and positive correlations were found across all constructs for each activity.

Insert Tables 2 – 4

Food shopping practices

The logistic regression model was statistically significant χ^2 (9, N=1129) = 51.072, p<0.001) indicating that the model was able to distinguish between participants who due to the pandemic intend or did not intend to shop from markets or shops with high hygiene standards. The model explains between 4.4% (Cox and Snell R square) and 10.2% (Nagelkerke R square) of the variance in food shopping practices, with 99.4% cases correctly classified in the model. Gender (OR = 0.545, p<0.05), response efficacy (OR=0.766, p<0.01) and self-efficacy (OR=0.765, p<0.05) were significant predictors in the model (Table 5). Women were 0.5 times more likely to shop from markets or shops with high hygiene standards. Participants with higher response and self-efficacy scores were more likely to shop from markets or shops with high hygiene standards.

Insert Table 5

Hand hygiene practices during COVID-19

The model was able to distinguish between participants who due to the pandemic intend to clean and sanitise their hands after shopping, χ^2 (9, N=1129) = 46.923, p<0.001). Hosmer and Lemeshow Test shows the model was a good fit for the data χ^2 (8, N=1129) = 6.718, p=0.567) and explains between 4.1% (Cox and Snell R square) and 13.7% (Nagelkerke R square) of the variance in handwashing and sanitising practices after shopping with 99.9% cases correctly classified in the model. Gender (OR=0.377, p<0.01) and perceived severity (OR=0.665, p<0.05) were significant predictors in the model (Table 6). Women and participants who perceived that COVID-19 is a serious threat were more likely to clean and sanitise their hands after shopping.

Insert Table 6

Using online food delivery services during COVID-19

The logistic regression model was statistically significant χ^2 (9, N=1129) = 225.851, p<0.001) indicating that the model was able to distinguish between participants who due to the pandemic were more likely to use food delivery services. Hosmer and Lemeshow Test shows the model was a good fit for the data χ^2 (8, N=1129) = 8.590, p=0.378) and explains between 18.1% (Cox and Snell R

square) and 24.2% (Nagelkerke R square) of the variance in using food delivery services. Gender (OR=1.452, p<0.01), age (OR=1.291, p<0.001), frequency of food shopping (OR=0.873, p<0.05), frequency of food preparation (OR=1.261, p<0.001), perceived severity (OR=0.899, p<0.05), perceived vulnerability (OR=1.149, p<0.01), response efficacy (OR=0.636, p<0.001) and self-efficacy (OR=0.771, p<0.001) were significant predictors (Table 7). Women were 1.452 times more likely to use online food delivery services than men. Increasing perceived severity, perceived vulnerability, response efficacy and self-efficacy scores were associated with increased likelihood of using OFD.

Insert Table 7

Discussion

Gender was identified as a significant predictor across all food safety behaviours during COVID-19. Previous studies had shown that a higher percentage of women reported avoiding public spaces and being more supportive of social distancing (Czeisler et al., 2020), avoid 3Cs such as closed spaces, crowded spaces and close-contact (Muto et al., 2020), engage in frequent hand hygiene practices and were more likely to rate the seriousness of COVID-19 threat as high (Wolf et al., 2020). Women in Indonesia also reported more handwashing frequencies when arriving home and before eating or preparing food (Dwipayanti et al., 2021). Our findings are aligned with previous studies including a multi-country study by Galasso et al. (2020) who found women were more likely to perceive the pandemic as a very serious health threat and tend to adhere to safe preventive measures. This could be due to women being more risk averse than men and women tend to believe they are more likely to be infected (Galasso et al., 2020; Lewis & Duch, 2021).

Food shopping practices

Response efficacy and self-efficacy were identified as significant predictors for food shopping practices. Consumers were confident in the efficacy of shopping from markets or shops that maintained high hygiene level and were less congested. They were also confident in their abilities to identify shops that carried out cleaning and hygiene procedures and best time to shop for groceries to avoid queues and minimise contact with other customers. This is in line with the recommendations by WHO (2020b) and WHO (2021) advice for the public in South East Asia while shopping for food during the COVID-19 pandemic. There is a clear need to shop from supermarkets with high hygiene standard. Shops with higher number of staff and the probability of staff being infected is much higher for supermarkets. Li and Tang (2022) found that the average infection probability for a customer visiting a supermarket was 6.22×10^{-6} compared to 1.40×10^{-6} for visiting one small shop. Wet markets are also common in Indonesia and Malaysia and one could often find a variety of fresh produce, meat, seafood, and poultry sold in semi open-air environments (Nadimpalli & Pickering, 2020). Wet markets are often humid, have poor ventilation in enclosed areas, insufficient hygiene facilities and this may contribute to viral transmission. Toilets and handwashing facilities were found

to be inadequate in wet markets in Malaysia (Soon & Abdul Wahab, 2021); and consumers would need to select markets with adequate hygiene facilities and cleaning procedures and avoid crowds.

Hand hygiene practices during COVID-19

Perceived severity significantly predicted intention to carry out hand hygiene practices. Our study revealed that consumers in Indonesia and Malaysia who perceived COVID-19 as a serious threat were more likely to wash their hands after arriving home from shopping and cleaning food packaging to avoid cross contamination. Similar findings were reported in Indonesia where respondents who perceived COVID-19 as a serious threat were more likely to wash their hands frequently (Dwipayanti et al. 2021). Consumers from Arab countries also reported a significantly higher frequencies of handwashing when returning home, after touching food packages and before food handling (Faour-Klingbeil et al., 2021a) and were extremely concerned about touching contaminated food packaging (Faour-Klingbeil et al., 2021b). Since the pandemic, Ministry of Health (MOH) Malaysia had provided multiple programmes on handwashing techniques and use of hand sanitisers on the Official Portal of MOH and social media and had been instrumental in urging all individuals to practice personal hygiene (Md Shah et al., 2020; Tang, 2020), while the Government of Indonesia recommended the '3 Ms' including '*memakai masker*' (wearing mask), '*menjaga jarak*' (social distancing) and '*mencuci tangan pakai sabun*' (handwashing with soap) (Dwipayanti et al., 2021). Hand hygiene is identified as one of the most effective interventions to stop the spread of pathogens including SARS-CoV-2 virus (CDC, 2020a; WHO, 2020c). Kwok et al. (2015) found that participants involuntarily touched their faces over 20 times per hour, with higher frequencies on the mouth, nose, and eyes. Contact transmission of COVID-19, i.e. touching contaminated surfaces followed by hand to facial mucosa has been identified as a potential infection route (Przekwas & Chen, 2020). Hence, the threat of contracting COVID-19 most likely drove the participants in our study to wash their hands after shopping. Participants may also be concerned about the possibility of being infected after touching contaminated surfaces such as food packaging. WHO recommended that it is not necessary to disinfect food packaging materials, but hands should be properly washed after handling food packages and before eating (WHO, 2020c). Although there is no evidence that SARS-CoV-2 is transmitted via food and food packaging (EFSA, 2020; WHO, 2020d), however, consumers are likely to be highly concerned and preferred to wipe down the food packaging as an additional measure. For example, an outbreak of COVID-19 in Singapore was linked to physical contact and sharing of food among participants at a conference (Pung et al., 2020). Thus, the increased perception of risk associated with touching contaminated surfaces and being infected with COVID-19 motivated participants to clean their hands and food packaging after shopping.

Using online food delivery services during COVID-19

In OFD usage intention, all predictors except country significantly affected intention to use online food delivery services. Younger adults were more likely to use OFD. Globally, young people (18-34)

are the main users of OFD platforms (Statista, 2022). OFD services are commonly used by young, working adults with higher disposable incomes in Australia (Bates et al., 2020), Malaysia (Yusra & Agus, 2019) and Indonesia (Ilham, 2018). Our findings also showed an inverse relationship between frequency of food preparation and shopping. Those who infrequently prepared food at home (e.g., once or less than once a week) and those who relied solely on delivery services or shopped for food 4 – 6 times / week were more likely to use OFD. Perceived severity and vulnerability were found to significantly affect use of OFD during COVID-19 and corroborate with Gavilan et al. (2021) where fear of COVID-19 increased consumers preference for OFD. People with higher perceived severity and vulnerability to an adverse health condition (i.e. COVID-19) were more likely to take protective measures purchasing food online (Carpenter, 2010). But our study contradicts findings from Hong et al. (2021) and Mehrolia et al. (2020) where perceived severity and vulnerability were not associated with use of OFD during COVID-19. In fact, Mehrolia et al. (2020) found that high perception of risk leads to negative purchase intentions via OFDs; linked to uncertainty involved in the purchase and perception of being infected through delivery partners. Consumers in Malaysia and Indonesia who showed high response efficacy and self-efficacy were more confident in their abilities to use OFD. Food delivery and curb-side pickup were recommended as measures to maintain social distancing practices and minimise spread of COVID-19 (CDC, 2020b; FDA, 2020). The risk of using OFD is lessened compared to visiting physical restaurants, as the probability of contracting COVID-19 is reduced due to social distancing, hence improving consumers' beliefs in their response and self-efficacy. Although there is risk of transmission from delivery employees who are often highly mobile with access to a wide range of clients (Ortiz-Prado et al., 2021), consumers' practices of wiping and disposing off food packaging and adhering to hand hygiene practices potentially helped to mitigate the risk. The participants in our study tend to use online food delivery from trusted restaurants and reflects the study by Soon and Xin (2020) who found that Chinese consumers prefer to purchase food from 'time-honoured' (reputable) or familiar restaurants. They tend to check online reviews and prefer recommendations through word of mouth. Strict lockdown measures imposed during the pandemic and travel or mobility restrictions had further affected consumers' willingness to dine out in Malaysia (Rodzi, 2021) and Indonesia (The Jakarta Post, 2020). A large number of restaurants that transitioned to online catering in both countries supported the use of OFD and consumers understood the use of OFDs as a protective measure. The use of OFD services is potentially one of the long-term behavioural shifts impacted by the pandemic.

Conclusion

Protection Motivation Theory was used to explore how COVID-19 affects consumers' food shopping, hand hygiene and use of online food delivery services. The logistic regression models explained between 4.1% (Cox and Snell R square) and 24.2% (Nagelkerke R square) of the variance in all three behaviours. Our findings revealed that gender was a significant predictor across all food safety behaviours during COVID-19. Women were more likely to shop from markets or shops with high

hygiene standards, clean and sanitise their hands after shopping, and use online food delivery services. Response efficacy and self-efficacy were significant predictors for food shopping behaviour. Participants believed in the efficacy of recommended practices such as 'Avoid 3Cs' in Malaysia and '3 Ms' in Indonesia while shopping. Similarly, participants were confident in their ability in identifying shops that practiced high hygiene standards and were aware of 'quiet periods' to minimise contact with other customers. Perceived severity significantly predicted hand hygiene practices after shopping. Participants from both countries were concerned about the risk of being infected with COVID-19 after touching contaminated surfaces and were more likely to wash their hands after arriving home from shopping and cleaning food packaging to avoid cross contamination. Threat and coping appraisals were associated with increased likelihood of using OFD services. Consumers in Indonesia and Malaysia with higher perceived severity and vulnerability to COVID-19 were more likely to use OFD. Similarly, participants with high response and efficacy scores believed in the efficacy and their abilities to use OFD in reducing the risk of COVID-19 infection.

This study has several limitations including the use of convenience and snowball sampling to recruit participants from both countries. It is likely that participants who were interested and motivated by COVID-19 and food safety topics were more likely to participate in the study, hence introducing selection bias among our respondents. The survey was conducted online, and the findings would have excluded potential participants with limited internet access.

This study has successfully used PMT to determine how threat and coping strategies motivate consumers to react in a self-protective manner. Our findings suggest focusing on interventions that seek to affect consumer food safety behaviour i.e., by improving self and response efficacies. These two constructs were significant predictors in food shopping and use of online delivery services. One way in which self and response efficacies could be improved is through visual and verbal recommendations of hand hygiene and food safety practices by local governments and regional / international health organisations. Improving awareness and understanding of the threat of COVID-19 can be used to encourage hand hygiene practices. It is recommended that qualitative studies such as in-depth interviews or focus group discussion be conducted to enable greater understanding of consumers' threat and coping appraisals. Similarly, future studies to investigate if consumers retained the protective measures post-pandemic is recommended.

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