

Structural Modeling of Knowledge, Attitude, and Prevention Practices of COVID-19 Among Online Food Delivery Services in Greater Jakarta Area, Indonesia

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ABSTRACT

This study aims to develop a structural model to assess knowledge, attitudes, and COVID-19 preventive practices among food handlers (FH) and food delivery workers (FDW) in Greater Jakarta, Indonesia. Given the region's high population density, the risk of COVID-19 transmission is heightened, making preventive practices essential. Data were collected from 675 respondents using a questionnaire consisting of 36 items. The data were analyzed using partial least squares structural equation modeling (PLS-SEM). Results revealed that both knowledge ($\beta = 0.959$ for FH; $\beta = 0.756$ for FDW; $p < 0.05$) and attitude ($\beta = 0.546$ for FH; $\beta = 0.410$ for FDW; $p < 0.05$) positively impacted COVID-19 preventive practices. Attitude emerged as a crucial predictor, explaining a higher variance in FH prevention practices ($R^2 = 0.346$) than in FDW ($R^2 = 0.174$). The findings underscore the importance of strengthening attitudes toward preventive measures like hand washing, mask-wearing, and physical distancing, particularly among FDWs, to enhance safe food delivery practices. The structural model and insights provide a valuable framework for developing targeted interventions and strengthening public health preparedness for future pandemics or similar crises.

Keywords: attitude, food handlers, food delivery workers, knowledge, practices

INTRODUCTION

The global spread of COVID-19, originating in Wuhan, China, has reached more than 220 countries across the globe. On January 16, 2023, 663,001,898 cases were reported, including 6,707,959 deaths (WHO, 2023). According to government data in Indonesia, on January 18, 2023, there were 6,727,007 cases and 160,756 deaths (The Indonesian COVID-19 Task Force, 2023). The transmission of this virus from one individual to another has resulted in its extensive dissemination not only in China but also across more than 220 additional countries (WHO, 2023). The primary method of SARS-CoV-2 transmission is through direct contact between individuals. This transmission happens through droplets released during coughing or sneezing (Dhand and Li, 2020). Doremalen (van Doremalen *et al.*, 2020) demonstrated that SARS-CoV-2 remained active for over 72 h on plastic and stainless steel surfaces, longer than on cuprum (4 h) and card stock (24 h). The virus can be detected on various surfaces of fixtures and fittings in every building (Ong *et al.*, 2020). Preventive measures have been taken to reduce the spread of COVID-19 in all countries, including in Indonesia. Research indicates that hand washing, wearing masks, and practicing social distancing can effectively mitigate

and slow the spread of the epidemic (Teslya *et al.*, 2020).

Indonesia, as one of the countries that experienced the impact of COVID-19, has also made a policy to prevent the spread of COVID-19. In early 2021, the Indonesian government implemented a new regulation known as micro-scale restrictions on public activities (Indonesian: Pemberlakuan Pembatasan Kegiatan Masyarakat or PPKM), which aims to reduce the number of active cases and increase the recovery rate. These restrictions include workplaces, schools, restaurants, religious places, and community activities in public places. Implementing the restrictions has proven effective in reducing the number of COVID-19 cases in Indonesia. Muhandri and Ilham (2021) revealed that the PPKM policy in Bandung effectively withholds the spread of COVID-19 from 549 cases per day to 222 cases per day.

Nonetheless, the large-restrictions policy also negatively impacted the community, especially regarding economic factors. Based on data from the Central Statistics Agency (Indonesian: Badan Pusat Statistik), Indonesia experienced a contraction in economic growth that fell to 2.07% in 2020 (Pratiwi, 2022). This restriction led to declining economic activity in several sectors, including bars and restaurants (Pramudita, 2020). However, due to the growth of technologies, bars and restaurants or food and beverage sectors still have the potential to expand their business using digital strategies. By

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adopting innovative technologies, online food delivery is implemented to keep the business running during the pandemic (Berawi, 2021).

Food Delivery Applications (FDAs), a burgeoning online mobile technology, have been used extensively by both the food services industry and customers. These apps have revolutionized the process of food ordering and consumption, particularly amidst the mobility constraints imposed by the COVID-19 pandemic. Many restaurants have begun offering online food delivery services to meet consumer demands and maintain business viability during these challenging times (Talwar *et al.*, 2021). This transition occurs because of unusual purchase consumer behavior (Laato *et al.*, 2020). User satisfaction is the primary determinant influencing the intention of users to persist in utilizing FDAs during the COVID-19 pandemic (Zhao and Bacao, 2020).

The food service sector must prioritize the safety of its staff as a crucial asset and ensure that all employees adhere to government mandates concerning measures for preventing and controlling COVID-19 infections (WHO, 2020b). Currently, no indication is that food, packaging, or handling plays a significant source or transmission pathway for SARS-CoV-2, leading to COVID-19 (ICMSF, 2020). Nevertheless, it is increasingly crucial for food enterprises to establish robust Food Safety Management Systems (FSMSs), incorporating meticulous hygiene protocols and implementing Hazard Analysis and Critical Control Point (HACCP) principles. These measures are indispensable for managing microbiological hazards in food manufacturing.

The primary concern for the food service sector should revolve around safeguarding their employees, customers, and food recipients against SARS-CoV-2 transmission through interpersonal contact. Food Handlers (FH) and Food Delivery Workers (FDW) play pivotal roles in upholding food safety standards during both food preparation and delivery processes (Limon, 2021). The service industry needs to increase awareness about occupational health risks (Alahdal *et al.*, 2020), promote personal hygiene effectively (Mieth *et al.*, 2021), implement effective cleaning and disinfection (WHO, 2020a), act quickly when the symptoms appear (Menni *et al.*, 2020), ensure workers understand self-isolation procedures (Farooq *et al.*, 2020), enforcing measures such as maintaining physical distance and other protocols to control the spread of COVID-19 (Chu *et al.*, 2020). Managers ought to effectively communicate and assist employees with heightened susceptibility to COVID-19 (Chanana and Sangeeta, 2021). Delivery workers must fill out a declaration confirming the absence of COVID-19 symptoms. Drivers should wear face coverings, maintain physical distance, and adhere to good hygiene while picking up and delivering orders (WHO, 2020b).

Previous research highlights the importance of Knowledge-Attitude-Practices (KAP) in shaping preventive behaviors. Studies from other regions, such as China and Malaysia, demonstrate that higher knowledge levels and positive attitudes towards COVID-19 prevention correlate with safer practices (Azlan *et al.*, 2020; Zhong *et al.*, 2020). However, literature focusing on KAP among FH and FDW, particularly within Indonesia's high-risk zones, still needs to be explored.

Understanding Knowledge-Attitude-Practices (KAP) is important to prevent the spread of false rumours about diseases that can negatively affect prevention practices (Djalante *et al.*, 2020). Because of this urgency, this study aims to form a structural model regarding KAP in preventing the spread of COVID-19 transmission. This study hypothesizes that (1) Knowledge affects attitudes, (2) Attitudes affect prevention practices of COVID-19, and (3) Knowledge affects prevention practices of COVID-19. Using Structural Equation Modeling (SEM), this research aims to develop and analyze a structural model that captures the relationships between knowledge, attitudes, and practices related to COVID-19 prevention among FH and FDW in Greater Jakarta. By identifying these relationships, the study aims to contribute to understand effective strategies for enhancing COVID-19 preventive practices in high-risk occupational groups within dense urban settings.

MATERIAL AND METHODS

Material

The research materials used are (1) two-section questionnaires about the subject's demographic profile and COVID-19 preventive measures, (2) *google form* for online data collection, (3) Social media platforms such as facebook, twitter, linkedin, instagram, and instant messenger applications such as whatsapp and telegram, (4) G*Power 3.1.9.4 software was utilized to ascertain the minimum required sample size, lastly (5) Smart-PLS 4.0 software was employed to analyze both measurements and structural models. The questionnaire was distributed online because the study was conducted during the COVID-19 pandemic when social activities were restricted. This approach also allowed for a wider reach of respondents despite these limitations. The social media platforms were selected based on their popularity in Indonesia in 2021. As indicated by a study from WeAreSocial, these platforms included youtube, whatsapp, instagram, facebook, and twitter (Kemp, 2021).

Research design

This research was conducted for 3 months, from December 2020 until February 2021, in the Greater Jakarta area, including Jakarta, Bogor, Depok, Tangerang and Bekasi. The study was conducted in Greater Jakarta through purposive sampling. This area was chosen due to the high number of COVID-19 cases reported in Indonesia in 2021. That year, cumulative COVID-19 cases in DKI Jakarta reached 851,222 (DKI Jakarta Provincial Health Office, 2021), with 48,267 cases in Bogor, 82,610 in Depok, 57,422 in Tangerang, and 67,533 in Bekasi (Task Force for Handling Corona Virus Disease 2019 (COVID-19), 2021). Respondents were selected purposively with the following inclusion criteria: (1) Working in the Jakarta, Bogor, Depok, Tangerang, or Bekasi areas; (2) Food service industries that partner with online delivery applications; (3) Food service industries that do not partner with online delivery applications; (4) Delivery drivers partnered with online ordering applications such as GoFood, GrabFood, Shopee, and Kulina. All respondents were fully informed about the study's purpose and procedures. Explicit consent was obtained from each participant, ensuring they were aware of and agreed to share their data for research purposes. The main advantages of cross-sectional studies are that they are inexpensive and relatively fast. Cross-sectional study is one way to study the relationship of outcomes and multiple exposures (Wang and Cheng, 2020).

Respondents

The study utilized G*Power 3.1.9.4 software to calculate the required sample size. Seventy-seven respondents were obtained based on a power level of 0.80, an alpha level of 0.05, and an effect size of 0.15 (Hair *et al.*, 2014). The respondent size was raised to 675 to enhance data stability. The survey was disseminated via various online platforms, including e-commerce websites, social media platforms (*i.e.* facebook, twitter, linkedin, and instagram), and instant messaging apps (whatsapp and telegram). A total of 675 ($n = 675$) fully filled-out questionnaires were collected through online purposive sampling, sourced from 91 facebook groups, twitter influencers, linkedin influencers, instagram accounts of food delivery businesses, 3 whatsapp groups, 1 telegram group, and food delivery business accounts on Shopee.

Validity and reliability

Testing of the validity and reliability of the questionnaire was conducted on 30 participants not involved in the main study and subsequent refinements were taken into account in their responses. Reliability assessments for each section were conducted using Cronbach's Alpha, with statements deemed reliable if Cronbach's Alpha exceeded 0.6

(Ursachi *et al.*, 2015). The Cronbach's Alpha values for knowledge, attitude, and practices for food handlers were 0.85, 0.82, and 0.83, respectively. For FDWs, these values were 0.78, 0.78, and 0.81 for knowledge, attitude, and practices, respectively.

Measurement

This study involved 675 participants who completed a questionnaire designed to gather demographic information and assess COVID-19 preventive measures. The questionnaire, adapted from Azlan *et al.* (2020); Machida *et al.* (2020); Zhong *et al.* (2020), consisted of 36 questions, including six demographic items (age, gender, education level, and net income) and 30 questions addressing specific topics on hand hygiene, COVID-19 symptoms, mask-wearing, and physical distancing.

Indicators for FH and FDW included the following: (1) Understanding of common COVID-19 symptoms, (2) Knowledge of workplace safety practices, (3) Awareness of health protocols in the workplace, (4) Attitude toward COVID-19 preventive practices, (5) Attitude toward self-care, (6) Attitude toward the COVID-19 preventive practices of others, (7) Implementation of COVID-19 preventive practices, (8) Reminding others to follow health protocols, and (9) Adherence to health protocols when experiencing illness. These indicators provided a comprehensive assessment of participants' knowledge, attitudes, and behaviors related to COVID-19 prevention, offering valuable insights into efforts to maintain health safety standards in the food service sector. In addition to the cited studies, the questionnaire incorporated elements from the World Health Organization (WHO, 2020c) and Indonesia's Food and Drug Control Agency guidelines (BPOM, 2020).

Each knowledge question came with three alternative responses, *i.e.* "True", "False", and "I do not know". A score of '1' is given when the respondent answers correctly, while a score of '0' is given if the respondent answers wrong or does not know. The Attitudes section utilized a Likert scale with 5 points, spanning from strongly disagree (1) to strongly agree (5). Similarly, the Preventive Practices section employed a 5-point Likert scale, with options ranging from never (1) to always (5).

Statistical analysis

This study uses structural equation modeling (SEM) to analyze the relationships between variables and assess the influence of certain factors on COVID-19 prevention behaviors. SEM is a multivariate analysis method that simultaneously describes linear relationships between observed variables (indicators) and unobservable variables (latent variables). The β value in partial least squares structural equation modeling (PLS-SEM) represents the direct influence of one latent variable

on another within the structural model. The magnitude of the β value reflects the strength of the relationship, with a larger absolute value denoting a stronger effect (Hussain *et al.*, 2018). This model is evaluated based on beta (β) values, significance levels, the coefficient of determination (R^2), and predictive relevance (Q^2), which indicate the influence of one latent variable on another and the predictive ability of independent latent variables on a dependent latent variable (Hair *et al.*, 2019).

Factor loadings, average variance extracted (AVE), composite reliability (CR), and discriminant validity (DV) were used to assess the measurement model. The structural model was analyzed through path coefficients, significance levels, R^2 values, and prediction accuracy (Hair *et al.*, 2020). This study employed a theoretical model consisting of (1) the effect of knowledge on attitudes, (2) the influence of attitudes on COVID-19 preventive practices, and (3) the impact of knowledge on COVID-19 preventive practices.

The study was conducted in Greater Jakarta in five stages: (1) respondent identification, (2) questionnaire development and validation, (3) data collection, (4) data analysis, and (5) modeling. It was grounded in prior research on knowledge, attitudes, and behavior (Ellinda-Patra *et al.*, 2020) and other COVID-19 studies (Azlan *et al.*, 2020; Machida *et al.*, 2020; Zhong *et al.*, 2020). Data collected were entered into Microsoft Excel 2010 and IBM SPSS

Statistics 25. Descriptive analysis was used to develop respondent demographic profiles, covering age, gender, education level, and income percentages. Analysis of the measurement and structural models was performed using Smart-PLS 4.0.

RESULTS AND DISCUSSION

Respondent's characteristics

The total number of respondents in this study was 675. Table 1 provides a detailed breakdown of respondent demographics and characteristics.

A descriptive analysis reveals disparities in characteristics between food handlers (FH) and food delivery workers (FDW). Figure 1 indicates that the number of respondents from the FH group totaled 386 people, or 57.18% of all respondents. Most FH completing the questionnaire were from the Bogor area, totaling 107 people (27.72%), while the fewest were from Depok, with 54 people (13.99%). This result may be due to differences in area size and population. Currently, Bogor Regency covers an area of 2,991.78 km² (Bogor Regency Central Statistics Agency, 2023) with a population of 5,489,536 (Bogor Regency Central Statistics Agency, 2021). In contrast, Depok City covers 199.91 km² (Central Statistics Agency of Depok City, 2023b) with a population of 2,145,400 (Central Statistics Agency of Depok City, 2023a).

Table 1. Sample respondents characteristic

Characteristics	Food Handlers (FH) (n= 386)		Food Delivery Workers (FDW) (n= 289)	
	Frequency	Percentage	Frequency	Percentage
Region				
Bekasi	60	15.54	54	18.69
Bogor	107	27.72	51	17.65
Depok	54	13.99	49	16.96
Jakarta	100	25.91	89	30.80
Tangerang	65	16.84	46	15.92
Age				
<20 years old	21	5.47	10	3.46
21-30 years old	211	54.95	88	30.45
31-40 years old	88	22.92	131	45.33
41-50 years old	43	11.20	53	18.34
51-60 years old	21	5.47	7	2.42
Gender				
Man	178	46.11	249	86.16
Woman	208	53.89	40	13.84
Education level				
Academic level	237	61.40	55	19.03
Elementary school	6	1.55	7	2.42
Senior high school	119	30.83	188	65.05
Junior high school	18	4.66	34	11.76
No education	6	1.55	5	1.73
Monthly income				
Less than Rp 1.000.000	73	18.91	65	22.49
More than Rp 4.000.000	121	31.35	18	6.23
Rp 1.000.001–2.000.000	95	24.61	110	38.06
Rp 2.000.001–4.000.000	97	25.13	96	33.22

Meanwhile, the number of respondents from the FDW totaled 289 people or 42.81% of all respondents. Most food delivery respondents who completed the questionnaire were from Jakarta, totaling 89 people (30.80%), while the fewest were from Tangerang, with 46 people (15.92%). This result may be due to differences in population size and density. Currently, DKI Jakarta has a population of 10,748,230 with a population density of 14,555 per km² (Central Statistics Agency of DKI Jakarta Province, 2022). In contrast, Tangerang has a population of 1.9 million and a population density of 11,619 per km² (Tangerang City Central Statistics Agency, 2022).

Most FH who completed the questionnaire were aged 21–30, totaling 211 people (54.95%), while the

fewest were under 20 and aged 51–60, with 21 people each (5.47%). According to the Indonesian Central Statistics Agency (Central Bureau of Statistics, 2023), Indonesia’s population aged 21–30 currently stands at 44.85 million, while the population aged 51–60 is 31.23 million.

A study by the Demographic Institute of the Faculty of Economics and Business University of Indonesia (2020) found that 77% of FDW in Indonesia are of productive age (20–39 years). Among those who completed the questionnaire, most were aged 31–40, totaling 131 people (45.33%), while the fewest were aged 51–60, with seven people (2.42%). This data is shown in Figure 2.

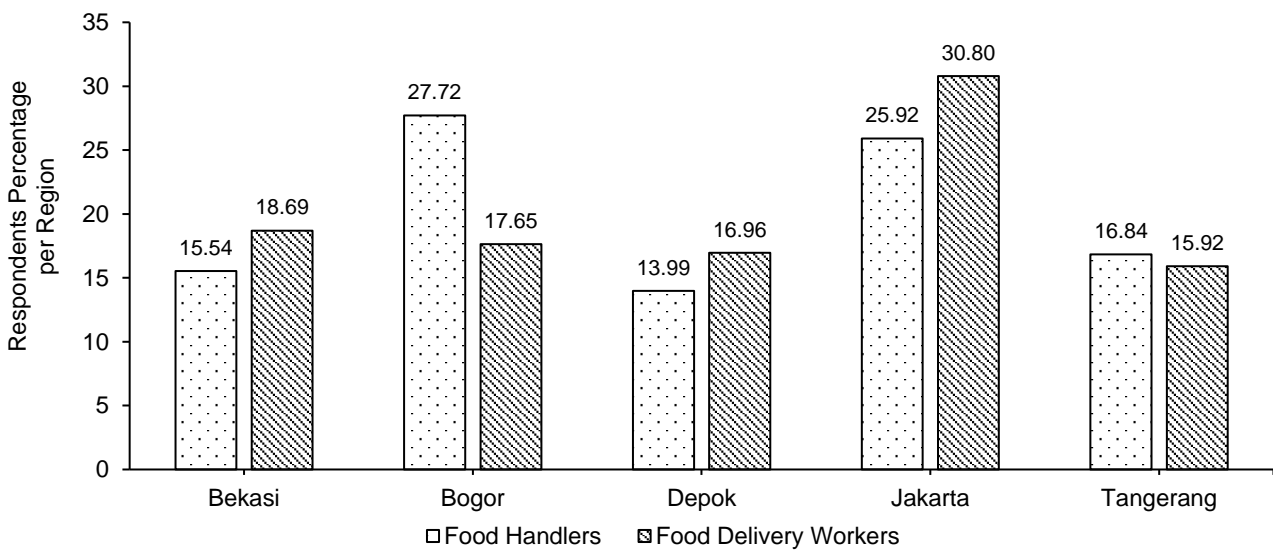


Figure 1. Region-based distribution of respondent percentages

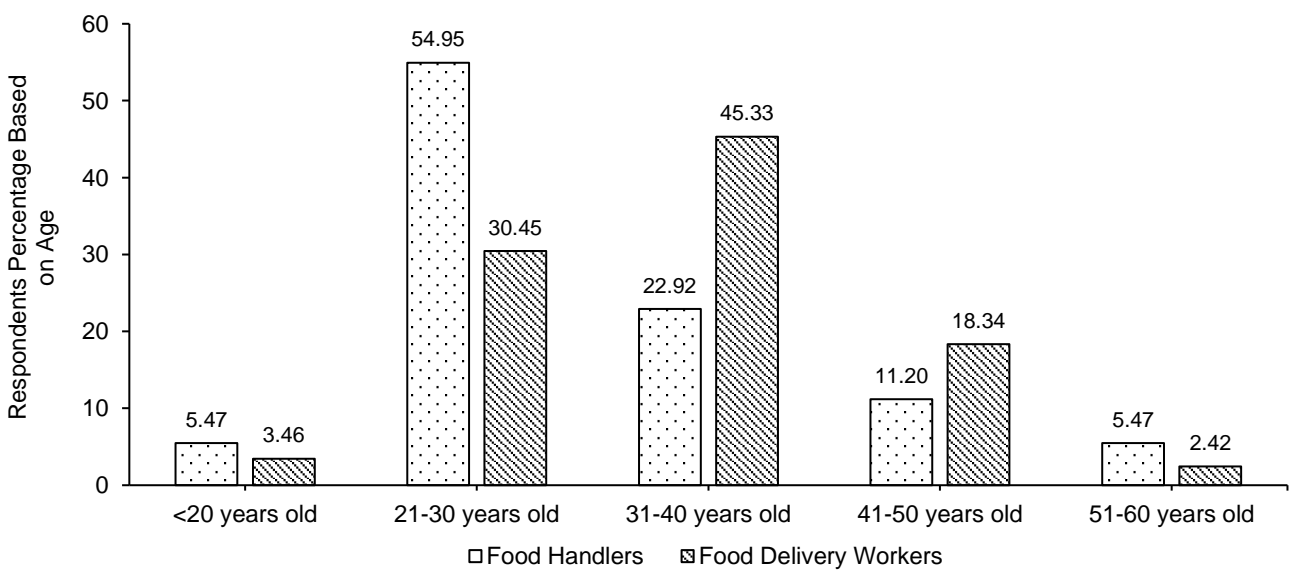


Figure 2. Age-based distribution of respondent percentages

Data in the gender category are presented in Figure 3, which shows that FH were predominantly female, with 208 individuals (53.89%) compared to 178 males (46.11%). This result aligns with the study by Ellinda-Patra *et al.* (2020), which reported that more FH is female than male. FDW, on the other hand, were predominantly male, totaling 249 individuals (86.16%), while females numbered 40 (13.84%).

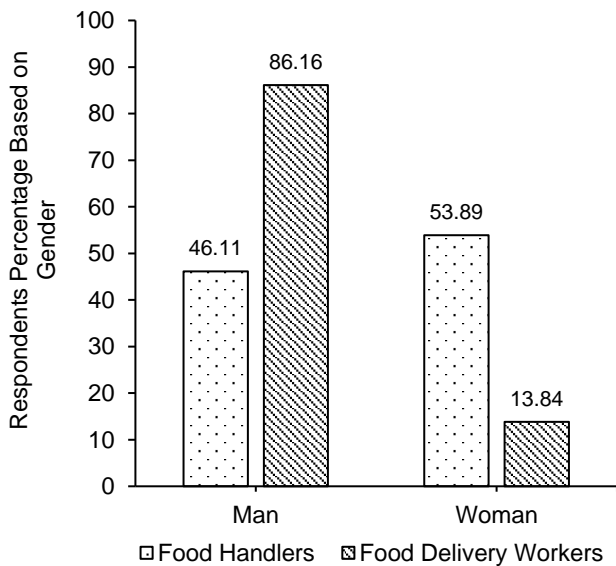


Figure 3. Gender-based distribution of respondent percentages

The education level of FH was dominated by academy/college graduates, totalling 237 individuals (61.40%), while the fewest were elementary school graduates or those with no schooling, with six people each (1.55%). For FDW, the majority were high school graduates or equivalent, totaling 188

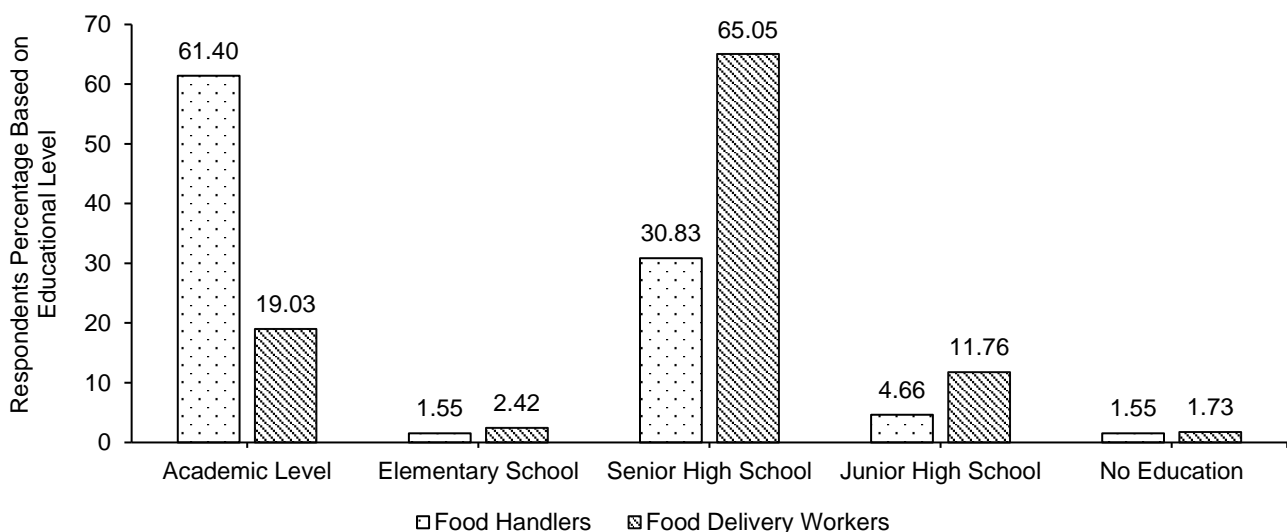


Figure 4. Education-based distribution of respondent percentages

people (65.05%), while the fewest had no education experience, with five individuals (1.73%). This result aligns with a study by the Demographic Institute of the Faculty of Economics and Business, University of Indonesia (2020), which reported that 75% of Gojek driver-partners are high school graduates or equivalent. Figure 4 shows the data based on the educational level of respondents.

Measurement model

Measurement models encompass implicit or explicit models that link the latent variable to its indicators. The quality of measurement is confirmed by assessing convergent validity and discriminant validity. Convergent validity is evaluated through factor loading, average variance extracted (AVE), and composite reliability (CR). Factor loading denotes the degree to which the specific factor accounts for the variance in a variable. Elevated factor loading values indicate that a factor extracts more variance from a variable (Maskey *et al.*, 2018).

AVE quantifies the variance captured by a construct compared to the variability caused by measurement error. Based on the results depicted in Table 2, all questions in the questionnaire have met the requirements. An AVE value exceeding 0.5 suggests that the measurement tool more accurately reflects the characteristics of the variables in the model (Gu *et al.*, 2019). A CR value surpassing 0.7 indicates a high level of consistency in the measurement tools (Hair *et al.*, 2014). Convergent validity was evaluated by ensuring factor loadings exceeded 0.6 (Maskey *et al.*, 2018). According to Hair *et al.* (2019), AVE should exceed 0.5, while according to Hair *et al.* (2014), composite reliability should exceed 0.7. Overall, these findings suggest adequate reliability and convergent validity.

The measurement model is additionally assessed through discriminant validity (DV), which evaluates whether the constructs in the model are strongly correlated. This study determined DV using the heterotrait-monotrait correlation ratio (HTMT) method. Previous methodological studies have recommended checking whether the HTMT is significantly less than one or below 0.850. Table 3 displays the results of discriminant validity using the HTMT correlation ratio. HTMT ratios below 0.850 suggest this measurement model exhibits favorable divergent validity (Henseler *et al.*, 2015).

Structural model

The structural model, also known as the inner model, refers to the relationship framework among the latent variables within the model. It is assessed based on estimates and hypothesis tests concerning the causal relationships between exogenous and endogenous variables as specified in the path diagram. This association is illustrated by the beta value, which signifies a direct relationship between endogenous variables. Standard errors and test statistics for the pertinent parameters are estimated in SmartPLS using the bootstrapping option. Significance testing was performed to ascertain the impact of the input variable on the output variable. If the *p*-value is less than α , the input variable significantly affects the output variable.

The FH path analysis findings are depicted in Table 4 and Figure 5. The analysis reveals that knowledge has a positive influence ($\beta= 0.959$; $p< 0.05$), and attitudes ($\beta= 0.546$; $p<0.05$) are positively associated with COVID-19 preventive practices. However, no significant positive relationship was found between knowledge ($\beta= 0.228$; $p>0.05$) and COVID-19 preventive practices. Therefore, only two hypotheses can be validated. This model's determination coefficient (R^2) stands at 0.151 and 0.346, suggesting that the variables account for 15.1% and 34.6% of the variance in attitudes and practices,

respectively. Moreover, with an R^2 value exceeding 0.20, the model is considered to have high predictive precision for studying consumer behaviour (Hair *et al.*, 2014).

The outcomes of the path analysis for FDW participants are illustrated in Table 4 and Figure 1. It is evident that both knowledge ($\beta= 0.756$; $p<0.05$) and attitudes ($\beta= 0.410$; $p<0.05$) exhibited positive associations with COVID-19 preventive practices. However, a notable positive correlation between knowledge ($\beta= 0.069$; $p<0.05$) and COVID-19 preventive practices was not observed. Therefore, only two hypotheses that were tested can be confirmed. The determination coefficient (R^2) resulting in this model stands at 0.067 and 0.174, indicating that the variables account for 6.7 and 17.4% of the variance in attitudes and practices, respectively. These results show that the predictors are unfavourable since the R^2 value is below 0.2 (Hair *et al.*, 2014).

Discussion

This study aims to create a structural model of knowledge, attitudes, and practices regarding prevention measures against COVID-19. Respondents who meet the criteria include Food Handlers (FH) and Food Delivery Workers (FDW) living in Greater Jakarta, Indonesia. This region is situated on Java Island, which has a dense population. The elevated population density heightens the risks of COVID-19 transmission (Rocklöv and Sjödin, 2020). In densely populated areas, individuals are more likely to contract the virus, consequently facilitating the widespread transmission of COVID-19 to neighboring regions (Kang *et al.*, 2020). Research conducted in Brazil similarly revealed that the dissemination of COVID-19 is influenced by factors such as air transportation, population density, and temperature (Pequeno *et al.*, 2020). With the increasing risk of spreading the COVID-19 virus, it is necessary to develop knowledge, attitudes, and practices to prevent the spread of COVID-19.

Table 2. Structural model of food handlers and food delivery workers

Variable	Food Handlers (FH)			Food Delivery Workers (FDW)		
	Loading	AVE	CR	Loading	AVE	CR
Knowledge	> 0.710	0.518	0.762	> 0.750	0.675	0.805
Attitude	> 0.640	0.679	0.950	> 0.750	0.704	0.955
Practices	> 0.630	0.502	0.889	> 0.690	0.592	0.910

Table 3. HTMT correlation ratio

Variable	Food Handlers (FH)			Food Delivery Workers (FDW)		
	Knowledge	Attitude	Practices	Knowledge	Attitude	Practices
Knowledge		0.545				
Attitude				0.298		
Practices	0.438	0.629		0.297	0.417	

Table 4. Assessment structural model of food handlers and food delivery workers

Hypothesis	Description	Food Handlers (FH)				Food Delivery Workers (FDW)			
		β -Value	p -Value	R ²	Decision	β -Value	p -Value	R ²	Decision
Hypothesis 1	Knowledge → Attitude	0.959	0.000	0.151	Accepted	0.756	0.000	0.067	Accepted
Hypothesis 2	Attitude → Practices	0.546	0.000		Accepted	0.410	0.000		Accepted
Hypothesis 3	Knowledge → Practices	0.228	0.062	0.346	Not accepted	0.069	0.744	0.174	Not Accepted

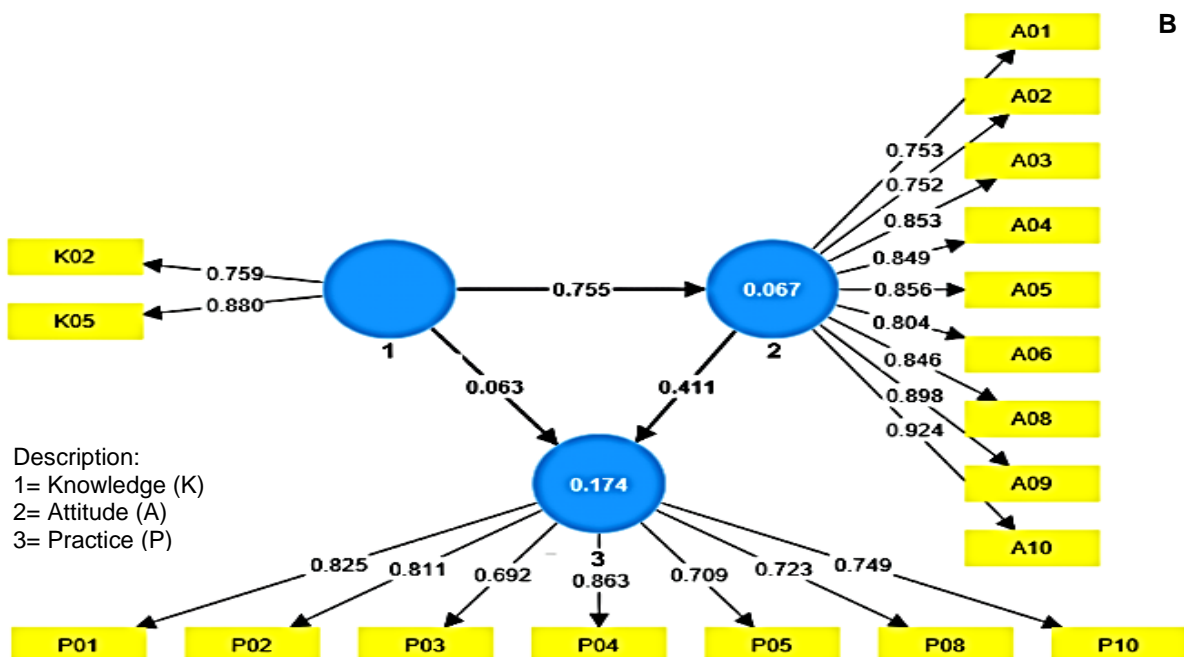
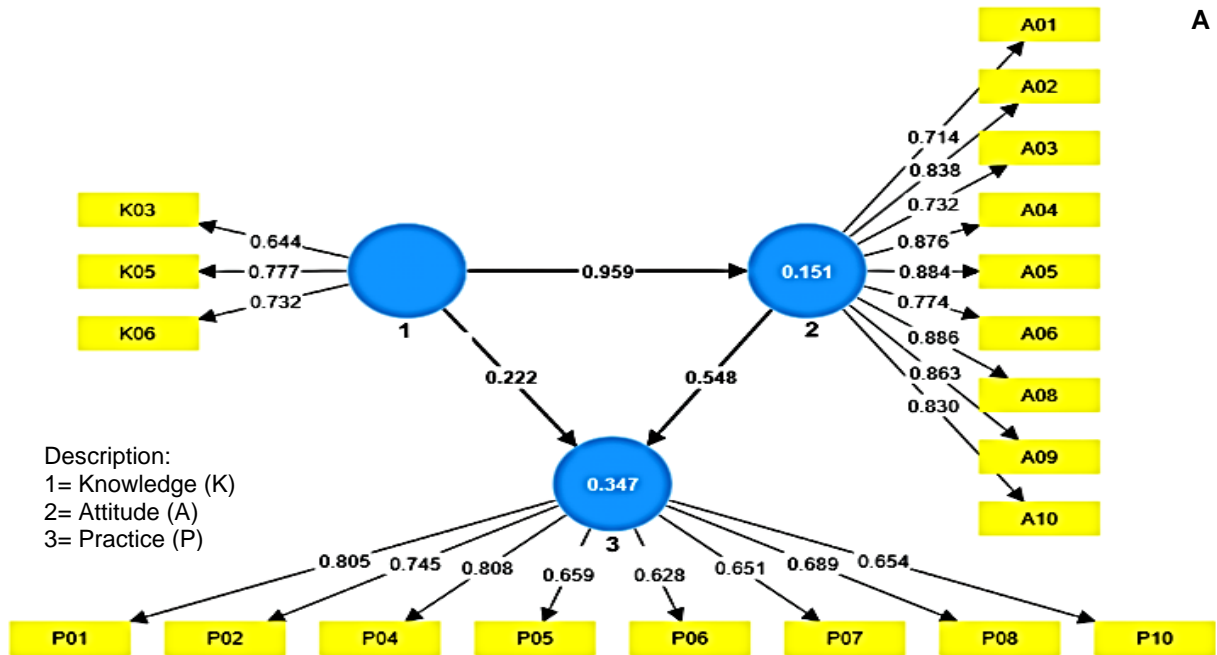


Figure 5. Structural model of COVID KAP on food handlers (A) and food delivery workers (B)

Disparities were observed in the outcomes between FH and FDW. Our analysis indicated that the FH model achieved an R^2 value of 0.346, indicating that knowledge and attitude collectively account for 34.6% of the variance in COVID-19 preventive practices. In contrast, for FDW, knowledge and attitude only explain 17.4% of the variance. As per Hair *et al.* (2014), an R^2 value of 0.20 is deemed high for consumer behavioral studies. Therefore, the R^2 value observed in this study was high for FH but low for FDW.

Knowledge exerts a substantial and most pronounced influence on the attitudes of FH ($\beta=0.959$; $p<0.05$) and FDW ($\beta=0.756$; $p<0.05$). Most respondents are well-informed about proper hand hygiene, wearing masks, and physical distancing. This discovery aligns with the research conducted by Lee *et al.* (2021), which investigated knowledge, attitudes, and practices (KAP) regarding COVID-19 in South Korea. Individuals with more excellent knowledge exhibited increased confidence in personal hygiene practices, such as wearing masks and maintaining hand hygiene, and higher confidence in avoiding crowded places.

Recently, several studies have been conducted regarding knowledge and its relationship to COVID-19 preventive practices. Zhong *et al.* (2020) investigated the knowledge, attitudes, and practices concerning COVID-19 among Chinese citizens during the initial surge of the outbreak in China. The study found that individuals with relatively higher socioeconomic status, particularly women, demonstrated considerable knowledge about COVID-19. They also displayed optimistic attitudes and adhere to appropriate practices related to COVID-19 (Zhong *et al.*, 2020). Therefore, health education initiatives focused on enhancing COVID-19 awareness proved beneficial in fostering positive attitudes and sustaining proper practices among Chinese residents.

Another research study also investigates the knowledge, attitudes, and practices related to COVID-19 among the Malaysian population (Azlan *et al.*, 2020). The study reveals a high level of knowledge among the participants, with most individuals expressing positive attitudes toward effectively controlling COVID-19. Furthermore, many participants took precautionary measures such as avoiding gatherings and maintaining adequate hand hygiene in the week leading up to the implementation of movement restrictions. A study conducted in Indonesia examined the relationship between knowledge and practices regarding COVID-19 prevention. The findings showed that most of the public understood the virus's various aspects, including its symptoms, transmission modes, high-risk groups, isolation and quarantine protocols, and proper use of disinfectants. However, there was a notable gap in the understanding between enhancing immunity and

preventing COVID-19 transmission among the population (Pascawati and Satoto, 2020).

In this study, attitudes have a significant effect on FH ($\beta=0.546$; $p<0.05$) and FDW ($\beta=0.410$; $p<0.05$) on prevention practices of COVID-19. It can be said that respondents' attitudes and beliefs positively influence prevention practices for COVID-19. If respondents believe that washing hands, using masks, and physically distancing are important, they will implement it properly. This result aligns with research by Gao *et al.* (2020) and Wong *et al.* (2020), indicating that attitudes play a crucial role in predicting preventive behaviors. Particularly concerning food delivery workers, maintaining personal hygiene, storing food at appropriate temperatures, preventing cross-contamination, ensuring thorough cooking, and utilizing safe water and raw materials are the main factors contributing to preventing COVID-19 transmission (Mutaqin *et al.*, 2023).

Based on the research, the result obtained shows that knowledge does not have a significant effect on practices of FH ($\beta=0.228$; $p>0.05$) and FDW ($\beta=0.069$; $p>0.05$). This result aligned with a few studies that showed practices towards preventing COVID-19 transmission had lower scores than knowledge and attitude. According to a study conducted in Indonesia, out of 483 undergraduate students surveyed, 99.5% exhibited good knowledge, 87.9% displayed positive attitudes, and only 67% demonstrated good practices (Limbong *et al.*, 2021). Another study in Southwest Ethiopia published that 81.8% of students had knowledge towards COVID-19, 70.9% had a positive attitude towards COVID-19, and only 47.0% of the respondents had good practices in preventing COVID-19 transmission (Yesuf and Abdu, 2022).

Two factors affect the execution of measures aimed at curbing the transmission of COVID-19: preventive practices and healthy lifestyle choices (Saefi *et al.*, 2020). Factors originating from within individuals, such as knowledge, emotions, motivation, and perception, influences their ability to uphold a healthy lifestyle. According to a study in Indonesia, the respondents were aware of the practices to prevent the transmission of COVID-19; however, they did not show a good health lifestyle, such as quitting smoking. This behavior was caused by the assumptions of the respondents that smoking had no relationship with the spread of COVID-19 (Pascawati and Satoto, 2020).

Knowledge holds significant importance in improving public adherence to preventive measures. Abundant information regarding COVID-19 is readily available through diverse online platforms. However, the rapidly spreading global epidemic misinformation via social media and other platforms can cause serious problems. The term "infodemic" denotes potentially detrimental information disseminated via

the internet or other media platforms. The infodemic, characterized by rapid and excessive dissemination of misinformation and disinformation, poses significant challenges in the digital age (Zielinski, 2021). Many social media users uncritically accept false information, while only a small fraction critically evaluate its validity using logical reasoning (Al-Zaman, 2021; Shahi *et al.*, 2021). This tendency towards uncritical acceptance underscores the risks associated with the rapid spread of unreliable information.

The widespread "infodemic" phenomenon can influence community's trust and knowledge when it comes to implementing the practices of preventing COVID-19 transmission. Studies conducted in Saudi Arabia state that education programs are needed to increase the level of awareness of health workers about medical misinformation (Alotiby and Al-Harbi, 2021). Level of awareness will influence practices in dealing with misinformation regarding the prevention of COVID-19.

Although the COVID-19 pandemic has subsided, the findings of this study remain highly relevant for addressing similar public health crises in the future. The structural model and insights into knowledge, attitudes, and preventive practices among food handlers and food delivery workers provide a framework for understanding the behavior in high-risk populations. These results can inform the development of targeted educational campaigns, policy interventions, and workplace health protocols to mitigate the spread of infectious diseases in similar scenarios. By bridging the gap between knowledge and practice, this study offers actionable strategies for enhancing compliance with preventive measures, thereby strengthening public health preparedness for future pandemics or localized outbreaks.

CONCLUSION

This study focuses on constructing a structural model to assess knowledge, attitudes, and practices for COVID-19 prevention, specifically among Food Handlers (FH) and Food Delivery Workers (FDW) in Greater Jakarta. This region's high population density poses heightened COVID-19 transmission risks, which is addressed by examining the influence of knowledge and attitudes on the preventive practices. Our findings indicate that knowledge and attitudes explain 34.6% of prevention practices for FH, a relatively strong influence, while explaining only 17.4% for FDW. Knowledge significantly impacts attitudes among both groups, aligning with prior research that links knowledge with confidence in personal hygiene practices. However, knowledge does not directly influence prevention practices for

either group, suggesting a gap between knowledge and behavior. Attitudes, in contrast, have a notable positive impact on the prevention practices for FH and FDW, supporting findings that attitudes are critical predictors of preventive behaviors. However, challenges arise due to knowledge gaps and lifestyle choices that counteract preventive measures, such as smoking, which was not perceived by respondents as a COVID-19 risk. Another barrier identified is the "infodemic" effect, which spreads misinformation through social media. This misinformation spreading among people highlights a need for improved public education. Studies suggest that awareness and education programs are vital to counter misinformation and foster accurate knowledge for COVID-19 prevention. The insights from this research are relevant not only to COVID-19 but can also guide responses to future public health crises involving communicable diseases. By addressing gaps in knowledge-to-practice translation and leveraging attitude-driven behavioral changes, policymakers and public health officials can develop more effective strategies for mitigating disease transmission in both large—and small-scale outbreaks.

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