Epidemiology and Society Health Review | ESHR
Vol. 5, No. 2, 2023, pp. 76-89 ISSN 2656-6052 (online) | 2656-1107 (print)

Research Article

Health Belief Model Application on Food Safety Behavior of Bantul Beach Tourism Culinary Food Handlers

Asep Rustiawan[1]*, Ichtiarini Nurullita Santri[1], Yohane Vincent Abero Phiri[2]

[1] Faculty of Public Health, Universitas Ahmad Dahlan, Yogyakarta, Indonesia
[2] School of Public Health, College of Public Health, Taipei Medical University, Taipei, Taiwan

*** Correspondence:** asep.rustiawan@ikm.uad.ac.id. Phone: +6285743847969

Received 13 December 2022; Accepted 15 August 2023; Published 05 September 2023

ABSTRACT

Background: Maintaining food safety is very important to reduce the incidence of foodborne diseases. Previous studies have shown that food safety is related to the healthy behavior of food handlers, while healthy behavior is related to their beliefs and perceptions. The Health Belief Model (HBM) is a theory with a concept of individual reasons for carrying out healthy behaviors based on the perception of disease threats and efforts to improve behavior when facing threats. This study aims to predict and analyze the effect of variables based on the HBM construct on food safety behavior.

Method: A total of 80 food handlers from all seafood stalls on the Bantul coast were interviewed face to face using a printed questionnaire regarding seriousness, vulnerability, benefits, barriers, a stimulus to action, and self-efficacy. The food safety behavior of food handlers was observed using observation sheets. Data were evaluated using Structural Equation Model-Partial Least Square (SEM-PLS) Version 3.0.

Results: HBM can predict 35.1% of food handlers' food safety behavior variance in the Bantul beach tourism culinary area (R^2 adjusted = 0.351). Of all the HBM construct variables analyzed, two variables had a significant effect, namely the stimulus-to-act variable with a path coefficient value ($\beta = 0.305$, $p = 0.009 < 0.05$) and the seriousness variable ($\beta = 0.302$, $p = 0.045 < 0.05$).

Conclusion: HBM succeeded in predicting the food safety behavior of food handlers in tourist culinary delights in Bantul, Yogyakarta, Indonesia. The stimulus-to-action variable was the strongest predictor positively affecting food handlers' food safety behavior, followed by the seriousness variable.

Keywords: Bantul beach culinary; Food safety; HBM theory; SEM-PLS

10.26555/eshr.v5i2.6996

INTRODUCTION

The south coast of Bantul District has become a tourist destination increasingly attracting tourist. The results of a survey by researchers at the end of 2020 showed at least 80 culinary stalls operating along the Bantul coast. With the growing development of this culinary business, the tourist location of the Bantul beach has turned into a busy culinary area on the Bantul beach. However, street food is also a cause of severe public health problems.[1,2] The results of previous studies showed that 40% of food handlers processed food unsafely. [3] Other researchers also reported that most of the existing culinary stalls needed more facilities to process food healthily, and the behavior of food handlers needed to be more hygienic.[4,5] Healthy behavior is related to beliefs and perceptions of food safety. Rosenstock states that individual beliefs influenced by their self-perception of vulnerability, seriousness, benefits, barriers, self-efficacy, and external encouragement or stimulus to act will shape behavior toward food safety.[6]

HBM effectively predicts strong predictors of food safety (FS) behavior.[7,8] Nevertheless, based on the results of a literature search, research has yet to be conducted in the culinary area of the Bantul beach tourism on applying this theory by using SEM analysis to measure the influence and predict strong predictors of the HBM construct variable on FS behavior. Knowledge related to this is useful in developing food safety improvement programs following local conditions to produce culinary processed food for beach tourism that is nutritious and safe for consumption. Thus, research to measure the magnitude of the influence and predict the determinants of the HBM construct variable on the FS behavior of food handlers in the Bantul beach tourism culinary area is very important.

This study aims to analyze the magnitude of the influence and predict strong predictors of perceived vulnerability, seriousness, benefits, barriers, self-efficacy, and stimulus to act on the FS behavior of food handlers in the culinary tourism of the Bantul coast. The alternative hypothesis is formulated and illustrated in Figure 1 based on HBM Theory.[6]

H1: Vulnerability, seriousness, benefits, barriers, self-efficacy, and stimulus-to-act variables have a significant positive effect on FS behavior variables.

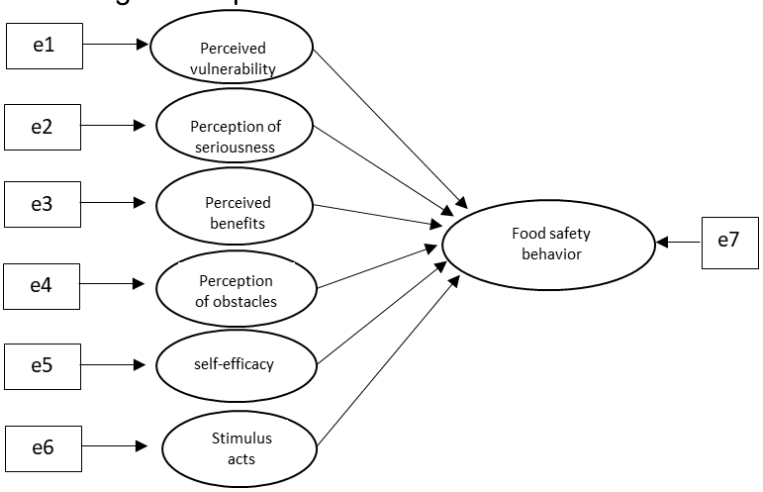

Figure 1. Preliminary SEM Model: Structural Relations of Exogenous Variables and Endogenous Variables

 10.26555/eshr.v5i2.6996

METHOD

Research Design and Sampling Techniques

The research was carried out with a cross-sectional design.[9] Exogenous variable data (vulnerability, seriousness, benefits, barriers, self-efficacy, and stimulus to act) and endogenous variables (food safety behavior) were collected simultaneously. The total population of culinary stalls on the Bantul Yogyakarta beach tour is 80 stalls; each shop is represented by one food handler as a respondent, so 80 food handlers are obtained as respondents.[10] Respondents were selected through inclusion and exclusion criteria according to the research objectives.

Questionnaire Design

The questionnaire developed consists of the characteristics of the respondents and six exogenous variables of the HBM construct, namely perceptions of vulnerability, seriousness, benefits, barriers, stimulus to action, and self-efficacy, as well as one endogenous variable, namely food safety behavior. Exogenous variables are measured with eight statements so that 48 reports are obtained. FS behavior variables are measured by observation using the Food Safety Score (FSS) form developed by Mudjajanto.[11] The questionnaire uses a 5-point Likert scale from point 1 (strongly disagree) to point 5 (strongly agree).

The questionnaire was validated at the Kulonprogo beach tourism culinary location in Yogyakarta, involving 32 respondents. Based on the validity test, an invalid statement was obtained, which was issued, namely, one report on the stimulus to act. The results of the final analysis got 47 valid statements (Corrected Item-Total Correlation test results > 0.20, and Cronbach's Alpha results = 0.949 > 0.6(12).[12] Furthermore, food handlers' perceptions of vulnerability, seriousness, benefits, barriers, stimulus to action, and self-efficacy questionnaires that were valid and reliable were used for research.

Data collection procedure

Face-to-face interviews collected data to evaluate perceptions of vulnerability, seriousness, benefits, barriers, stimulus to action, and self-efficacy. It took between 30-45 minutes to interview each respondent. The data of FS behavior was evaluated using non-participatory observations made when processing food. The time required is between 45-60 minutes for each respondent. This research received ethical approval from Ahmad Dahlan University Research Ethics Committee No. 012208112 on August 24, 2022.

Statistical analysis

The validity and reliability of the instrument were evaluated by Measurement Model Evaluation using SEM analysis with SmartPLS 3.0.[13] The influence relationship between perceptions of vulnerability, seriousness, benefits, barriers, stimulus to action, and self-efficacy on FS behavior was analyzed by Structural Model Analysis using SEM-PLS at a 95% confidence level through Goodness of Fit Analysis and Analysis of hypothesis testing.

RESULTS

Characteristics of Respondents

Respondents in this study were food handlers who made direct contact with food, totaling 80 people and representing every culinary stall located on the south coast of Bantul District. The respondents' characteristics in this study were gender, age, education level, length of work experience, and beach location, which were obtained through interviews.

Table 1. Frequency Distribution of Respondents Based on Gender, Age, Education, Length of Work, and Beach Location

Characteristics of Respondents	Amount	Percentage (%)
Gender		
Man	0	0%
Woman	80	100%
Age		
Adult (25 years-45 years)*	54	67.50%
Elderly ≥46 years**	26	32.50%
Education		
Junior High School	45	56%
SMA/SMK	34	43%
Undergraduate diploma	1	1%
Length of work (years)		
Average	9.9	
Minimum	7.7	
Maximum	15.3	
Beach Location		
Parangtritis	19	23.75%
Depok	26	32.50%
Samas	2	2.50%
Goa Cemara	5	6.25%
Kuwaru	6	7.50%
Baru	22	27.50%

Information: ** Youngest age 25 years*
*** Oldest 50 years old*

Table 1 shows that all respondents are female. The most age group is the adult group (25-45 years), as much as 67.5%. The youngest respondent is 25 years old, and the oldest is 50. The average length of work as a food handler is 9.9 years, with a junior high school education level (56%) and only 1% above senior high school. Most respondents came from Depok Beach (32.50%), and the least came from Samas Beach (2.50%).

Measurement Model Evaluation

The measurement model undergoes evaluation through validity and reliability tests. The validity test assesses construct validity, examining whether the chosen indicators are suitable for measuring latent variables. Conversely, the reliability test focuses on assessing the consistency of indicators and whether the statement items used as indicators yield consistent responses from participants. The validity test includes considerations of Convergent Validity, as indicated by the Loading Factor and Average Variance Extracted (AVE) values, as well as Discriminant Validity, measured through Cross-Loading and Fornell-Larcker Criterion values.

The evaluation of the reliability test is presented through Composite Reliability and Cronbach's Alpha values. The initial structural model proposed is depicted in Figure 2 below.

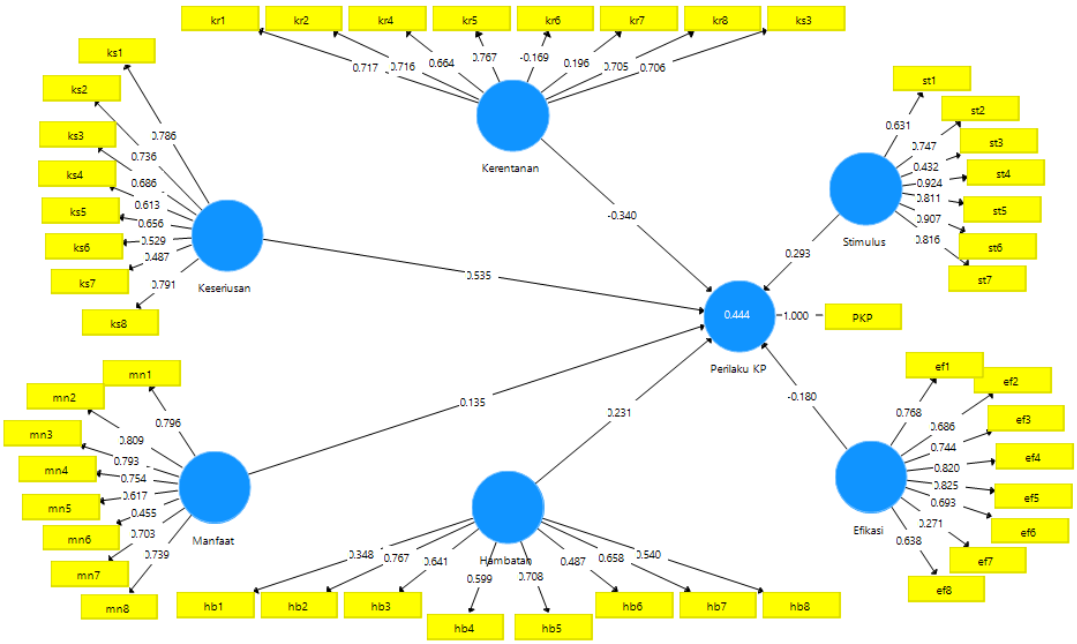

Figure 2. Initial structural model of the relationship between vulnerability, seriousness, benefits, barriers, stimulus to action, self-efficacy, and the food safety behavior of food handler's culinary tourism in Bantul

Based on Figure 2 above, there are indicator items that have a Loading Factors value of <0.7 and are then discarded, namely: vulnerability variables (4,6,7) seriousness (3,4,5,6,7); benefit variable (5,6); obstacle variables (1,3,4,6,7,8); stimulus variable (1,3); and self-efficacy variables (2,6,7,8). Furthermore, the initial structural model evaluated for its Loading Factor was tested again, and a second model was produced, as shown in Figure 3. All indicators have a Loading Factor value of > 0.7, so it meets the requirements. AVE values for all variables > 0.5 so that the model is said to be convergently valid.

Table 2 displays the loading factor values of the manifest indicators for all variables, which are consistently above 0.70, ranging from 0.715 to 0.930. Additionally, the AVE values for all variables are consistently above 0.50, ranging from 0.566 to 1.000. These results confirm the convergent validity of all indicators.[14] Table 3 presents the cross-loading values for each manifest indicator of every variable, all of which exceed 0.70 and surpass the correlations with other latent variables. Similarly, the data in Table 4 reveals Fornell-Larcker Criterion values greater than 0.70, indicating stronger distinctions than the correlations with other latent variables. This affirms the discriminant validity of all analyzed manifest indicators (14). Furthermore, Table 5 demonstrates that all Cronbach's Alpha values exceed 0.70, ranging from 0.717 to 1.000, and the Composite Reliability value exceeds 0.70, ranging from 0.798 to 1.000. These findings confirm the reliability of all analyzed indicators.[15]

 10.26555/eshr.v5i2.6996

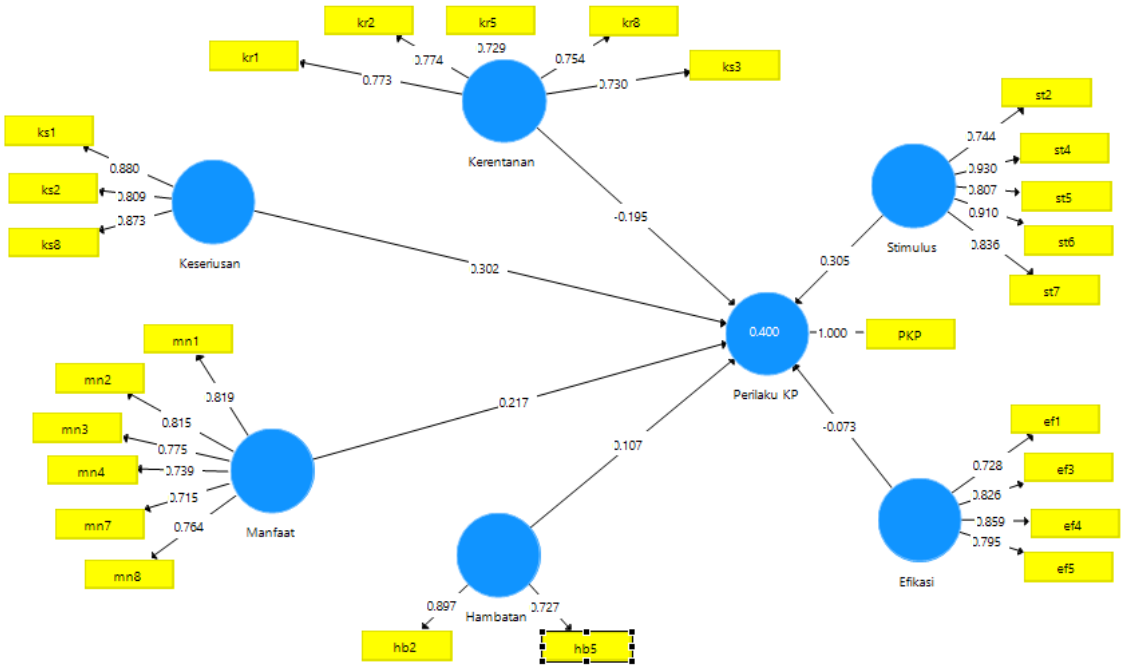

Figure 3. The final structural model of the relationship between vulnerability, seriousness, benefits, barriers, stimulus to action, self-efficacy, and the food safety behavior of food handler's culinary tourism in Bantul

Structural Model Analysis

Figure 3 illustrates the structural model, which describes the causal relationships between latent variables constructed based on established theory. The variables, namely vulnerability, seriousness, benefits, obstacles, stimulus to action, and self-efficacy, exert direct influences on FS behavior variables. Structural Model Analysis aims to ascertain the relationships between latent (exogenous) and endogenous variables. In this study, we specifically investigate direct relationships. The subsequent analysis of the structural model will be elaborated upon, including discussions on the Goodness of Fit Model and hypothesis testing.

Model Feasibility Analysis (Goodness of Fit)

The Model Feasibility Analysis aims to determine the degree to which empirical data align with the theoretically structured model depicting relationships between variables. Various indices were employed to assess the model's feasibility, as outlined in Tables 2, 3, 4, and 5. Table 6 presents the data, indicating an R-squared adjusted value of 0.351 with a p-value of 0.000 ($p < 0.05$). This suggests that the model can account for 35.1% of the variability in FS behavior. Chin categorizes R-squared values of 0.67 as substantial (strong) and 0.33 as moderate.[16] Thus, the R-squared value of 0.351 in this study falls into the moderate range, signifying that the structural model constructed is sufficiently robust for predicting FS behavioral intentions. To validate the overall performance of both the measurement model and the structural model, we calculate the Goodness of Fit (GoF) using the following formula:

 10.26555/eshr.v5i2.6996

$$GoF = \sqrt{\overline{AVE} \times \overline{R^2}}$$

$$= \sqrt{0.703 \times 0.351}$$

$$= 0.497$$

Table 2. Loading Factors and AVE values of the manifest indicators for all HBM variables

Manifest	HBM Variables						
	Efficacy	Obstacle	Vulnerability	Seriousness	Benefit	Stimulus	Food safety behavior (FSB)
fsb							1.000
ef1	0.728						
ef3	0.826						
ef4	0.859						
ef5	0.795						
hb2		0.897					
hb5		0.727					
kr1			0.773				
kr2			0.774				
kr5			0.729				
kr8			0.754				
ks1				0.880			
ks2				0.809			
ks3				0.730			
ks8				0.873			
mn1					0.819		
mn2					0.815		
mn3					0.775		
mn4					0.739		
mn7					0.715		
mn8					0.764		
st2						0.744	
st4						0.930	
st5						0.807	
st6						0.910	
st7						0.836	
AVE	0.646	0.667	0.566	0.730	0.596	0.719	1.000

 10.26555/eshr.v5i2.6996

Table 3. Cross Loading Value of the manifest indicators for all HBM variables

Manifest	HBM Variables						
	Efficacy	Obstacle	Vulnerability	Seriousness	Benefit	Food safety behavior	Stimulus
fsb	0.360	0.439	0.324	0.560	0.522	**1.000**	0.526
ef1	**0.728**	0.433	0.580	0.517	0.529	0.226	0.468
ef3	**0.826**	0.383	0.523	0.428	0.494	0.351	0.421
ef4	**0.859**	0.551	0.538	0.527	0.483	0.336	0.545
ef5	**0.795**	0.436	0.591	0.544	0.608	0.173	0.533
hb2	0.465	**0.897**	0.433	0.563	0.440	0.423	0.406
hb5	0.464	**0.727**	0.483	0.502	0.602	0.273	0.421
kr1	0.458	0.438	**0.773**	0.480	0.438	0.195	0.431
kr2	0.608	0.438	**0.774**	0.526	0.529	0.221	0.423
kr5	0.425	0.388	**0.729**	0.475	0.483	0.230	0.395
kr8	0.558	0.497	**0.754**	0.587	0.465	0.199	0.479
ks1	0.529	0.652	0.593	**0.880**	0.621	0.570	0.649
ks2	0.527	0.474	0.541	**0.809**	0.633	0.327	0.423
ks3	0.500	0.332	0.730	**0.487**	0.414	0.322	0.401
ks8	0.522	0.506	0.601	**0.873**	0.722	0.482	0.553
mn1	0.515	0.517	0.459	0.651	**0.819**	0.522	0.529
mn2	0.627	0.545	0.539	0.672	**0.815**	0.410	0.477
mn3	0.459	0.460	0.428	0.549	**0.775**	0.375	0.357
mn4	0.483	0.408	0.615	0.488	**0.739**	0.364	0.469
mn7	0.575	0.456	0.525	0.616	**0.715**	0.264	0.488
mn8	0.327	0.414	0.342	0.572	**0.764**	0.409	0.349
st2	0.470	0.378	0.421	0.494	0.485	0.292	**0.744**
st4	0.574	0.465	0.482	0.617	0.581	0.563	**0.930**
st5	0.480	0.440	0.545	0.608	0.459	0.302	**0.807**
st6	0.563	0.524	0.498	0.619	0.529	0.530	**0.910**
st7	0.449	0.287	0.480	0.440	0.378	0.432	**0.836**

Source: SmartPLS Program Data Output Version 3.0

Table 4. Fornell-Larcker Criterion Values of the manifest indicators for all HBM variables

	Efficacy	Obstacle	Vulnerability	Seriousness	Benefit	Food safety behavior	Stimulus
Efficacy	**0.804**						
Obstacle	0.560	**0.816**					
Vulnerability	0.679	0.545	**0.752**				
Seriousness	0.611	0.649	0.678	**0.855**			
Benefit	0.636	0.606	0.617	0.766	**0.772**		
FS behavior	0.360	0.439	0.324	0.560	0.522	**1.000**	
Stimulus	0.600	0.496	0.564	0.653	0.575	0.526	**0.848**

Source: SmartPLS Program Data Output Version 3.0

 10.26555/eshr.v5i2.6996

Table 5. Cronbach's Alpha and Composite Reliability Values of the indicators for all HBM variables

	Cronbach's Alpha	Composite Reliability
Efficacy	0.823	0.879
Obstacle	0.717	0.798
Vulnerability	0.813	0.867
Seriousness	0.821	0.890
Benefit	0.865	0.898
FS behavior	1.000	1.000
Stimulus	0.903	0.927

Source: SmartPLS Program Data Output Version 3.0

The GoF is considered small when its value falls within the range of 0.00 to 0.25, moderate when it falls within the range of 0.25 to 0.36, and large when its value exceeds 0.36. Consequently, the value of 0.497 falls into the category of a large GoF. Overall, the combined performance of the measurement model and the structural model hypothesized in this study aligns well with the empirical data and can be accepted.

Table 6. R Square adjusted value

	Original Sample (O)	Sample Means (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
FS behavior	0.351	0.400	0.095	3.679	0.000

Source: SmartPLS Program Data Output Version 3.0

Hypothesis Test Analysis

Hypothesis testing analysis is conducted once the theoretically developed structural model is deemed feasible, indicating its representativeness and alignment with empirical data. In this study, hypothesis testing analysis focused on examining the relationships between the variables outlined in the structural model presented in Figure 3. Additionally, it involved the calculation of statistical t-values and p-values to assess the direct influence between latent variables, as detailed in the path coefficient table derived from the SmartPLS bootstrapping analysis results, as presented in Table 7.

Table 7. Summary of the results of hypothesis testing the direct effect of the variables

	Original Sample (O)	Sample Means (M)	T Statistics (|O/STDEV|)	P Values
Efficacy -> FS Behavior	-0.073	-0.096	0.533	0.297
Barriers -> FS Behavior	0.107	0.109	0.839	0.201
Vulnerability -> FS Behavior	-0.195	-0.145	1.288	0.099
Seriousness -> FS Behavior	0.302	0.257	1.695	0.045
Benefits -> FS Behavior	0.217	0.237	1.235	0.108
Stimulus -> FS Behavior	0.305	0.320	2.377	0.009

The path coefficient of the structural model studied is shown in Figure 3, and the data in Table 7 indicates the strength of the direct relationship between variables. Two of the six exogenous variables analyzed had a p-value <0.05, meaning a significant effect, namely the seriousness variable and the stimulus variable to act. Among the two critical variables, the stimulus variable for action has the most considerable path coefficient ($\beta = 0.305$, $p = 0.009<0.05$), followed by the seriousness variable ($\beta = 0.302$, $p = 0.045<0.05$). This means that the stimulus variable for action is the strongest predictor that has a positive effect on FS behavior from food handlers, followed by the seriousness variable, which also positively impacts FS behavior. Other variables in this study have path coefficient values that are not significant. Thus, it can be concluded that the research hypothesis can be accepted as a whole except for the variables of vulnerability, benefits, barriers, and self-efficacy.

DISCUSSION

This research assessed the FS behavior of food handlers and relevant factors according to HBM in the culinary area of Bantul beach tourism. Overall, the results of this study were seen from several variables, namely: perceived vulnerability variables, perceived seriousness variables, perceived benefits variables, perceived barriers variables, self-efficacy variables, and stimulus-to-act variables directly influencing FS behavior variables. Of the various variables examined, the seriousness variable and the stimulus variable have a significant favorable influence on FS behavior. Food handlers who believe FS behavior can cause severe problems if not done correctly are a decisive driving factor in realizing FS behavior. If the belief increases, the actualization of FS behavior will also increase. Likewise, the stimulus will be a strong driver in learning FS behavior. If the catalyst for action obtained by food handlers increases, the actualization of FS behavior will increase.

The level of seriousness/severity positively affects FS behavior, following Handson et al.[17] state that the perceived seriousness/severity of the foodborne disease is positively related to the two measurable dimensions of FS behavior, sanitation and cross-contamination. Those who are more aware of the risk of FS will have better food handling practices. An increase in perceived vulnerability can result in more remarkable behavior charges when accompanied by an increase in perceived seriousness/severity.[18] So, this study shows that perceived seriousness/severity is essential in maintaining the behavior and attitudes related to FS behavior.

Food handlers' beliefs about the seriousness of FS behavior are influenced by socio-cultural background/individual characteristics. As stated by Sjoberg and Wachinger et al., several factors, such as knowledge, experience, attitudes, and emotions, can influence personal thoughts and judgments regarding the seriousness and acceptance of risk in the FS management system.[19,20]

It is further said that the level of knowledge of food handlers significantly shapes their perceptions of various aspects of proper food handling practices. These perceptions include the expected benefits of a commitment to acceptable food handling practices, perceived barriers to such commitment, and risks scheduled from food handling malpractices. The correlation test results also show that although knowledge positively affects food handlers' beliefs about the benefits and risks, knowledge has a weaker negative effect on their beliefs

about barriers.[21] Experts recommend implementing future food safety educational interventions through a behavioral change theoretical framework.[22,23] Education level is essential to understanding and developing appropriate training tools in food safety. Academic levels vary from illiterate to primary school or higher studies, so it can help determine the approach needed.[24]

The stimulus variable (cues to action) positively influences FS behavior; in line with Pie, [25] a stimulus to action is defined as a factor that influences individuals to change their behavior toward implementing FS behavior. Three elements are measured in cues to action: (1) media such as mass media or print media, (2) communication such as communication between handlers and stakeholders, (3) food labels on food packaging and posters in the kitchen. [26] Those who frequently listen to the radio and watch television news about food poisoning are likelier to exhibit FS behavior.[17] Individuals can also take health-related actions if they receive external cues to act, such as educational cues to action or media messages.[26]

HBM is effective in predicting strong predictors of FS behavior.[7,8] This study showed that HBM succeeded in predicting 35.1% of the variance of FS behavior of food handlers in the culinary area of Bantul beach tourism. Of all the HBM constructs analyzed, the stimulus to act is the most influential variable on FS behavior, followed by the variable of seriousness. Other variables have no significant effect.

In another study, HBM showed 58.9% significance in the practice of food handlers. All HBM dimensions significantly contribute to explaining food handlers.[21] Among the different HBM constructs, beliefs about the expected benefits of proper food handling practices substantially contributed to the model's predictability. In contrast, food handlers' perceptions of barriers to adequate food handling had the weakest contribution.

Previous studies have shown disparities in the utilization of the HBM construct within the context of food handling. For instance, only one study[27] has delved into the role of perceived benefits in elucidating food handling practices. Conversely, a limited number of studies[17,28,29] have explored how food handlers' beliefs impact barriers to proper food handling. Simultaneously, all prior research has examined the influence of perceived risk on food handlers' practices. Food product safety is an absolute demand of consumers. Producers are responsible, so applying existing laws and developing new production techniques is critical to protect human health.[30]

The strength of this study is that it is the first study of specific FS behavior associated with six indicators of HBM along the Bantul beach resorts. In addition, this study also uses PLS analysis which is rarely used in similar studies. This study also has limitations. Namely, the number of samples is relatively small because many places to eat are closed due to the COVID-19 pandemic.

 10.26555/eshr.v5i2.6996

CONCLUSION

The research hypothesis can be accepted as a whole except for the variables of vulnerability, benefits, barriers, and self-efficacy predicted 35.1% of the FS behavior variance of food handlers in the Bantul beach tourism culinary area. The stimulus for action variable is the strongest and most significant predictor with a significant positive effect on FS behavior, followed by the seriousness variable, which also has a significant positive impact.

Declarations

Authors' contribution

AR designed the study, supervised all data analyses, and drafted the manuscript. INS drafted the manuscript. YVAP data analyzed. Each author contributed to the intellectual content of the manuscript. This manuscript has been read and approved by the authors.

Funding Statement

This project received support from the Research Institute and Community Service at Universitas Ahmad Dahlan, Yogyakarta, Indonesia, under grant number PD-156/SP3/LPPM-UAD/VII/2022.

Conflict of interest

There is no conflict of interest in this research.

REFERENCES

1. De Sousa CP. The impact of food manufacturing practices on foodborne diseases. Braz Arch Biol Technol. 2008;51(4):815–823. Retrieved March 19, 2020, from http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-89132008000400020
2. Ghosh M, Wahi S, Kumar M, Ganguli A. Prevalence of enterotoxigenic Staphylococcus aureus and Shigella spp. in some raw street vended Indian foods. Int J Environ Health Res. 2007;17(2):151–156. doi:10.1080/09603120701219204
3. Aspiani M, Rustiawan A. Relationship of knowledge, attitudes of food handlers and sanitation facilities to food safety in restaurants in the culinary tourism area of Depok beach, Bantul Regency in 2019. URECOL-11. Yogyakarta: UNISA; 2020
4. Kurniaty. Relationship between sanitation hygiene practices and Escherichia coli contamination in processed grilled fish at seafood food stalls at Depok Beach, Bantul, Yogyakarta. Journal Formil (Scientific Forum). 2017:2(2).
5. Suryani D. Existence of Grilled Pomfret Fish Germs and Grilled Cutlery. Journal of Public Health. 2015; pp:191–196.
6. Rosenstock IM. Historical Origins of the Health Belief Model. Health Education Monographs. 1974;2(4):328–335. doi:10.1177/109019817400200403
7. Becky JB. Using the Health Belief Model to Determine Differences in University Foodservice Employees' Beliefs and Perceptions About Handwashing and Foodborne Illness. Manhattan, Kansas; 2013
8. Asma P, Mohammad-Ali MS, Hossein F, Jalal S. Food Handling Behaviors Based on the Health Belief Model in Iranian Women. Kerman, Iran; 2012

9. Notoatmodjo. Health Research Methods. Jakarta: Rineka Cipta. Jakarta; 2012.
10. Sugiyono. Quantitative, Qualitative and R&D Research Methods. Bandung: Alphabet, Bandung; 2019. [In Indonesian]
11. Mudjajanto ES. Food Safety: Training and Development of Technology and Snack Food Safety. Bogor: Department of GMSK, Faculty of Agriculture, IPB and Directorate General of Basic Education, Ministry of National Education; 1999. [in Indonesian]
12. Murti B. Measurement Validity and Reliability. Doctoral Study Program Matriculation, Faculty of Medicine, UNS; 2011. [in Indonesian]
13. Ringle, Christian M, Wende Sven, Becker J-M. SmartPLS 3. Boenningstedt: SmartPLS; 2015
14. Ghozali I. Structural equation modeling: An alternative method with Partial Least Squares (PLS). Semarang: Diponegoro University Publishing Agency; 2014.
15. Nunnally JC, Bernstein I. Psychometric theory. In Psychometric theory. 1994;pp:264–265
16. Chin WW. The Partial Least Squares Approach to Structural Equation Modeling, Modern Methods for Business Research. 1998;pp:295-336
17. Hanson JA, Hughes SM, Liu P. Use of Health Belief Model Variables to Examine Self-Reported Food Handling Behaviors in a Sample of US Adults Attending a Tailgate Event. Journal of Food Protection. 2015;78(12):2177–2183. doi:10.4315/0362-028x.jfp-15-077
18. Wang M, Huang L, Pan C, Bai L. Adopt proper food-handling intention: An application of the health belief model. Food Control. 2021;127. doi:10.1016/j.foodcont.2021.108169
19. Sjoberg L. Factors in risk perception. Risk Anal. 2000;20():1–11
20. Wachinger G, Renn O, Begg C, Kuhlicke C. The risk perception paradox—implications for governance and communication of natural hazards. Risk Anal. 2013;33():1049–1065
21. Habiballah MA, Alhelalat JA, Masadeh MA, Al-Ababneh M. Use of the Health Belief Model (HBM) to Examine Food Handlers' Practices in Five Stars Hotels at Petra City, Jordan. Journal of International Business and Economics. 2020;8(1):32-39. doi:10.15640/jibe.v8n1a3
22. Sivaramalingam B, Young I, Pham MT, Waddell L, Greig J, Mascarenhas M, Papadopoulos A. Scoping Review of Research on the Effectiveness of Food-Safety Education Interventions Directed at Consumers. Foodborne Pathog. 2015;12():561–570.
23. Young I, Reimer D, Greig J, Meldrum R, Turgeon P, Waddell L. Explaining Consumer Safe Food Handling Through Behavior-Change Theories: A Systematic Review. Foodborne Pathog. 2017;14():609–622.
24. Mishra M, Prakash J. Status of Education and Training among Food Handlers from Selected Catering Establishments. International Journal of Food, Nutrition and Dietetics. 2017;5(2). doi:10.21088/ijfnd.2322.0775.5217.3
25. Piee NF, Abu R, Rashid AM. The Relationship Between Cues to Action Towards Food Safety Behavior among Food Program Students at Vocational School. Middle-East Journal of Scientific Research 19 (Innovation Challenges in Multidisciplinary Research & Practice). 2014;pp:133-137, doi: 10.5829/idosi.mejsr.2014.19.icmrp.20
26. Kavanaugh M, Fisher K, Quinlan JJ. Use of Focus Groups to Identify Food Safety Risks for Older Adults in the US. Foods. 2022;11(37). doi:10.3390/foods11010037
27. Hanson JA, Hughes SM, Liu P. Use of Health Belief Model Variables to Examine Self-Reported Food Handling Behaviors in a Sample of US Adults Attending a Tailgate Event. Journal of Food Protection. 2015;78(12):2177–2183. doi:10.4315/0362-028x.jfp-15-077
28. Meysenburg R, Albrecht JA, Litchfield R, Ritter-Gooder PK. Food safety knowledge, practices and beliefs of primary food preparers in families with young children. A mixed methods study. Appetite. 2014;73():121–131. doi:10.1016/j.appet.2013.10.015
29. Hanson JA, Benedict JA. Use of the Health Belief Model to Examine Older Adults' Food-Handling Behaviors. Journal of Nutrition Education and Behavior. 2002;34():S25–S30. doi:10.1016/s1499-4046(06)60308-4

30. Clayton DA, Griffith CJ, Price P, Peters AC. Food handlers' beliefs and self-reported practices. International Journal of Environmental Health Research. 2002;12(1):25–39. doi:10.1080/09603120120110031
31. Sanlier N, Baser F. The Relationship Among Food Safety Knowledge, Attitude, and Behavior of Young Turkish Women. Journal of the American College of Nutrition. 2019;pp:1–11. doi:10.1080/07315724.2019.1639084