

ORIGINAL ARTICLE

Feasibility and Acceptability of MyWarung©: A Food Poisoning Prevention Smartphone-Apps During Dining Out

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ABSTRACT

Introduction: Eating out has always been associated with increasing cases of food poisoning. These problems can be minimized through mobile applications and technology development. A mobile application called MyWarung© was developed to provide an alternative, improved tool for improving food poisoning knowledge and preventive behaviour. **Methods:** This cross-sectional study aims to assess the feasibility and acceptance of the MyWarung© application for consumers in Terengganu. The 50 consumers were selected based on the inclusion and exclusion criteria using convenience non-probability sampling. The data were collected through a questionnaire that included three components: socio-demographic, feasible (6 components) and acceptable (7 components). The scoring above 80.0% indicates an acceptable, while lower than 80.0% show unacceptable for both feasibility and acceptability sections. SPSS 22.0 has analyzed the data. **Results:** The results showed excellent feasibility with a median score of 27.5 (IQR 6.0) out of 30.0, and acceptance with 32.0 (IQR 7.0) out of 35.0. Majority of the respondents agreed that the app is easy to use (94.0%), easy to understand (88.0%), attractive (84.0%), catchy (88.0%), provides more information (96.0%), efficient (96.0%), knowledge improvement (96.0%), beneficial (100.0%), useful application (88.0%), and recommend to the other people (84.0%). The overall result showed that most respondents agreed that MyWarung© application was feasible and acceptable with 90.0% and 86.0% feasibility and acceptability rate. **Conclusion:** The MyWarung© application among consumers can be highly feasible and acceptable in preventing food poisoning during dining out.

Keywords: MyWarung©, Food poisoning prevention, Feasibility, Acceptability, Mobile application

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INTRODUCTION

Food poisoning refers to a class of diseases caused by infectious organism foods consumption (1). Most food poisoning bacteria are *Salmonella*, *Escherichia Coli*, *Campylobacter*, *Staphylococcus aureus* and *Clostridium botulinum* (2). Food poisoning symptoms can range from mild to severe, with fever, diarrhoea, vomiting, nausea and stomach aches common (3).

As a health problem, the prevalence of food poisoning has grown at an alarming rate worldwide. An estimated 600 million people become ill, and 230 000 die each year due to food contamination (4). A lack of awareness of this disease's severity increases food poisoning in Malaysia (5). The highest incidence rate recorded for

food poisoning cases was 45.71 per 100,000 Malaysians in 2018 (6, 7, 8). Moreover, in 2017 and 2018, Terengganu showed the highest incident rate of food poisoning in Malaysia, with an incidence rate of 47.32 and 33.16 per 100,000 population (9, 10). The increase in food poisoning cases reported over the years reflects Malaysia's poor food safety situation and increases the foodborne disease burden (11).

Many factors have been identified contributing to food poisoning, the most important being inadequate food safety practices (1). Most food poisoning cases are due to poor hygiene and are usually found in restaurants and stall markets (12). Nevertheless, eating out is part of people's lifestyle and has contributed to the Malaysian foodservice industry (13). Most Malaysians prefer food taste rather than food safety (11). However, Todd et al. (14) reported that 97% of food poisoning cases were due to improper food treatment, inadequate hygiene, and insufficient cleaning of utensils or equipment processing or preparation. These factors relate directly to food

handlers and cause food poisoning among consumers. In the same agreement, consumers could quickly become infected with previous research by Ruby et al. (15), which carried out a study among adult consumers. They are ultimately end-users in the food processing chain.

The current study aims to educate consumers, particularly in preventing food poisoning during dining out in the absence of a systematic consumer education program (16) on food safety and hygiene in Terengganu. Consumer education is a primary intervention aimed at enhancing knowledge and food poisoning prevention (17). Recent research has improved using the smartphone application as an educational tool, as people spend more time using their smartphone app (18). The word "mobile thinking," as they are so dependent on their mobile telephone, was used to describe how owners relate to their phones (19). Current technologies such as smartphones, smartphone application, and activity trackers offer realistic and dynamically tailored approaches that integrate successful behavioural changing strategies (20).

Mobile health apps have been widely used, and up to 500 million users have been reportedly using health-related apps (21). Under Proudfoot et al. (22), people are interested in using the app because it is easy to use and improves self-awareness. Earlier studies showed significant positive results using smartphone apps in the form of a health education tool (23, 24), suggesting the promising use of smartphone apps in improving human health and prevention. Besides, an earlier study by Middelweerd et al. (20) found that the systematic reviews found app-based approaches to benefit health changes. As a result, empowering smartphone users to increase their knowledge and offer solutions through the development of telecommunications and related technologies (25).

MyWarung© is an innovative solution to the prevention of food poisoning while dining out. The public usually does not have access to food poisoning prevention when eating outside, including selecting the clean food premise and food handlers before they consume. Plus, the app educates the consumers to be self-aware to prevent food poisoning by observing the food premises' cleanliness and food handlers' hygiene. Moreover, the consumers can effortlessly access the food poisoning prevention guidelines during dining out by easily referring to the information given in this smartphone-apps, MyWarung©. This is the first mobile app-based study covering the understanding of food poisoning and preventive behaviour during eating outside and directly making a report to the Ministry of Health of Malaysia (MOH). The app's objectives are to increase the knowledge of food poisoning and self-awareness towards food poisoning preventive behaviour among consumers. The consumers who are more actively engaged with the application will experience positive behavioural changes towards food poisoning prevention,

particularly during dining out.

The app that can deliver food poisoning knowledge and preventive behaviour while dining out is still not available in the Google Playstore and Apple Store, to the best of our knowledge. The purpose of this study is to describe the feasibility and acceptability of a new MyWarung© smartphone app to increase knowledge and prevent food poisoning while eating outside among consumers.

MATERIALS AND METHODS

Research Design

This cross-sectional study was conducted in Kuala Nerus, Terengganu from April 2020 to July 2020. Kuala Nerus was chosen in Terengganu because in this selected district, as announced by the Ministry of Domestic Trade and Consumer Affairs in 2018, there has been a rise in food poisoning cases (26). Fifty consumers were chosen as participants based on inclusion and exclusion criteria through non-probability of convenience sampling. The sample size calculation was based on the GPower 3.1.9.7 software. Given the proportion 0.8, type 1 error rate set at .05, the pre-specified level of statistical power for calculating the sample size set to .8, and proportion at .5, the final minimum sample size was 50 respondents after taking 10% attrition into account.

The criteria for selecting subjects were as follows: dining outside at least once a week; age 18 years old and above; smartphone-owned Android platform; willingness to use mobile apps given; and ability to read and write in the Malay language as the questionnaire was provided in the Malay language. All participants were thanked for their cooperation and participation at the end of the study.

The validated self-administration questionnaire used was adapted from the previous modified studies (5, 25). The questionnaire consists of three parts: the socio-demographic profile, the respondents' feasibility, and acceptability to the MyWarung© app.

In the socio-demographic profile section, respondents were asked about gender, age, ethnicity, marital status, academic qualifications, employment, and respondents' monthly income. The feasibility questionnaire has six items that evaluate the ease of operation, easy to understand, an attractive application, provides much information, and effectively obtains information. Meanwhile, the acceptability of MyWarung© questionnaire consists of seven items which include the knowledge enhancement, usefulness, potential recommendations and overall satisfaction towards MyWarung©. The minimum feasibility and acceptability score was 6 and 7, respectively. The maximum feasibility and acceptability score was 30 and 35, respectively. Responses have been converted

to 100% on both feasibility and acceptability scores. The scoring above 80.0% indicates an acceptable, while lower than 80.0% show unacceptable for both feasibility and acceptability sections (30, 31). Therefore, for feasibility towards MyWarung©, a score of 24 or above indicates that MyWarung© is feasible among the respondents. Meanwhile, in the section of acceptability of MyWarung©, a score of 28 or above showing MyWarung© is acceptable to the respondents.

The reliability test for the feasibility and acceptability questionnaire was calculated using Cronbach's alpha. The rules of thumb of Cronbach's alpha value were less than 0.5 indicates the unacceptable value, between 0.6-0.7 is acceptable, and 0.8 and greater indicate a good level of reliability (28, 29). Cronbach's alpha was used to measure internal consistency and showed a good level of reliability of feasibility with 0.755 and acceptability with 0.946. Ethical approval for the app's evaluation was obtained from the ethics committee of Research Involving Human Subjects of the Faculty of Medicine and Health Sciences at Universiti Putra Malaysia (UPM) (JKEUPM-2019-302).

Data collection

A one-page flyer was distributed to the consumers, which describes the study's details and respondents' eligibility criteria. The selected consumers were assembled in their villages' council hall, and they have to register their I.D and phone number. All selected consumers included in the study were informed of the study purposes and objectives through a subject information sheet, and a written consent form was collected before data collection. Next, the mobile app's link was provided to the respondents via text message to access the application. The researchers performed and tracked the tutorial about installing and using the app given. The text messages with the link of google form containing the self-administered feasibility and acceptability questionnaire were sent to the respondents at the end of the study. Lastly, each of the respondents earned a token of gratitude after completing the questionnaire.

Description of MyWarung© application

MyWarung© is a new, attractive android-based electronic health education software designed to increase awareness and preventative food poisoning behaviour, particularly during outdoor dining among users. The app consists of seven main sections: definition of food poisoning, causes of food poisoning, signs and symptoms of food poisoning, preventive food poisoning during meals, assessment of food premises, the complaint to the Ministry of Health of Malaysia (MOH), and the treatment of food poisoning. First, the content of food poisoning is further elaborated on the bacteria's causative agents, which cause food poisoning, viruses, parasites, and chemical compounds that cause food poisoning. Second, the food signs segment discussed the average duration of symptoms, the onset of symptoms

caused by foodborne germs, and familiar food sources that cause food poisoning. Third, the food prevention training sessions were shown in posters and videos; steps to identify spoiled food, seven steps in hand washing, food handlers' ethics, measures to prevent food during dining outside, and behaviour in food premises. Next, the food premises' assessment was designed to tell consumers whether the food premises they visited were clean or dirty, with five stars rating. The overall marks will be given based on star ratings. One star indicates the food premise is very dirty, two stars indicate dirty, three stars indicate moderate dirty, four stars indicate clean, and five stars indicate a very clean food premise. Besides, the consumers can complain if they find the food premises dirty directly to the MOH by using smartphone apps. Lastly, the features of treatment to food poisoning also provided in MyWarung©. The consumers could act immediately when contracted with food poisoning and determine the suitable treatment for food poisoning. Therefore, the MyWarung© can increase food poisoning and its prevention knowledge among consumers, give exposure to preventive behaviour during dining out, and self-awareness on the cleanliness of food premises and food handlers' hygiene.

The contents of MyWarung© mobile app and technical problems were discussed and addressed through meetings and discussions among research teams. The app was developed for the Android platform because of its success and most used mobile devices in Malaysia (5, 34), and was the most cost-effective choice (35). The language used in this app was Malay, which was intended to make it understandable even at a high or low educational level and to ensure that the instructions and information provided in the apps could be read and understood. The platform was developed using the Malay language as the targets were among locals in Malaysia, particularly among Terengganu consumers. MyWarung© mobile app subsequently tested its feasibility and acceptability among consumers to educate consumers about preventing food poisoning during dining out.

Data analysis

The data were provided as percentage frequencies for nominal variables. For numerical variables, the data was present in a median and interquartile range (IQR). Using the Kolmogorov-Smirnov test, the score of feasibility and acceptability towards MyWarung© was checked for normality. As all scores' normality was not met, with a significance level of 5%, the data was carried out non-normally distributed with median (IQR). Each component in the feasibility and acceptability questionnaire was evaluated descriptively by evaluating the frequency of responses in each Likert scale and the corresponding percentage. For the final result, those who strongly agree or agree are considered to agree, whereas strongly disagree and disagree as to the opposite. A 5-point Likert scale of 1 (strongly disagreed),

2 (disagreed), 3 (neither agreed nor disagreed), 4 (agreed) and 5 (strongly agreed) was used for the feasibility and acceptability questionnaire.

RESULTS

Socio-demographic profile of respondents

The results of the socio-demographic profile of the respondents are displayed in Table I. Majority of the respondents were female (58.0%), and the age group of 21-30 years old (34.0%). 100.0% of respondents are Malay, and the majority of them are married with 58.0%. The respondents' highest academic qualification was the secondary school with 40.0%, and 30.0% were self-employed. Lastly, 42.0% of the respondents had a monthly income of less than RM500. Majority of the respondents had low monthly income as they were unemployed. These results showed the socio-demographic profile of the selected respondents in the current study.

Feasibility of MyWarung©

Table 1: Socio-demographic profiles of the respondents (n=50)

Socio-demographic Profiles	Distribution n (%)
Gender	
Male	21 (42.0)
Female	29 (58.0)
Age group	
18-20 years	7 (14.0)
21-30 years	17 (34.0)
31-40 years	11 (22.0)
41-50 years	3 (6.0)
>50 years	12 (24.0)
Ethnic	
Malay	50 (100.0)
Marital status	
Single	18 (36.0)
Married	29 (58.0)
Separated/Divorced/Widowed	3 (6.0)
Academic qualification	
Primary school	4 (8.0)
Secondary school	20 (40.0)
Certificate/STPM/A level/GCE/Foundation/Matriculation/ Diploma	18 (36.0)
Tertiary Education (Degree/Master/PhD)	8 (16.0)
Job sector	
Self-employed	15 (30.0)
Government sector	10 (20.0)
Private sector	11 (22.0)
Unemployed	14 (28.0)
Monthly income	
Less than RM 500	21 (42.0)
RM 501 – RM 1000	11 (22.0)
RM 1001 – RM 1500	10 (20.0)
RM 1501 – RM 2000	3 (6.0)
More than RM 2000	5 (10.0)

Table II presents the responses on the feasibility of MyWarung© app. The results showed excellent feasibility with a median score of 27.5 (IQR 6.0) out of 30.0. Majority of the respondents agreed that the app is easy to use (94.0%), easy to understand (88.0%), attractive (84.0%), and the features used are catchy (88.0%). Most respondents agreed that the app provides much information (96.0%) and is efficient in gaining knowledge (96.0%). However, less percentage of the

respondents disagree on the MyWarung© is easy to understand with 4.0%, attractive and a good app with 4.0%, and catchy with 2.0%.

Acceptability of MyWarung©

Table III showed the responses on the acceptability of MyWarung© app. The results on the acceptability of MyWarung© showed excellent acceptability with a median score of 32.0 (IQR 7.0) out of 35.0. The respondents agreed that MyWarung© helped improve their knowledge with 96.0%, it also gives benefit to the respondents as all of them with 100.0% agreed that MyWarung© beneficial for them. Plus, the majority of the respondents agreed this app attracts their attention (86.0%), and they planned to continue using the app (86.0%). Moreover, most of the respondents, like the app (84.0%), agreed that the app is a useful application (88.0%). As such, 84.0% of them would recommend the app to other people. Nevertheless, 6.0% of the respondents disagree that they like MyWarung© app, a useful app, and recommend the app to the other people. Overall, the answers of feasibility and acceptability questions were positive. Table IV reported that most respondents agreed that MyWarung© application was feasible and acceptable, with 90.0% and 86.0% feasibility and acceptability rate.

DISCUSSION

The present study assessed the feasibility and acceptability of MyWarung© during dining out. Overall results showed that MyWarung© application was feasible and acceptable among the consumers. The results showed the app's excellent feasibility and acceptability in terms of attractive features, ease of use and understanding, attractiveness, information availability, information efficiency, knowledge improvement, usefulness, potential recommendations and overall satisfaction with MyWarung©. Following the present results, the results were similar to the previous study by Yew et al. (5) which investigated the reduction of risk of food poisoning and food wastage among students and demonstrated that the respondents had good feasibility and acceptability the smartphone app used, EatSAFE-StopWASTE©. The consistency of these results has been explained because there is a strong need to develop conveniently available and affordable apps to users (25) as offered by the MyWarung© app.

In this study, consumers agreed that MyWarung© improved their knowledge of food poisoning, provided benefits, continued use, and recommended it to others. The results were the same as the previous study by Salihah et al. (34), which shows that consumers feel more motivated to continue using the app and think that it was important to them and benefited them. Another potential reason for these outcomes is that the information is accessible and convenient via smartphone apps and prevents any recall issues as users can refer directly to

Table II: Feasibility of the MyWarung© application among consumers (n=50)

Statement	Distribution					
	Median (IQR)	Strongly disagree N (%)	Disagree N (%)	Neither agree nor disagree N (%)	Agree N (%)	Strongly agree N (%)
Feasibility	27.5 (6.0)					
1. MyWarung© is easy to operate		0 (0.0)	0 (0.0)	3 (6.0)	15 (30.0)	32 (64.0)
2. The language used in MyWarung© is easy to understand		0 (0.0)	2 (4.0)	4 (8.0)	9 (18.0)	35 (70.0)
3. The colour scheme of MyWarung© is attractive and good		1 (2.0)	1 (2.0)	6 (12.0)	17 (34.0)	25 (50.0)
4. The features in MyWarung© are catchy		0 (0.0)	1 (2.0)	5 (10.0)	18 (36.0)	26 (52.0)
5. MyWarung© provides a lot of information		0 (0.0)	0 (0.0)	2 (4.0)	17 (34.0)	31 (62.0)
6. MyWarung© is fast and efficient in gaining information		0 (0.0)	0 (0.0)	2 (4.0)	21 (42.0)	27 (54.0)

Table III: Acceptability of the MyWarung© application among consumers (n=50)

Statement	Distribution					
	Median (IQR)	Strongly disagree N (%)	Disagree N (%)	Neither agree nor disagree N (%)	Agree N (%)	Strongly agree N (%)
Acceptability	32.0 (7.0)					
1. MyWarung© will help me improve my knowledge regarding food poisoning		0 (0.0)	0 (0.0)	2 (4.0)	16 (32.0)	32 (64.0)
2. MyWarung© will be beneficial to me		0 (0.0)	0 (0.0)	0 (0.0)	18 (36.0)	32 (64.0)
3. MyWarung© attracts my attention		0 (0.0)	0 (0.0)	7 (14.0)	17 (34.0)	26 (52.0)
4. I am planning to continue to use MyWarung©		0 (0.0)	0 (0.0)	7 (14.0)	18 (36.0)	25 (50.0)
5. I like MyWarung©		0 (0.0)	1 (2.0)	7 (14.0)	16 (32.0)	26 (52.0)
6. Overall, I think MyWarung© is a useful application		0 (0.0)	1 (2.0)	5 (10.0)	17 (34.0)	27 (54.0)
7. I would like to recommend MyWarung© to other people		0 (0.0)	1 (2.0)	7 (14.0)	16 (32.0)	26 (52.0)

Table IV: Categorization of feasibility and acceptability of MyWarung© based on the total score (n=50)

Sections	Frequency n (%)	Median (IQR)
Feasibility		27.5 (IQR 6.0)
Feasible among respondents (Score of 24 and above)	45 (90.0)	
Unfeasible among respondents (Score of less than 24)	5 (10.0)	
Acceptability		32.0 (IQR 7.0)
Acceptable by respondents (Score of 28 and above)	43 (86.0)	
Unacceptable by respondents (Score of less than 28)	7 (14.0)	

the app they are using. Previous research has shown that mobile apps' use increases self-monitoring compared to pen and paper (36). Ali et al. (21) also reported that several qualitative studies on the health app showed users' positive attitude using apps. In general, therefore, it appears that the use of the app can improve the user's behaviour, as provided in the MyWarung© app. Smartphone applications can increase the preventive

behaviour of the individual. Previous studies supported the statement by Salihah et al. (34) and Zulkifli et al. (31), which reported a positive impact on preventive behaviour by implementing the smartphone app. It is convenient for users to help improve their knowledge. Similarly, MyWarung©'s application was designed and developed to enhance consumers' knowledge of food poisoning and preventive behaviour, significantly assisting consumers in preventing food poisoning during dining out. It is a solution that offers a novel approach to addressing food poisoning prevention during meals, and the consumers can easily access food poisoning and prevent it while dining out, only by referring to the module in the posters and videos provided in MyWarung©. The educational programme using MyWarung© is therefore essential. It has a high capacity to be scaled, and future intervention studies can be carried out to determine its effectiveness in the target cluster.

Although the results showed positive feedback from MyWarung© users, some limitations still exist. The results were slightly biased towards females, as females

had a higher percentage than males (25). Second, the app will only be released on the Android operating system, making it unavailable to other functional system users. Due to the wide range of smartphone devices available on the market, it is possible to test compatibility with many Android devices to reach most Malaysian users (34). Future research in conducting a smartphone app study with Android and IOS platforms is needed to educate and reach more people.

CONCLUSION

Smartphone-application as an educational tool can positively impact in improving knowledge and preventive behaviours as it is feasible and acceptable among the users. Besides, the consumers can identify the channel to complain of food poisoning directly to the Malaysia Ministry of Health (MOH), and instil awareness on food poisoning and unsanitary food premise by reporting to the authority using MyWarung© mobile app. Therefore, the study brings positive impacts to the community from many aspects: food poisoning prevention, lifestyles, education, general health and awareness. Future work is needed to approach and educate many people and expose them to the importance of practising food poisoning preventive behaviour, particularly during dining out.

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