Universal Journal of Public Health 11(5): 690-697, 2023
DOI: 10.13189/ujph.2023.110518 http://www.hrpub.org

The Relationship between Environmental Hygiene Practices and Community Awareness Related to Dengue Outbreaks in Alor Setar, Malaysia

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Received June 24, 2023; Revised September 11, 2023; Accepted October 12, 2023

Cite This Paper in the Following Citation Styles

(a): *[1] Tuan Pah Rokiah Syed Hussain, Hamidi Ismail, "The Relationship between Environmental Hygiene Practices and Community Awareness Related to Dengue Outbreaks in Alor Setar, Malaysia," Universal Journal of Public Health, Vol. 11, No. 5, pp. 690 - 697, 2023. DOI: 10.13189/ujph.2023.110518.*

(b): *Tuan Pah Rokiah Syed Hussain, Hamidi Ismail (2023). The Relationship between Environmental Hygiene Practices and Community Awareness Related to Dengue Outbreaks in Alor Setar, Malaysia. Universal Journal of Public Health, 11(5), 690 - 697. DOI: 10.13189/ujph.2023.110518.*

Abstract The practice of hygiene care in the environment is vital in human life since it can cause a variety of difficulties, particularly those related to health. This study focused on the issue of low environmental hygiene practices which cause the outbreak of dengue epidemics in a population area. This is important because previous studies did not explain a certain level of practices among communities. Thus, the objective of this study was to look at the correlation between environmental hygiene care practices and awareness among the community. Several residential areas in the Alor Setar City Council were selected as a study sample, involving the residential areas of Flat Tongkang Yard, Taman Berjaya, Taman Sultan Badlishah, Taman Indah and Kampung Tok Pasai. A total of 302 samples or respondents were taken to examine their practices and awareness of environmental hygiene practices to avoid dengue outbreaks. The analysis technique used is Pearson correlation to examine the level of relationship between the variables in the study. The results of the study found that the aspect of awareness significantly affects hygiene care practices with a value of $r = 0.703$ and $p \leq 0.01$; and the strength of the relationship through the value of the correlation coefficient is about 70 percent. This explains that the aspect of community awareness determines the occurrence of a dengue epidemic because the analysis shows that there is a positive relationship between the two variables. Therefore, control and prevention measures need to be implemented consistently, such as intensifying awareness campaigns for the public about the dangers of dengue epidemics and the importance of environmental protection.

Keywords Alor Setar City, Awareness, Dengue Fever, Hygiene Care, Malaysia

1. Introduction

In dealing with infectious disease outbreaks, the daily behaviour or practices of the local population need to be studied and understood to find out the lifestyle of the local community in dealing with related problems. The lifestyle of the population is directly related to the level of awareness of good hygiene practices. Awareness related to the practice of maintaining hygiene in the community is an important matter in human life because if it is not properly practiced, it can create various problems, especially related to infectious health aspects such as dengue epidemics. The transmission of various disease outbreaks often occurs due to unsanitary environmental health conditions, such as dengue fever, involves space and time, as well as environmental factors such as land use changes, population distribution, and the social and economic environment. Therefore, in order to deal with the spread of the epidemic in the community, control and prevention measures need to be implemented consistently, including providing

awareness to the community regarding the dangers of the dengue epidemic and the need to practice environmental care as best as possible at all times [1].

Dengue fever is a mosquito-borne disease that is one of Malaysia's major public health issues. Dengue haemorrhagic fever is a prominent cause of death in many countries, including Malaysia. The bite of an Aedes mosquito on humans causes dengue illness. The dengue disease vector comprises of two mosquito species, Aedes aegypti and Albopictus [2]. Aedes aegypti is a mosquito that is commonly found indoors, while Aedes albopictus is always found outside the home area. Aedes mosquitoes can be recognised by their black and white-striped bodies and legs. However, only female Aedes mosquitoes can spread the dengue virus, breed in clear water bodies, and actively bite victims in the early morning or evening. In addition, dengue is a dangerous infectious disease that must be reported since 1971 and is required in Section 10(2) of Act 342 (the Prevention and Control of Infectious Diseases Act 1988).

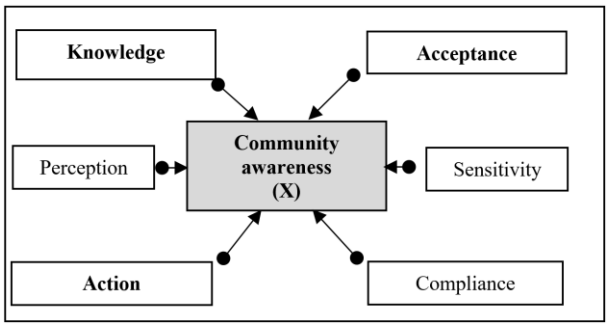
When it comes to the appearance of the dengue epidemic, [1,3,4,5,6] viewed that it is caused by a polluted environment or low environmental hygiene practices by the local community. The findings of the study are based on qualitative opinions that do not explain a certain level of practice and are the findings of studies in other places. For example, environment problems include garbage that can hold water, damaged or blocked drainage systems, stagnant water puddles, unmaintained bush areas, ant traps, and roof gutters that hold rainwater. Since the cause of its transmission is an unsanitary environment, the Ministry of Health established a Communication for Behavioural Impact Team (COMBI). The purpose is to combat the dengue epidemic through community programmes in the scope of public awareness and environmental cleanliness [7].

However, the issue of environmental hygiene care practices is still low and causes dengue outbreaks in a population area. Dengue infections, for example, remain high in the Alor Setar area; in 2019, there were as many as 243 cases, with one death, and in 2022, there were as many as 136 cases [8]. In fact, based on research on previous studies, especially for the Alor Setar City Council (ASCC) area, the researcher found that it was very difficult to find studies on community awareness of environmental hygiene practices related to dengue outbreaks. Therefore, the objective of this study was to look at the correlation between environmental hygiene care practices and awareness among the community. Thus, the researchers are motivated to study it from the aspect of community awareness of hygiene care practices related to the dengue epidemic in the ASCC area.

Without looking at the role of the awareness aspect of the population in the dengue outbreak area, it is quite difficult for researchers and authorities to evaluate hygiene care from the perspective of the population. This is because the aspect of consciousness is the basis for knowing a person that involve the psychological assessment of the human.

The measurement of the concept of awareness based on previous studies involves three main components, namely knowledge, acceptance, and action, and those three components will determine a person's practice in hygiene care related to the dengue epidemic. The practice of hygiene care is something expressed by every group of people to express their love and affection for the state by creating a clean and beautiful atmosphere because cleanliness is part of the nation's culture based on the first-class mentality [9]. In fact, good hygiene care practices can guarantee a comfortable environment and can avoid various diseases because hygiene care practices are interconnected with the life and health of the community [10]. However, the practice of hygiene care in this study means the process of preserving the environment according to a certain place and time, environmental care, creating a clean and beautiful atmosphere, habits, sweeping and throwing trash into the trash can, and practicing a healthy lifestyle.

Meanwhile, the concept of consciousness, in general, means someone who has the power of knowledge and acceptance, which ultimately form action (behaviour). In this regard, the most important aspect that needs to be evaluated in awareness is a person's knowledge, which plays a role in shaping thoughts and behaviours [11,12]. In fact, acceptance plays a role in shaping self-awareness in the context of hygiene practices [13]. In the context of the level of awareness, it should be measured based on the aspect of action because it can reflect the awareness possessed by a person [14,15]. In this regard, the awareness model should involve several constructs [16,17] (Figure 1). In addition, community awareness can be identified by the level of knowledge. In fact, awareness can be formed with the help of mass media such as television and newspapers. Therefore, the concept of awareness clearly needs to involve the factors of perception, acceptance, compliance, sensitivity, action, and knowledge. Based on the conceptual meaning of awareness expressed by previous researchers, this study only focuses on three main things: knowledge, acceptance, and action on hygiene care practices related to cognitive (knowledge), affective (acceptance), and psychomotor (action) contexts.



Source: **bold font** is adapted from Bloom [16], Bloom et al. [17]

Figure 1. Community awareness concepts

Thus, the conceptual framework of the study involves the relationship between research variables related to community awareness of health care practices related to dengue disease in Kota Setar District. Community awareness requires good research through aspects of knowledge, acceptance, and action on hygiene care practices related to dengue disease. This study involves the dependent variable (Y) consisting of hygiene care practices, while the independent variable (X) involves aspects of community awareness itself, which consists of the constructs of knowledge (X_1), acceptance (X_2), and action (X_3) (Figure 2). In this case, variable X (together with each of its constructs) will determine the position of the dependent variable Y.

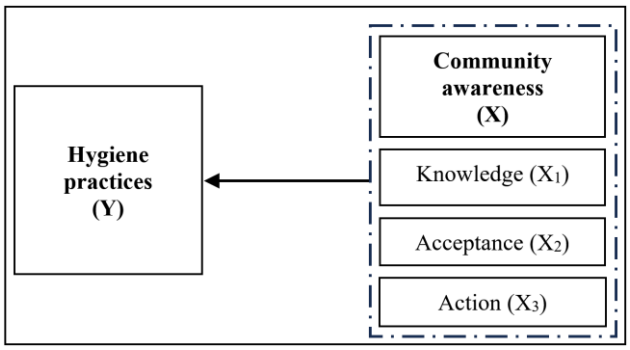


Figure 2. Research conceptual framework

2. Materials and Methods

In general, the total area of ASCC is 666 km^2, with a population of over 300,000 people. Meanwhile, for the main dengue area in the ASCC area, there are as many as five population locations [18]. The following is the location of the dengue area, the number of residential units, and the distribution of the sample using a percentage technique (Table 1). The total amount of sample distribution is determined through the sample size table by Krejcie and Morgan [18].

The determination of the sample size is made by considering the 95 percent degree of confidence, and the margin of error is not more than five percent; it makes the total sample size as many as 302 respondents. In this case, the study took every head of household. The sample size calculation only involves three areas of the population, namely: first, Flat Tongkang Yard; second, Taman Berjaya; and third, Taman Sultan Badlishah. This is due to the large number of residences in the area. However, Kg. Tok Pasai and Taman Indah are not included in the sample size calculation because the number of residential units is small; instead, all residential units are involved in the field study. The study took every head of household through a systematic sampling technique based on the list of residential units provided by the ASCC. Before taking the sample, an interval range value needs to be identified through the total unit of residences method divided by the sample size and produce a numerical interval of 3.7. Therefore, the recruitment of respondents for this study began with the first residential unit, continued with the fourth residential unit (closest to the value of 3.7), the eighth residential unit, and so on until a total of 85 respondents were obtained for Flat Tongkang Yard, 142 people in Taman Berjaya and 53 people Taman Sultan Badlishah. However, all heads of households for Kg. Tok Pasai and Taman Indah were included in this study considering their small numbers. This study used a survey in the form of a five-point Likert Scale, namely Scale 1 (Very Weak), Scale 2 (Weak), Scale 3 (Neutral), Scale 4 (Good), and Scale 5 (Excellent). In order to ensure a certain level of awareness and hygiene practices, the study set a mean between 1.00 to 2.33 (Low or Weak Level), 2.34 to 3.66 (Moderate Level), and 3.67 to 5.00 (High or Good Level).

The simplest and useful analysis technique used to test the level of awareness and hygiene practices were the mean level as mentioned above. In addition, the Pearson's correlation analysis is also involved in this study to examine the relationship between the aspects of hygiene care practices and awareness. The statistical unit used in this study involves the p value and the correlation coefficient (r). If the p value is below 0.01 ($p \leq 0.01$), then this study accepts the alternative hypothesis (H_1 to H_4). This indicates that there is a relationship between the test variables. In the context of the r value, it shows the strength of the relationship between the study variables, whether positive or negative. A positive relationship shows that there is a direct relationship between the variable community awareness (knowledge, acceptance, and action) and the variable hygiene practices. The quantitative approach is used in the study because it is in accordance with the research objective, and the analysis used is in line with the approach and objective of the study, which is related to testing the relationship between the two variables.

Table 1. Sample Size

No.	Residences	Total unit	Sample (%)	Interval range	Sample size
1.	Flat Tongkang Yard	320	30.50		85
2.	Taman Berjaya	533	50.81	3.7	142
3.	Taman Sultan Badlishah	196	18.68		53
Sub-total		**1049**	**100.00**	**-**	**n=280**
4.	Kg. Tok Pasai	10	Not relevant	-	10
5.	Taman Indah	12	Not relevant	-	12
Sub-total		**22**	**0.00**		**n=22**
Total		**1071**	**100**		**N=302**

Source: ASCC [8]

3. Results and Discussion

The majority of the respondents in this survey were men, with the median age of the most frequent respondents being 45 years. This study's respondents included 21% who were highly educated, 70% who were secondary educated, and 9% who were elementary educated. The participants in the study were 92 percent Muslim, 5% Buddhist, and 3% Christian. The majority of respondents have a monthly household income of RM4,000.00 to RM6,000.00. Their primary occupations are in the city's commercial sector (65%), government (21%), and private firms (14%).

In line with the respondents' background above, the study found that the level of knowledge is generally low (mean as high as 2.23) with a median value of 2.20, a mode value of 2.0, and a SD of 17.256. The level of acceptance and action are also low, with mean values of 2.24 and 1.52, respectively. Therefore, the overall level of awareness also shows that it is still low, with a mean value as high as 2.01. Likewise, with the level of hygiene practices, with a mean value of only as high as 2.05, median = 2.00, mode = 2.0, and SD = 16.236 (Table 2). In general, in the context of the level of awareness and hygiene practices, the researcher found that it is still at a low level. As a result of the respondent's low degree of awareness, the level of hygienic practices is similarly low. This is supported by the study's findings and discussion in the following section.

Table 2. The Level of Hygiene Practices and Awareness

Variables	Mean	Median	Mode	SD
Awareness	*2.01*	*2.00*	*2.0*	*16.352*
Knowledge	2.23	2.20	2.0	17.256
Acceptance	2.24	2.20	2.0	17.301
Action	1.52	1.50	1.0	15.000
Hygiene practices	*2.05*	*2.00*	*2.0*	*16.236*

N= 302

3.1. Hygiene Practices and Knowledge

The study found that the relationship between test items for the knowledge variable and hygiene care practices related to dengue disease is positive. Researchers found that the better each item of the community knowledge, the better the hygiene care practices related to dengue disease in Kota Setar District. In fact, all the relationships between test items for construct X_1 and construct Y are significant at the $p \leq 0.01$ level with a significance of 0.000. The highest relationship strength is on Test Item 2 through the statement "Healthy life practices can reduce the risk of being exposed to disease" with a value of $r = 0.514$, $p \leq 0.01$ and a significant value at the 0.000 level. Next, Test Item 7 through the statement "Standing water makes it easier for Aedes mosquitoes to breed" shows the lowest relationship strength with a value of $r = 0.338$, $p \leq 0.01$ and a significant value at the 0.000 level.

In the context of the overall relationship between construct X_1 and aspect Y, the study found that the relationship that occurs is positive, i.e., the higher the level of community knowledge in Kota Setar District, the higher the hygiene care practices. However, the strength of the relationship is moderate, as the overall value of r is about 61 percent. This is clear as found in the study through Table 3, which shows the value of $r = 0.610$, $p \leq 0.01$ and the significant value of 0.000. However, the study failed to reject H_1, where the relationship is significant with a strength of around 61 percent. In other words, the level of knowledge of a respondent directly determines the level of community hygiene care practices in Kota Setar District related to dengue disease. Therefore, the accepted alternative hypothesis is:

H_1 There is a significant relationship between community knowledge and hygiene care practices related to the dengue epidemic in Kota Setar District.

Table 3. The Relationship between Knowledge and Hygiene Care Practices

Construct		Hygiene practices	Failed to reject
Knowledge	Sig.	0.000	H_1
	r	0.610**	

N= 302

** The correlation is significant at p≤0.01

The findings of the study statistically through the analysis of this relationship show that knowledge has a positive effect on the issue of hygiene care practices at a level of 61 percent, or a moderate proportion. This means that the construct of knowledge is not a strong determinant of the hygiene care practices of respondents in Kota Setar District, even though it has an influence on the form of relationship.

Nonetheless, the study believes that a relationship exists, which is consistent with the previous research conducted by Francisca and Tina [19]. They believe that having an excellent knowledge of dengue disease can influence a person's lifestyle. The ability to have knowledge, expertise, and a high social status in order to influence decisions and shape actions is the intended practice. Indeed, Katyal et al. [20] claimed that the reduction of dengue epidemic cases is highly related to the execution of community educational and legal activities.

3.2. Hygiene Care Practices and Acceptance

The analysis also found that the relationship between the test items for the acceptance variable and hygiene care practices related to dengue disease is also positive. This explains that the better each item of the community acceptance test, the better the hygiene care practices related to dengue disease in Kota Setar District. In fact, all the relationships between test items for construct X_2 and construct Y are also significant at the p≤0.01 level with a significance of 0.000. The highest relationship strength is on Test Item 5 through the statement "Keeping clean does not bother me" with a value of r = 0.519, p≤0.01 and a significant value at the 0.000 level. Next, Test Item 1 through the statement "The practice of keeping the house clean should be applied to children from an early age" shows the lowest strength of relationship with a value of r = 0.416, p≤0.01 and a significant value at the 0.000 level.

For the purpose of the relationship as a whole for construct X_2 with aspect Y, the analysis of the relationship establishes that it is positive, i.e., the higher the level of community acceptance in Kota Setar District, the higher the level of hygiene care practices. This is because, through Table 4, the statistics show that the value of r = 0.632, p≤0.01 and the significant value is 0.000. In fact, the strength of the relationship is also moderate because the overall value of r is about 63 percent. Because of that, the study needs to accept H_2, which is that the relationship is significant with a strength of around 63 percent. It can be said that the higher the acceptance of a respondent, the higher the level of community hygiene care practices in Kota Setar District related to dengue disease. Therefore, the accepted alternative hypothesis is:

H_2 There is a significant relationship between community acceptance and hygiene care practices related to the dengue epidemic in Kota Setar District.

Table 4. The Relationship between Acceptance and Hygiene Care Practices

Construct		Hygiene practices	Failed to reject
Acceptance	Sig.	0.000	H_2
	R	0.632**	

N= 302

** The correlation is significant at p≤0.01

This shows that community acceptance has a positive effect on the issue of hygiene care practices related to dengue disease at a level of 63 percent, which is moderate. This means that the construct of acceptance does not strongly influence the hygiene care practices of respondents in Kota Setar District, although there is an influence in the form of a significant positive relationship. However, the study accepts the relationship even if it is moderate because it is parallel to previous studies by Hukil Sino et al. [10] and Yunus Abdullah et al. [21], who found that hygiene care practices will result from the community's acceptance of personal and family interests, government policies, and community prosperity.

3.3. Hygiene Care Practices and Action

The study's findings indicate a positive type of relationship among the test items for the variable of community action on hygiene care practices related to dengue health issues. The study confirmed that the better each item of the community action test, the better the dengue illness hygiene care practices in Kota Setar District. The study also discovered that all of the correlations between construct X_3 and construct Y test items are significant at the p≤0.01 level with a significance of 0.000.

The highest relationship strength is on Test Item 3 through the statement "The compound or fine set by the government can maintain the cleanliness of my house" with a value of r = 0.493, p≤0.01 and the significant value is at the 0.000 level. On the other hand, Test Item 10 through the statement "My family members often have mutual help every weekend to clean the house area" shows the lowest relationship strength with a value of r = 0.338, p≤0.01 and a significant value at the 0.000 level.

Through the context of the overall relationship for construct X_3 with aspect Y, the analysis of the relationship that occurs is in a positive form, that is, the higher the level of community action in Kota Setar District, the higher the hygiene care practice. This is according to the findings of the study in Table 5, which show a value of r = 0.651,

p≤0.01 and a significant value of 0.000. However, the strength of the relationship is also moderate because the overall value of r is about 65 percent. Since the study has to accept H_3, where the relationship is significant with a relationship strength of around 65 percent, in other words, the high or good actions of a respondent, it can directly determine the high level of community hygiene care practices in Kota Setar District regarding dengue disease. Therefore, the accepted alternative hypothesis is:

H_3 There is a significant relationship between community actions and hygiene care practices related to the dengue epidemic in Kota Setar District.

Table 5. The Relationship between Action and Hygiene Care Practices

Construct		Hygiene practices	Failed to reject
Action	Sig.	0.000	H_3
	r	0.651**	

N= 302

** The correlation is significant at p≤0.01

The findings of the study through relationship analysis show that actions positively affect the issue of hygiene care practices at a level of 65 percent or a moderate proportion; however, it still shows a significant relationship and accepts H_3. This means that the construct of action is not strong in determining the hygiene care practices of respondents in Kota Setar District due to the moderate proportion. However, the study still thinks the relationship still exists, and it is consistent with previous studies by Khaled Saied et al. [22] because they found that actions to maintain hygiene related to dengue outbreaks have determined the existence of positive community practices. This point is in line with the view of Keenan et al. [23], who stated that usually in an individual there is self-awareness before a person is able to make a decision about something.

3.4. Community Awareness and Hygiene Care Practices

The overall aspect of community awareness in the context of knowledge, acceptance, and action has a significant relationship with hygiene care practices at the p≤0.01 level among respondents in the study area. The relationship strength that occurs is in a moderate state i.e., knowledge 61 percent (r=0.610), acceptance 63 percent (r=0.632), and action 65 percent (r=0.651), with the overall average value for awareness being as much as 70 percent (r=0.703), which is marked by the r value (or a correlation coefficient). It is also in the form of a positive relationship, which means that an increase in the variable value related to awareness will determine an increase in the variable value of hygiene care practices. However, in the context of the level and whether looking at the strength of the relationship is different because it is only at a moderate level. The important thing here is that the overall relationship is significant at a high confidence level of p≤0.01 or falls into insignificance (Figure 3). Therefore, this research failed to reject H_4.

H_4 There is a significant relationship between community awareness and hygiene care practices related to the dengue epidemic in Kota Setar District.

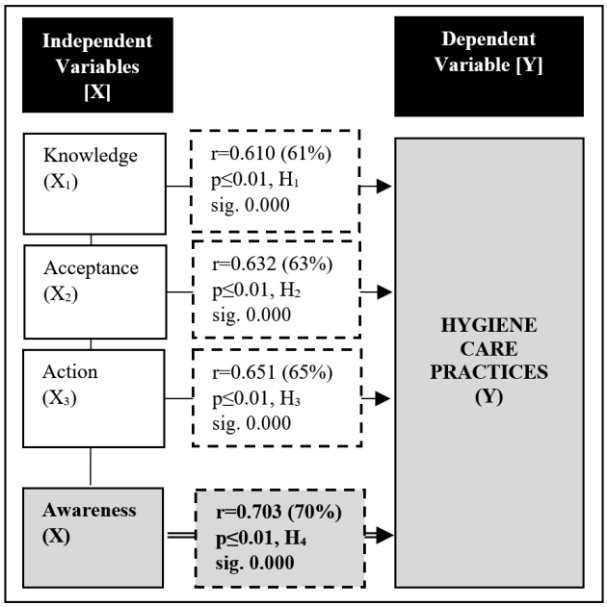


Figure 3. Summaries for Relationship Analysis

The study's findings, which show a substantial association between characteristics of awareness and hygiene care practices, are consistent with the findings of Faizan Maisarah Abu Bakar et al. [24]. According to this study, awareness is the initial stage for changing a practice. According to Noor Azizah Samsudin and Zanaton Ikhsan [25], the influence of poor self-awareness on society has led human life quality and the environment to become unbalanced, resulting in damage and disease. The source of this damage, according to Nor Fadillah Derahim et al. [26], is that each individual lacks in-depth knowledge of the idea of sustainable development and is less qualified to manage sustainable development activities and programmes. This is significant because sustainable development and a responsible mindset will improve environmental quality [27].

4. Conclusions

As a whole, the practice of poor hygiene care in the study area, which results in dengue disease cases, is linked to factors of community awareness. The relationship has been analysed as a positive correlation, implying that the greater the community's awareness, the better their hygiene care practices. As a result, this study contends that increased community awareness is required in the future. In this regard, the two main parties, namely the community and the government, should play a role in enhancing the

dengue eradication strategy and environmental cleanliness. This is consistent with Anastasia Tri Yuli Susanti, Sarsintorini Putra, and Anggraeni Endah K.'s [28] study on disease control, which indicates that the government must have a role in the development of appropriate policies or programmes. Until recently, the COMBI has been the government's only dengue programme in Malaysia, and it is currently working solely on community awareness and initiative. As a result, public awareness and government agency personnel must be enhanced because the dengue problem persists. The purpose is to enhance components of hygiene care practices while also steadily reducing dengue occurrences. Increasing community awareness is critical because the study's findings revealed that awareness and hygiene practices are still lacking. This lack of understanding in the framework of relationship analysis has an impact on the problem of hygiene care practices in the Alor Setar area of Kedah, Malaysia. However, if the public awareness campaign has been enhanced but is still ineffective, more research is needed to develop a new model to replace the COMBI.

Ethical Declaration

The process and results of this study have been supervised, reviewed, and certified by the Research Committee of the School of Government, Universiti Utara Malaysia.

Acknowledgements

This article is a part of research results from a University Research Grant, Universiti Utara Malaysia (Output Specification Code 21058).

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