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TESTING A MODEL OF HFMD PREVENTIVE PRACTICE: A CONTEMPORARY PARADIGM FOR RESEARCH USING STRUCTURAL EQUATION MODELING

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[doi: 10.48047/AFJBS.6.15.2024.1531-1547](https://doi.org/10.48047/AFJBS.6.15.2024.1531-1547)**Abstract**

Background: Hand, Foot, and Mouth Disease (HFMD) is an emerging infectious disease that is prevalent worldwide. It primarily affects toddlers, and there is currently no effective vaccine or specific treatment available for HFMD. Outbreaks of HFMD commonly occur in nurseries, playgroups, and schools. Caretakers play a role in the well-being of children. It is crucial to have accurate information about their knowledge, attitude, health beliefs, and preventive practices regarding HFMD due to persistence in Terengganu, Malaysia.

Objective: This study aimed to validate HFMD questionnaires designed for kindergarten caretakers in Kuala Nerus, Terengganu.

Methods: The study utilized a cross-sectional method, and the questionnaires were distributed to the respondents. The independent variables in this study were knowledge, attitude, and health beliefs, while the dependent variable was the preventive practices of HFMD. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structures (AMOS) software.

Results: There was a total of 411 participants, with a response rate of 95.6%. These participants were caretakers from diverse backgrounds, and all of them were female. The setting for this study was a kindergarten. The outcomes indicated that the EFA analysis successfully met the validity criteria (significant Bartlett's Test, KMO > 0.6, Total Variance Explained > 60%, and Factor Loading > 0.6) and had a reliability value > 0.70. No items from the questionnaire were removed. The CFA analysis demonstrated that all constructs fulfilled the predetermined standards, with factor loading values exceeding 0.6, validity values (AVE > 0.5), reliability values (CR > 0.6), and fitness index values (RMSEA < 0.08, CFI > 0.90, and Chisq/df < 5.0). No items from the questionnaire were eliminated. Additionally, the CFA pooled analysis confirmed the discriminant validity of all constructs within the research model.

Conclusion: The study found that knowledge, attitude, and health beliefs significantly influence preventive practices among kindergarten caretakers, suggesting efforts to enhance knowledge, improve attitudes, and strengthen health beliefs for better prevention.

Keywords: HFMD, preventive practices, validate questionnaire, health belief, caretaker

INTRODUCTION

Hand, Foot, and Mouth Disease (HFMD) is a highly contagious virus that results in blister-like rashes on the hands and feet of youngsters, as well as severe ulcers in their mouths. Toddlers, who are under the age of five, are the most susceptible to this disease. Generally, Hand, Foot, and Mouth Disease (HFMD) is a rather benign illness that usually resolves spontaneously after around one week. There is a need to increase disease surveillance due to the global spread of HFMD (Chua and Kasri, 2011; Nayak et al., 2022). The research conducted by Yang et al. (2010), Chua & Kasri (2011), and Nayak et al. (2022) have all identified EV71 as the primary cause of HFMD epidemics in Malaysia. The disease known as HFMD (Hand, Foot, and Mouth Disease) first broke out in Malaysia in 1997 and reoccurred later in 2000, 2003, 2005, 2006, 2010 and 2018. The consequence of the outbreaks was the death of infants and toddlers (Chua & Kasri, 2011). Children below five years old especially those in crowded places like schools are at higher risk of contracting and transmitting the disease (Chan et al., 2011; Laor et al., 2020). In addition, it is likely that more lethal strains of this virus may emerge leading to an increase in neurological complications and deaths. Moreover, if childcare services were closed due to severe HFMD outbreaks these problems could be further exacerbated (Siegel et al., 2017; Zhao et al., 2022).

There was less knowledge concerning HFMD in Malaysia including its occurrence, frequency, origins and outcomes before May 1997. The first cases of Hand, Foot and Mouth Disease (HFMD) were noticed in Sarawak, Malaysia in April 1997. By June the same year it had spread to Peninsular Malaysia (Chua per se Kasri 2011). There is great concern internationally about the high incidence of Asian epidemics of HFMD with serious neurological diseases. Until October 2006 there were no formal requirements for notification on Hand, Foot and Mouth Disease (HFMD) cases in Malaysia. Additionally, Nadia et al. (2016) have noted that the national surveillance data for viral agents do not yet belong to this country. Seek studies regarding current state of knowledge, perspectives, health attitudes and practices related to the prevention of hand-foot-mouth disease. However little or no information exists about kindergarten caregivers understanding towards HFMD as a disease and how they control it. Most previous studies concentrated on mothers as care takers/parents hence more research needs to be done here.

Mahadzar and Rahman (2019) as well as Mansor and Ahmad (2021) have conducted prior research where the caregivers had adequate knowledge on Hand, Foot, and Mouth Disease (HFMD). There are multiple studies examining concerns regarding Hand, Foot, and Mouth Disease (HFMD). Several studies have extensively investigated methods of assessing children's exposure to Hand, Foot, and Mouth Disease (HFMD). An alternative method would be to conduct a survey among kindergarten teachers and other caretakers to determine their knowledge of HFMD, its indications and symptoms, and ways of preventing it. By appraising their health beliefs, attitudes, knowledge and preventive control measures towards kindergarteners in Malaysia one may assess the level of awareness among caretakers about HFMD. This study will therefore provide multiple methodologies through which quality healthcare education can be given to the caregivers thus immensely affecting this sector. Therefore kindergarten teachers who hope to get an opportunity in teaching must possess good knowledge about this disease since it is very dangerous. The outcomes will enable people in Malaysia intensify efforts towards fighting HFMD through publicizing information about the condition as well as its types.

LITERATURE REVIEW

Knowledge, Attitude and Practice (KAP) towards HFMD

There is a scarcity of research studies that investigate the Knowledge, Attitudes, and Practices (KAP) regarding HFMD among various participant groups. The latest research conducted through interviews reveal disparities in knowledge, attitudes, and behaviors among the participants, therefore highlighting gaps in understanding. In a particular study conducted by Yang et al. (2010), a standardized questionnaire was administered to survey 690 parents and 104 instructors from ten kindergartens in Taiwan. The study sought to assess their behaviors and knowledge regarding Enterovirus 71 infections. The study recommended enhancing the training provided to kindergarten educators in order to mitigate ambiguity and anxiety. It is essential to emphasize that the majority of individuals who are infected with the virus will naturally recover without assistance, which helps to mitigate panic responses. Additionally, teachers and parents should be provided with instructional resources regarding the risk factors associated with persistent enterovirus

infection. Jhao et al. (2008) conducted a random selection of 911 caregivers of young children from the National Immunisation Information System (NIIS) in Taiwan. The objective was to assess their understanding of enterovirus symptoms through a phone interview. According to the study, caregivers know about the serious effects of enterovirus illness as well as the first signs and symptoms. Lou and Lin (2006) knew a lot about enterovirus infections, including how to treat them and what signs to look for. A very high 82.0% of people who were asked to fill out the poll did so. They got an average score of 10.67 on the test of their understanding and a score of 4.24 on the test of how healthy they were as adults. The fact that they were able to do this shows that they really knew what they were talking about. A study done by Ruttiya and Tepanata in Bangkok in 2013 found that people who took care of kids younger than five years old knew how to deal with Hand, Foot, and Mouth Disease (HFMD). They also had the right attitude and habits. To change the way guardians think, especially poor ones who haven't been to school in a long time, the study stressed the need for more CPD classes on HFMD. A study by Abdullah et al. (2019) on caregivers in Perak, Malaysia, found the same things that a study by Kamble et al. (2023) in Pune, India, did. A study found that people in Pune did not know much about hand, foot, and mouth disease (HFMD). People don't know enough about how to stop HFMD, especially when it comes to how it spreads, according to studies by Mansor and Ahmad (2021) and Qudsiah et al. (2017). About half of the people polled in Malaysia didn't know much about or recognize HFMD. For example, they couldn't understand hospital visits (Othman et al., 2012!). Mahdzar and Rahman's 2019 study also found that nursery directors knew and felt about how to avoid Hand, Foot, and Mouth Disease (HFMD) in a moderate way.

Health Belief Model (HBM)

Sociologists came up with the Health Belief Model (HBM) in the 1950s. There have been a lot of changes in mental health treatments since this paradigm was first made. It has changed how researchers look at how people's actions change because of their health. A lot of the work by Shojaei et al. (2016), Mead and Irish (2020), Ghorbani-Dehbalaei et al. (2021), and Funnell et al. (2024) has been based on the Health Belief Model (HBM). The HBM is a mix of cognitive-behavioral theories and stimulus-response ideas. There are some theory issues with the model that make it hard to use in real life (Jones et al., 2015), it looks like a great way to study communication.

The rational beliefs model (HBM) is useful because it gives a simple and clear way to see how demographic factors affect health behavior patterns and the desire to change these patterns through training programs. One way to change behaviors that affect public safety is to tell doctors to base their decisions on how their patients feel about their illness and care, and then use this model to carry out health-related tasks. Cognitive modeling is also very important for public health studies and is driven to the top of health care research by HBM's value (Abraham & Sheern, 2005; Ritchie et al., 2021; Wang et al., 2022). Rosenstock (1974) and Becker (1974) found that the Health Belief Model (HBM), which predicts these kinds of behaviors, can be used to make effective efforts to change people's health-promoting behaviors.

Many researchers have applied this paradigm in their investigations. According to Qudsiah et al. (2017), mothers' preventive activities and all Health Belief Model (HBM) subscales demonstrate a relationship. Furthermore found by Kim et al. (2012) was the effect of HBM on the tendency toward a balanced diet and regular exercise. Assisting women's health viewpoints, Guvenc, Akyuz, and Açikel (2011) proved the validity and dependability of the Pap Smear Test and the HBM Cervical Cancer Scale. Several recent research used this model to evaluate health beliefs during the COVID-19 epidemic (Al-Metwali et al., 2021; Mercadante & Law, 2021; Fathian-Dastgerdi et al., 2021; Wang et al., 2021; Mirzaei et al., 2021; Hsing et al., 2021).

Usually, HBM has as its main goal stopping the spread of diseases. Hochbaum et al. (1952) developed health belief theories to help to explain changes in health behavior. One's personal conviction in their own state of well-being can greatly influence their behavior. Scientists use it to find whether people's compliance to disease preventive strategies is strongly correlated with the effectiveness of such interventions. Moreover, the researcher will apply this model to assess the behavioral and cognitive traits of kindergarten caregivers with respect to health monitoring, strengths, overcoming challenges, and improved health outcomes especially linked to HFMD.

HFMD Prevention

Given the lack of any effective therapies or vaccinations for HFMD, preventative actions against the condition are absolutely necessary (WHO, 2011; Liu et al., 2011). Screen and clean polluted places, guarantee cleanliness in one's surroundings, and practice suitable personal hygiene to help to prevent the spread of HFMD. Should Hand, Foot, and Mouth Disease (HFMD) be detected, daycares, preschoolers, and nurseries should kindly stop running their activities momentarily. Studies by Ang et al. (2009) show that programs for hygiene promotion and school closures help to significantly lower the HFMD frequency. In 2016 Abdul Rashid and Herry Rena found that people showed more awareness of their environment and a wish to learn more. The word "impact" describes the results—positive or negative—that follow from an event or the changes brought about by a certain element.

HYPOTHESES DEVELOPMENT

The Health Belief Model has been used extensively by researchers looking at theories of health prevention. HBM has as its main goal stopping the spread of illnesses. Establishing the discipline of health belief theory (Hochbaum et al., 1952) sought to improve understanding of how people's thoughts on health affect their behavior. Researchers in this HFMD issue have extensively looked at the possible high correlation between the practice of avoiding disease transmission utilizing HBM and prevention initiatives. This paper includes Figure X as a component of the process of developing research hypotheses. The importance of the figure is in its capacity to show how the distribution of HFMD preventive strategies is affected by traits including attitude, health beliefs, and degree of knowledge. Moreover, a thorough evaluation of the knowledge, viewpoints, health beliefs, and preventative measures connected to HFMD among kindergarten caregivers is necessary to spot and control the outbreak in its earliest stage. When compared to other diseases, HFMD has been fairly understudied in studies looking at the link between knowledge, attitude, and particular components of health belief and health preventative actions. Researchers have underlined some health indicators showing how preventative efforts and health belief model (HBM) help to address related problems. The 2021 Hamirudin et al. research shows that proactive efforts in preventing Hand, Foot, and Mouth Disease (HFMD) correlate with caregivers' opinions on health and the aspects of their community. Moreover, the researchers found that a lack of consciousness could be involved in this relationship with preventative behavior. Almoslem et al. (2021) similarly used the Health Belief Model (HBM) to find a relationship between awareness of COVID-19 and the acceptance of health preventative actions. Furthermore found by Abdel Fattah et al. (2022) was how awareness of the COVID-19 epidemic affected community knowledge, attitudes, and actions taken toward disease control and avoidance. Considering these results and past studies, the present study aims to investigate, independent of kindergarten teachers' Health Belief Model (HBM), knowledge, and attitude as independent variables, their participation in preventative actions as the dependent variable. Examining the hypotheses of the research is the secondary goal of it. Moreover, the study sought to answer the questions the hypotheses underlined raised.

H₁: Knowledge has a significant impact on preventive practices of HFMD among caretakers of kindergartens in Kuala Nerus, Terengganu.

Knowledge is awareness or understanding of a given topic, say information. It is absolutely important for preventative policies since it is the foundation of wise decision-making and effective application of preventive actions. Numerous health research (Lee & You, 2021; Jothula&Sreeharrshika, 2021; Chelf et al., 2022; Oh et al., 2023) have shown a link between knowledge and preventative activities within communities. Some health studies, like Al-Shiekh et al. (2021), Ghosh et al. (2021), and Kurdi et al. (2021), have produced contradicting findings where knowledge was not linked with health practices. Consequently, for this investigation researchers have suggested hypothesis H₁.

H₂: Attitude has a significant impact on preventive practices of HFMD among caretakers of kindergartens in Kuala Nerus, Terengganu.

When deciding whether a person is inclined to engage in health-promoting activities, attitude plays absolutely critical part. Numerous research, like those by Lee et al. (2021) and Alwhaibi et al. (2022), have repeatedly shown that a good attitude toward preventative behaviors is a strong predictor of real behavior.

Research has produced contradicting results, nevertheless, implying that attitude does not always translate into preventative measures. This disparity has driven scientists to create hypothesis H2 specifically for this project.

H₃: Health belief has a significant impact on preventive practices of HFMD among caretakers of kindergartens in Kuala Nerus, Terengganu.

RESEARCH METHODOLOGY

Ethical Approval

The research study received ethical clearance from the Jabatan Kemajuan Masyarakat Negeri Terengganu [JKMN.TRG.610/11 JLD 35], the Jabatan PASTI Negeri Terengganu [PASTI/N/07/11/ (019)], and the Universiti Sultan Zainal Abidin (UniSZA) Human Research Ethics Committee (UHREC) [UniSZA.C/2/UHREC/628-2 JLD (13)]. Prior to commencing the study, consent was obtained from the principals of each individual kindergarten. All participants in the study provided informed consent.

Study Design

The study was conducted by using cross-sectional study design.

Target Population

The reference population was caretakers from all kindergartens in Kuala Nerus.

Source Population

The source population was caretakers from selected kindergartens in Kuala Nerus.

Research Location

Based on data provided by the Department of Education Terengganu, Jabatan Kemajuan Masyarakat Negeri Terengganu, and Jabatan PASTI Negeri Terengganu, it was found that Kuala Nerus has the highest number of kindergartens compared to other districts in Terengganu. Consequently, Kuala Nerus was chosen as the primary research location.

Participants Criteria

Subjects that were recruited as the participants in this study were caretakers who were directly involved in handling the children in the selected kindergartens. Exclusion criteria included those who were unwilling to participate in this study and who were absent during the conduct of the survey.

Sample size determination

Here is the calculation of sample size for this study. To examine the relationship or influence of Knowledge, Attitude and Health Belief on Preventive Practices of HFMD among caretakers of kindergartens in Kuala Nerus.

Two proportions formula were applied to calculate the sample size for determining the contributing factors to having good practice regarding HFMD. The proportion of having good practice regarding HFMD among single respondents (P_0) = 86.0% (from the pilot study done in Kuala Terengganu).

The estimated proportion of having good practice regarding HFMD among married respondents (P_1) = 76%

Power of the study = 80% (0.8)

Level of significance = 0.05

Total sample size of 246 subjects was required for each group.

As a conclusion, the estimated sample size calculated from objective 3 was chosen for this study. To cover the missing value, 10% of total calculated sample size. Two groups $[(246 + 246) + 10\% \text{ (Missing Value)} = 541]$. Thus, the total required sample size for this study was 541.

Sample size determination was carried out, based on several significant variables identified from the previous literatures. However, because of logistic problems and available sample size, the researcher decided to recruit 438 samples for this study.

UNIT OF ANALYSIS (UOA)

The research employed quantitative approaches and included a survey questionnaire. This study included a sample of 411 caretakers who successfully completed 450 questionnaires. This research involved caregivers who had direct interaction with the children in the selected kindergartens. Individuals who met the study's inclusion and exclusion criteria and were responsible for the care of kindergarteners were included. The study encompassed a total of eighty-three preschools located in the Kuala Nerus, Terengganu region. A typical kindergarten often consists of two or three rooms. Each class of fifteen to twenty-five children is supervised by a caregiver (teacher) and an assistant. Individuals who were not present or chose not to take part in the poll were also excluded.

DATA COLLECTION PROCEDURE

The surveys were disseminated to all of the chosen kindergartens in Kuala Nerus. The research objective was clearly described in the cover letter, and caretakers were kindly asked to actively participate. After identifying the responders, the researcher proceeded to visit the individual kindergartens. The researcher obtained consent from the headmaster or proprietor of each kindergarten to administer questionnaires to the participants. The exclusion criteria encompassed individuals who declined to participate in the study and were not present for the administration of the survey. The researcher collected the questionnaires on the same day during a field visit to the kindergarten. The caretakers were selected from a list provided on site. The personal information of the respondents was erased. The aforementioned procedures were employed in the study to enable participants to respond to the questionnaire without any constraints, while ensuring that their answers accurately represented their genuine emotions. Consequently, the inclusion of time limitations and the researcher would decrease response bias.

QUESTIONNAIRE DEVELOPMENT

In this investigation, a structured survey was used. Questionnaires are a common way to collect data since they allow researchers to conveniently gather information and record completed surveys, as demonstrated by Sekaran and Bougie (2009). Survey data, according to Bryman and Cramer (1994), aids researchers in determining whether or not there are any relationships between the several variables included in the survey. There were five sections in the survey: Sociodemographic inquiries concerning gender, age, marital status, level of education, duration of service, source of HFMD data, and number of kindergarten pupils are included in Part A. As shown in Table 1, Part B included questions regarding knowledge about HFMD, Part C questions about attitudes about HFMD, Part D questions about health beliefs about HFMD, and Part E questions about HFMD preventative activities. The survey questions were reviewed by a committee of experts prior to the pilot study being carried out.

Table 1: Questionnaire item category

No	Category		Items	Total Items
1	Knowledge		1 - 9	9
2	Attitude		10 - 13	4
3	Health Belief		14 – 21	8
4	Preventive Practices		22 - 30	9
	Total			30

To measure the caretakers of kindergartens' Knowledge, Attitude, Health Belief and Preventive Practices, the questionnaire was modified from the previous questionnaire as shown in Table 2 (Othman et al., 2012; Nasir et al., 2015; Qudsiah et al., 2017).

Table 2:Source of all the items used for this study

Construct	Source	Scoring Description
Knowledge of HFMD	(Othman et al., 2012)	10-point Likert Scale (1 = strongly disagree, 10 = strongly agree)
Attitude of HFMD	(Nasir et al., 2015)	10-point Likert Scale (1 = strongly disagree, 10 = strongly agree)
Health Belief toward HFMD	(Qudsiah et al., 2017)	10-point Likert Scale (1 = strongly disagree, 10 = strongly agree)
Preventive Practices toward HFMD	(Qudsiah et al., 2017)	10-point Likert Scale (10 = Often, 1 = Never)

In order to ensure maximum comprehension, the questionnaire should be prepared in the Malay language, as that is the language that most people are familiar with. An further problem was the interpretation of the intangible concept within the context of linguistic or literal equivalence. The majority of individuals were able to comprehend and approve of the Malay language translation of the research questionnaire. The translation addressed the conceptual correspondence of queries. Maintaining the originality of the questionnaire is challenging. However, the main emphasis has been on preserving the questionnaire's goal, clarity, and consistency throughout the process of translation and cultural reinterpretation. An English teacher translated the questions. The expert panel provided their suggestions for alternative translations that would maintain a similar sense to the original questionnaire. Using the same procedure, an independent translator, whose native language is English and who is unfamiliar with the questionnaire, translated the instrument back into English. Once the questionnaire was prepared, it was distributed to thirty preschool educators from the main school. This was done to focus on the organization and take note of the comments regarding the language, level of understanding, and overall format of the questions. The majority of participants reported no difficulty in completing the provided questionnaire, since all the questions were straightforward and coherent.

STATISTICAL METHODS

By definition, structural equation modeling (SEM) comprises two models: measurement model and structure model. Confirmatory Factor Analysis (CFA) is the first step in developing a model of Structure Equation Modeling (SEM), it is used to confirm whether or not Measurement Model fits well on field data. This ensure that the SEM is true to data and correlates properly. Secondly, SEM methods are applied to develop a model for each of these constructs in the structural model. The built-in SEM in this case will not work, because when I try to make the tool match between MEasurement Model (Field Data) - it doesn't do anything.

Hence using the CFA method to test the structures which have been built is extremely relevant, in order for us to statistically check if that Measurement Model (constructed) holds true. The study followed the Knowledge, Attitude, Health Belief and Preventive Practices model. The underpinning ideas of these paradigms are crucial in that they identify and demonstrate knowledge, belief as well as attitude on health or HAV mitigation strategies.

Results

Respondent profiles

Two models—the structural and measurement models—have to be evaluated in structural equation

modeling (SEM). The Confirmatory Factor Analysis (CFA) method is applied as the initial phase in constructing Structural Equation Modeling (SEM) to guarantee that the Measurement Model is fit with the field data. This ensures that the SEM is credible and relevant to the data. The second stage consists of using SEM techniques and developing a model for each construct in the structural model. If the Measurement Model is not consistent with the field data, then this internal structural equation modeling (SEM) has no purpose. Therefore, the hypothesis of goodness-of-fit of the measurement models should be verified statistically using CFA technique. The study will be guided by a suggested model, which highlights information, attitude, health belief and preventive activities. These logical foundations are important because they determine how knowledge, attitude and health beliefs influence HFMD prevention strategies.

Table 3: Sociodemographic background of the caretakers of kindergartens

Demographic	Frequency	Percentage %
Gender		
Female	411	100.0
Age		
18 to 20 years old	7	1.7
21 to 40 years old	226	55.0
41 to 60 years old	178	43.3
Marital status		
Single	92	22.4
Married	313	76.2
Widow/Divorcee	6	1.5
Level of education		
SPM or below	220	53.5
Tertiary education	191	46.5
Length of service		
Less than 5 years	89	21.7
5 to 10 years	110	26.8
More than 10 years	212	51.6
Number of students per class		
15 to 20 students	107	26.0
21 to 25 students	304	74.0

POOLED CONFIRMATORY FACTOR ANALYSIS (PCFA)

The process of constructing SEM involves two steps. First, the measurement model for all constructs involved must be verified using the CFA method. Second, a model for all constructs in the Structural Model must be constructed, and SEM procedures must be conducted (Awang, 2012; 2014; 2015; Hoque et al., 2017) as in Figure 1.

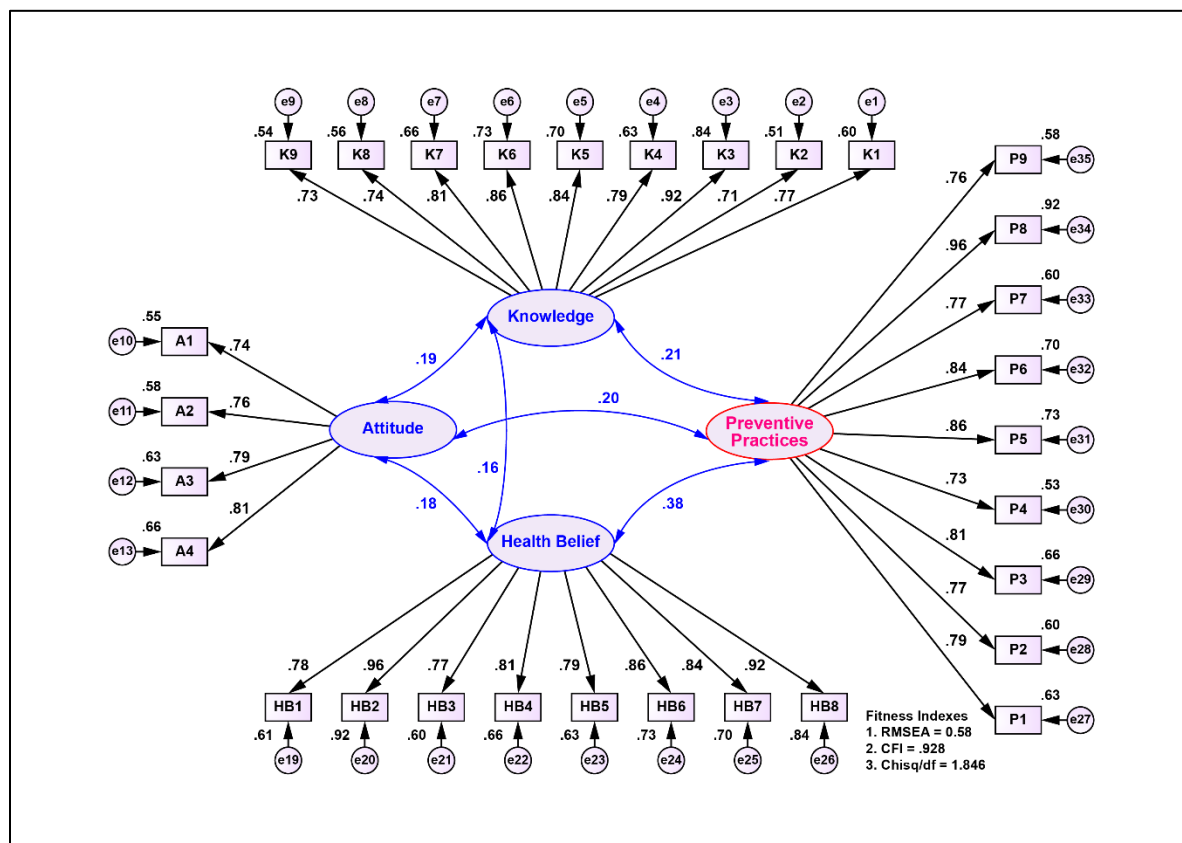


Figure 1: Analysis of Pooled-CFA

The researcher should analyze the factor loadings at the item level, correlations at the construct level, and evaluate the fitness of the measurement model using the CFA results. Factor loading quantifies the significance of each item in assessing its constructs, whereas fitness indices demonstrate the construct validity. The construct validity assessment is based on the fitness indices, which are presented in Table 4. The fitness indices fulfilled the requirements for construct validity, as proposed by Awang (2011, 2012, 2014, 2015), as seen in Table 5. Therefore, the measurement model has successfully achieved construct validity. Once all the prerequisites in the CFA have been met, researchers can utilize the SEM approach to address the hypothesis of the study.

Table 4: Results of fitness indexes for pooled confirmatory factor analysis (CFA)

No.	Category Name	Index Name	Index Value	Findings
1	Absolute fit	RMSEA	0.058	Reach the set level
2	Incremental fit	CFI	0.928	Reach the set level
3	Parsimonious fit	ChiSq/df	1.846	Reach the set level

Table 5: Factor loading value, CR and AVE each construct

Constructs	Items	Factor Lording	CR (> 0.6)	AVE (> 0.50)
Knowledge	K1	0.77	0.941	0.640
	K2	0.71		
	K3	0.92		
	K4	0.79		
	K5	0.84		
	K6	0.86		
	K7	0.81		
	K8	0.75		
	K9	0.73		
Attitude	A1	0.76	0.890	0.670
	A2	0.86		
	A3	0.84		
	A4	0.81		
Health Belief	HB1	0.78	0.952	0.712
	HB2	0.96		
	HB3	0.77		
	HB4	0.81		
	HB5	0.79		
	HB6	0.86		
	HB7	0.84		
	HB8	0.92		
Preventive Practices	P1	0.79	0.946	0.660
	P2	0.77		
	P3	0.81		
	P4	0.73		
	P5	0.86		
	P6	0.84		
	P7	0.77		
	P8	0.96		
	P9	0.76		

Subsequently, the study must calculate the Average Variance Extracted (AVE) value for each construct to evaluate its convergent validity. In order to assess the reliability of evaluating a particular construct, the study also calculates the construct's coefficient alpha (CR). The AVE must be at least 0.5, whereas the CR must be at least 0.6. Table 5 displays the mean values of AVE (Average Variance Extracted) and CR (Composite Reliability). Table 4 demonstrates that, in relation to their specific threshold values of 0.5 and 0.6, all AVE and CR values surpassed the thresholds set by Awang in his studies conducted in 2011, 2012, 2014, and 2015. Therefore, the results indicate that there is evidence of convergent validity and composite dependability for this latent construct.

Establishing the absence of a strong connection between all constructs relies on the discriminant validity, which is useful in preventing concerns related to multicollinearity (Awang, 2014; 2015; Awang et al., 2015; Kashif et al., 2016; Hoque et al., 2017). Table 6 displays a concise overview of the discriminant validity index. The correlations between the respective pair of constructions represent the other values, while the bold diagonal values represent the corresponding structures as "square root of the AVE". If the values of the AVE (Diagonal) are greater than any other value in its row and column, the discriminant validity meets the requirements set by Awang (2014; 2015), Kashif et. al. (2015), and Hoque et. al. (2017). Table 7 displays the tabulated values that satisfy the requirement of discriminant validity. Thus, the analysis demonstrated that the model achieves discriminant validity for each construct.

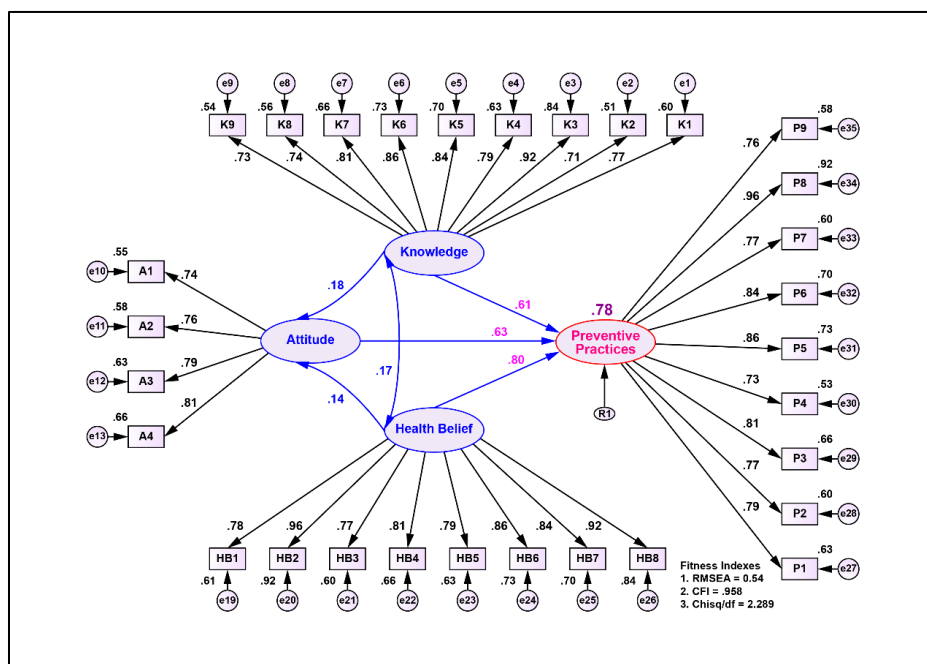
Table 6: Summary of the discrimination validity index for all constructs

Constructs	Knowledge	Attitude	Health Belief	Preventive Practices
Knowledge	0.800			
Attitude	0.190	0.818		
Health Belief	0.140	0.160	0.844	
Preventive Practices	0.210	0.160	0.360	0.812

Table 7: Normal distribution assessment for measuring items for constructs

Variable	Min	Max	Skew	C.R.	Kurtosis	C.R.
P1	1.000	5.000	-0.350	-1.610	-0.547	-1.259
P2	1.000	5.000	0.115	0.527	-1.190	-2.736
P3	1.000	5.000	-0.804	-6.656	0.191	0.790
P4	1.000	5.000	0.073	0.337	-0.908	-2.089
P5	1.000	5.000	-0.273	-1.258	-0.111	-0.256
P6	1.000	5.000	-0.506	-4.187	-0.979	-4.051
P7	1.000	5.000	-0.102	-0.471	-0.633	-1.457
P8	1.000	5.000	-0.277	-1.274	-0.226	-0.519
P9	1.000	5.000	0.105	0.483	0.197	0.453
HB1	2.000	5.000	-0.266	-1.224	-0.686	-1.577
HB2	1.000	5.000	-0.586	-2.698	1.467	3.374
HB3	2.000	5.000	-0.742	-6.140	0.487	2.015
HB4	1.000	5.000	0.160	1.327	-0.994	-4.115
HB5	1.000	5.000	-0.941	-7.792	1.257	5.203
HB6	1.000	5.000	-0.222	-1.022	-0.612	-1.407
HB7	1.000	5.000	-0.643	-2.958	0.191	0.438
HB8	1.000	5.000	0.057	0.471	-1.283	-5.310
A1	1.000	5.000	-0.302	-2.377	0.207	0.796
A2	1.000	5.000	-0.279	2.199	0.305	1.201
A3	1.000	5.000	-0.227	-1.794	-0.348	-1.371
A4	1.000	5.000	-0.181	-1.425	-0.509	-2.342
K1	1.000	5.000	-0.131	-0.602	-1.330	-3.060
K2	1.000	5.000	-0.381	-1.754	-0.732	-1.683
K3	1.000	5.000	-0.759	-6.278	0.092	0.381
K4	1.000	5.000	-0.668	-5.532	-0.634	-2.622
K5	1.000	5.000	-0.279	-1.284	-0.580	-1.334
K6	1.000	5.000	-0.049	-0.406	-0.663	-2.743
K7	1.000	5.000	-0.528	-2.431	0.518	1.191
K8	1.000	5.000	-0.449	-2.065	-0.041	-0.094
K9	2.000	5.000	-0.904	-7.486	0.778	3.219
Multivariate					205.368	45.055

STRUCTURAL MODEL



Figure

2:

Standardized regression weight

The R1 value to Preventive Practices construct is 0.78. It shows that the three predictors in the model namely Knowledge, Attitude, and Health Belief, accounted for 78% of Preventive Practices from the study population (Figure 2).

Table 8: Regression value and probability (p) value

Constructs		Constructs	Estimate	S.E.	C.R.	P	Results
Preventive Practices	<---	Knowledge	0.68	0.312	2.176	0.030	Significant
Preventive Practices	<---	Attitude	0.60	0.125	4.512	***	Significant
Preventive Practices	<---	Health Belief	0.86	0.109	8.045	***	Significant

*** Significant value at level of understanding, $p < 0.001$

The results of this study from Table 8 show that the Knowledge construct, Attitude, and Health Belief have a positive and significant influence on the construct of Preventive Practices. Hence, H1 hypothesis testing in this study is supported based on the observed data. Among the exogenous constructs, Health Belief construct ($\beta = 0.86$, p -value = ***) is viewed as the most important construct in the model, followed by Knowledge ($\beta = 0.68$, p -value = 0.030) and Attitude ($\beta = 0.60$, p -value = ***) .

IMPLICATION OF THE THEORY

The Health Belief Model (Abraham & Sheeran, 2005; Anuar et al., 2020; Vahedian-Shahroodi et al., 2021; Ghorbani-Dehbalaei et al., 2021; Jose et al., 2021) has had a major influence on public health research. Predicting preventive health behaviors and enabling the design of health treatments has shown dependability using the models put out by Becker (1974) and Rosenstock (1974). Drawing on and referencing the Health Belief Model (Green et al., 2020; Saghafi-Asl et al., 2020; Azadi et al., 2021; Rajamoorthy et al., 2022; Yusop et al., 2023), the health interventions program has been widely implemented over several years. Emphasizing its direct and clear influence, our present study shows a strong association between the Health Belief Model and preventative behaviors. This suggests that influencing preventative behaviors depends much on health attitudes. Especially, the results of this investigation are rather consistent with those who similarly found a significant positive association between these two constructs, Qudsiah et al. (2017), Rajamoorthy et al. (2022), Hamirudin et al. (2021), and Amin et al. (2023).

DISCUSSION AND IMPLICATION TO THE PRACTICE

Focusing on knowledge, attitude, and health beliefs, this study evaluated the preventive strategies of HFMD among kindergarten caregivers. The results of the investigation show that the efficacy of preventative actions against HFMD increases with knowledge, attitude, and health beliefs.

The 2020 Kwol et al. and the 2021 Yang et al. underline the need of information, attitude, and actions in many spheres of daily life. These three parts taken together form a dynamic system. The HBM is helpful since it provides a logical framework of ideas that helps one to grasp how demographic traits affect the process of decision-making for a healthy lifestyle. Moreover, it acts as a motivation for people to engage in learning. Wickramasinghe (2003) claims that knowledge and practice are closely related. Indeed, lack of practical experience renders information useless, resulting in simple ignorance and makes the knowledge useless. In their individual projects, Balle et al. (2020) and Raveendran et al. (2020) have tackled interdependence and knowledge. Therefore, it is imperative to apply knowledge of HFMD to properly stop the spread of the illness. Recent research indicates that the execution of preventative actions directly depends on information about HFMD. The results show that information is quite important for the acceptance of preventative actions. Information is thus seen as absolutely necessary as a first condition before starting preventative actions. The results of this research fit those recorded by Othman et al. (2021), Mansor and Ahmad (2021), and Qudsiah et al. (2017). But Mahadzar and Rahman (2019) looked at it themselves and found no correlation. Still, the present study shows a strong association suggesting that knowledge does in fact affect preventative actions. Attitude is important since it is less detrimental than action. Young (1968) advises those who claim that reactions are caused by attitudes to take into account that underlying reasons usually affect behaviors, thereby influencing attitudes. Attitudes include personal preferences for reacting to events, seeing and understanding events depending on particular tendencies, and arranging ideas into logical and related structures (Kaliyaperumal, 2004). One's attitude greatly determines the value of preventative actions. This study clearly shows how strongly and favorably attitude influences the execution of preventative actions. This runs counter to the results of a 2019 Mahadzar and Rahman study showing no correlation between practice and attitude.

CONCLUSION

Utilizing the Structural Equation Model, the study results have led to meaningful conclusions. It was found that knowledge, attitude, and health beliefs played a significant and positive role in influencing the preventive practices adopted by the study participants. Consequently, statistical data has provided evidence for health concepts, beliefs, and understanding. Furthermore, it has been found that the size of the hypotheses significantly and positively impacts the effectiveness of HFMD preventive measures. Caretakers in kindergartens who participate in policy-making on HFMD in kindergartens may have a heightened awareness of this information. In addition, it can assist kindergartens in establishing a secure environment for both caregivers and children by complying with rules and promoting a wholesome atmosphere to prevent the spread of Hand, Foot, and Mouth Disease (HFMD). Government and social policy

intervention can enhance caregivers' awareness of HFMD. The preceding comments underscore the distinctiveness and robustness of the present study, as it is one of the few undertaken in Malaysia that investigates the correlation between knowledge, attitude, and health beliefs regarding preventative measures for HFMD. Furthermore, it provides valuable insights on the implementation of policies in kindergartens. These findings suggest that knowledge, attitude, and health belief play crucial roles in implementing effective strategies to prevent HFMD. Additionally, it facilitates the identification of any discrepancies among kindergarten educators. Therefore, this study offers significant and valuable perspectives on addressing the issue of HFMD prevention.

LIMITATION AND FUTURE RESEARCH

Multiple limitations necessitate more investigation. One notable drawback is that the study was confined to a specific geographic region, specifically the caregivers of Kuala Nerus kindergartens. Consequently, there is a possibility that the findings may not be applicable to a broader demographic, specifically all kindergarten educators in Malaysia. Moreover, due to the cross-sectional nature of the study, the findings do not consider any alterations in the population over time. Consequently, it is not feasible to examine the chronological order of the variables. Examining data from multiple time periods is necessary to evaluate each cause-and-effect relationship between variables. In addition, the researcher's comprehension of the responses' meanings may be hindered if closed-ended surveys and multiple-choice questions are employed. This limitation could impede the capacity to foresee ideals that may not adequately capture the subtleties of expression. Due to their reliability and cost-effectiveness, questionnaires are frequently employed by researchers to collect data. As a result, the self-administered questionnaire used in the study may include elements that are not easily understood by some individuals, potentially resulting in replies that are influenced by bias. Furthermore, potential biases may have arisen due to the data collection not taking place during the height of the infection period. In order to obtain a more comprehensive perspective, it is necessary to expand the research and compare its findings with those of other states. It is essential to interpret the data in a manner that accurately represents a significant population with a substantial response rate. This work holds significance across various domains. It is strongly recommended to use a scaled questionnaire, specifically an interval scale, when designing one for a research project because it allows for accurate measurement and distinction between choices. Utilizing nominal and ordinal scales is not preferable as they do not consider quantitative perspectives. An interval scale is a representation of a set of values that have equal intervals on a preset scale. Precise calculation of the variance between variables can be achieved with the aid of scientific indicators. In addition, utilizing qualitative research methodologies may provide a more comprehensive elucidation of the results. This allows the researcher to evaluate the importance of the feedback. Instead, it is recommended to directly study the chosen persons in their natural environment to gain a more profound understanding.

CONFLICT OF INTEREST: The author(s) declare that they do not have any conflicts of interest related to the subject matter or materials addressed in this manuscript.

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