

**KNOWLEDGE AND PREVENTION PRACTICES
OF HAND, FOOT AND MOUTH DISEASE (HFMD)
AMONG PARENTS WHO VISITED HOSPITAL
PAKAR UNIVERSITI SAINS MALAYSIA (HPUSM)**

NUR FAZLIN ADRIN BINTI SAKRI

**BACHELOR IN NURSING
SCHOOL OF HEALTH SCIENCES
UNIVERSITI SAINS MALAYSIA**

2025

**KNOWLEDGE AND PREVENTION PRACTICES
OF HAND, FOOT AND MOUTH DISEASE (HFMD)
AMONG PARENTS WHO VISITED HOSPITAL
PAKAR UNIVERSITI SAINS MALAYSIA
(HPUSM)**

by

NUR FAZLIN ADRIN BINTI SAKRI

**Dissertation submitted in partial fulfilment of the requirements
for the degree of
Bachelor in Nursing**

August 2025

DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.



Nur Fazlin Adrin binti Sakri (158140)

Student of Bachelor of Nursing (Honors)

School of Health Sciences

Universiti Sains Malaysia

Health Campus

16150 Kubang Kerian

Kelantan

Date: 03rd August 2025

ACKNOWLEDGEMENT

I would like to express my heartfelt gratitude to Dr. Noor Shuhada binti Salleh, my supervisor, for her dedicated guidance, unwavering support, and continuous encouragement throughout this research journey. Her valuable insights and professional advice have helped me stay focused and motivated, especially during challenging times. This study would not have been possible without her expert supervision and kind patience in guiding me through each stage of the process.

My sincere thanks also go to the Director of Hospital Pakar Universiti Sains Malaysia (HPUSM) for granting me the opportunity and permission to conduct my research within the institution. I am especially grateful to all the participants who took part in my study. Their willingness to contribute their time and share their experiences made this research a meaningful and insightful one.

I am forever indebted to my beloved parents, Mrs. Marsuhada binti Ab Rahman and Mr. Sakri bin Hamzah, for their unconditional love, encouragement, and moral support. Their prayers and constant belief in me have been the foundation of my strength. I would also like to thank my dear friend, Siti Zulaikha binti Zainuddin, for her continuous support, motivation, and companionship throughout this journey.

Lastly, I would like to acknowledge all individuals who, directly or indirectly, contributed to the successful completion of my thesis. Words may not suffice to express my gratitude, but I carry immense appreciation in my heart for all the kindness and support extended to me.

TABLE OF CONTENTS

CERTIFICATE	iii
DECLARATION	iv
ACKNOWLEDGEMENT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF ABBREVIATIONS	xii
LIST OF APPENDICES	xiii
ABSTRAK	xiv
ABSTRACT	xvi
CHAPTER 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Background of the Study	1
1.3 Problem Statement	3
1.4 Research Questions	5
1.5 Research Objectives	6
1.5.1 General Objective	6
1.5.2 Specific Objectives	6
1.6 Research Hypothesis	6
1.7 Significance of the Study	7
1.8 Definitions of Operational Terms	8
CHAPTER 2 LITERATURE REVIEW	10
2.1 Introduction	10
2.2 Hand, Foot and Mouth Disease (HFMD)	10
2.3 Prevalence of HFMD According to Age Group	11

2.4	Pathophysiology of HFMD	12
2.5	Clinical Manifestations of HFMD	13
2.6	Knowledge of HFMD	14
2.7	Prevention Practices of HFMD	15
2.8	Relationship between Knowledge and Prevention Practices of HFMD	17
2.9	Conceptual Framework of the Study	18
CHAPTER 3 METHODOLOGY		21
3.1	Introduction	21
3.2	Research Design	21
3.3	Study Setting and Population	21
3.3.1	Sample Criteria	22
3.3.1(a)	Inclusion Criteria	22
3.3.1(b)	Exclusion Criteria	22
3.4	Sampling Plan	23
3.4.1	Sample Size Estimation	23
3.4.2	Sampling Methods	26
3.5	Instrumentation	26
3.5.1	Instruments	26
3.5.2	Translation of the Instrument	27
3.5.3	Validation and Reliability of the Instrument	28
3.6	Variables	28
3.6.1	Measurement of Variables and Variable Scoring	29
3.7	Data Collection Methods	31
3.7.1	Flow Chart of Data Collection	32
3.8	Ethical Consideration	33
3.9	Data Analysis	34

CHAPTER 4	RESULT	35
4.1	Introduction	35
4.2	Socio-demographic Characteristics	35
4.3	Level of Knowledge of HFMD	36
4.4	Level of Prevention Practices of HFMD	39
4.5	Relationship between the Level of Knowledge and Prevention Practices of HFMD	42
CHAPTER 5	DISCUSSION	44
5.1	Introduction	44
5.2	Level of Knowledge of HFMD	44
5.3	Level of Prevention Practices of HFMD	45
5.4	Relationship between the Level of Knowledge and Prevention Practices of HFMD	47
5.5	Strengths and Limitations	48
CHAPTER 6	CONCLUSION AND FUTURE RECOMMENDATIONS	50
6.1	Introduction	50
6.2	Summary of the Study Findings	50
6.3	Implications and Recommendations	51
6.3.1	Implications to Nursing Practice	51
6.3.2	Implications to Nursing Education	51
6.3.3	Recommendation for Future Research	52
6.4	Conclusion	52
REFERENCES		53
APPENDICES		
Appendix A	Questionnaire	63
Appendix B	Research Information for Participants	69
Appendix C	Consent Forms	74
Appendix D	Ethical Approval	76

Appendix E	Letter of Hospital Approval	77
Appendix F	Permission to Use the Instrument	78
Appendix G	Recruitment Poster	79
Appendix H	Pamphlet Honorarium	80

LIST OF TABLES

	Page
Table 1.1 Conceptual and operational definitions	8
Table 3.1 Independent and dependent variables	28
Table 3.2 Scoring level of knowledge of HFMD	30
Table 3.3 Scoring level of prevention practices of HFMD	30
Table 3.4 Data analysis plan	34
Table 4.1 Socio-demographic characteristics of the participants	36
Table 4.2 Level of knowledge of HFMD of participants based on Bloom's cut-off point	37
Table 4.3 Distribution of response for each item on knowledge of HFMD	38
Table 4.4 Level of prevention practices of HFMD of participants based on Bloom's cut-off point	40
Table 4.5 Distribution of response for each item on prevention practices of HFMD	41

LIST OF FIGURES

	Page
Figure 2.1 Number of HFMD cases in Malaysia based on the age group (MOH Malaysia, 2023).....	11
Figure 2.2 Health Belief Model (HBM) by Glanz et al. (2008).....	19
Figure 2.3 Conceptual framework adopted from the Health Belief Model (HBM)..	20
Figure 3.1 Sample size calculation for the association between the level of knowledge and prevention practice of HFMD.....	25
Figure 3.2 Flow chart of data collection	33

LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
CVA16	Coxsackievirus A16
EV71	Enterovirus 71
HBM	Health Belief Model
HFMD	Hand, Foot and Mouth Disease
HPUSM	Hospital Pakar Universiti Sains Malaysia

LIST OF APPENDICES

Appendix A	Questionnaire
Appendix B	Research Information for Participants
Appendix C	Consent Forms
Appendix D	Ethical Approval
Appendix E	Letter of Hospital Approval
Appendix F	Permission to Use the Instrument
Appendix G	Recruitment Poster
Appendix H	Pamphlet Honorarium

**PENGETAHUAN DAN LANGKAH PENCEGAHAN TERHADAP
PENYAKIT TANGAN, KAKI DAN MULUT (HFMD) DALAM KALANGAN
IBU BAPA MELAWAT KE HOSPITAL PAKAR UNIVERSITI SAINS
MALAYSIA**

ABSTRAK

Penyakit Tangan, Kaki dan Mulut (HFMD) ialah penyakit virus yang sangat mudah berjangkit dan lazimnya menyerang kanak-kanak. Walaupun kebiasaannya ringan, komplikasi serius boleh berlaku sekiranya tidak mendapat rawatan tepat pada masanya. Kajian keratan rentas ini bertujuan untuk menilai tahap pengetahuan dan langkah pencegahan berkaitan HFMD dalam kalangan ibu bapa yang mengunjungi Hospital Pakar Universiti Sains Malaysia (HPUSM), serta untuk mengkaji hubungan antara pengetahuan dan langkah pencegahan. Seramai 191 orang ibu bapa telah mengambil bahagian dalam kajian ini menggunakan soal selidik yang sah dan dikendalikan sendiri, yang diadaptasi daripada kajian-kajian terdahulu. Instrumen yang digunakan mengukur ciri-ciri sosiodemografi, pengetahuan mengenai HFMD dan amalan pencegahan. Respons diklasifikasikan menggunakan titik potong Bloom. Keputusan menunjukkan bahawa 52.8% daripada responden mempunyai tahap pengetahuan yang tinggi, 44.6% tahap sederhana, dan 0.5% tahap rendah. Dari segi amalan pencegahan, 87.2% melaporkan amalan yang baik, 10.8% tahap sederhana, dan tiada yang melaporkan amalan yang lemah. Langkah-langkah biasa yang diamalkan termasuk kerap mencuci tangan, mengelakkan kawasan sesak semasa wabak, serta membersihkan mainan dan permukaan. Walau bagaimanapun, masih terdapat beberapa salah tanggapan, terutamanya berkaitan cara penularan dan tahap keterukan penyakit. Analisis korelasi Pearson menunjukkan hubungan yang lemah

dan positif tetapi tidak signifikan secara statistik ($r = 0.118$, $p = 0.103$) antara pengetahuan dan amalan pencegahan. Ini mencadangkan bahawa pengetahuan semata-mata mungkin tidak mencukupi untuk mempengaruhi tingkah laku, dan faktor lain seperti persepsi risiko serta norma sosial turut memainkan peranan penting. Secara keseluruhannya, kajian ini menunjukkan tahap pengetahuan dan langkah pencegahan yang tinggi dalam kalangan ibu bapa di HPUSM. Namun begitu, inisiatif pendidikan kesihatan yang lebih tertumpu masih diperlukan bagi menangani jurang pengetahuan dan menggalakkan amalan kebersihan yang berterusan untuk membendung penularan HFMD.

**KNOWLEDGE AND PREVENTION PRACTICES OF HAND, FOOT AND
MOUTH DISEASE (HFMD) AMONG PARENTS WHO VISITED HOSPITAL
PAKAR UNIVERSITI SAINS MALAYSIA (HPUSM)**

ABSTRACT

Hand, Foot and Mouth Disease (HFMD) is a highly contagious viral illness that primarily affects children. While typically mild, severe complications may arise without timely intervention. This cross-sectional study aimed to assess the level of knowledge and preventive practices regarding HFMD among parents who visited Hospital Pakar Universiti Sains Malaysia (HPUSM), and to examine the relationship between knowledge and preventive behaviour. A total of 191 parents participated using a validated, self-administered questionnaire adapted from previous studies. The instruments measured socio-demographic characteristics, knowledge of HFMD, and preventive practices. Responses were classified using Bloom's cut-off points. Results showed that 52.8% of respondents had a high level of knowledge, 44.6% moderate, and 0.5% low. In terms of preventive practices, 87.2% reported good practices, 10.8% moderate, and none reported poor practices. Common measures included frequent handwashing, avoiding crowded areas during outbreaks, and cleaning toys and surfaces. However, some misconceptions persisted, particularly regarding modes of transmission and the severity of the disease. Pearson's correlation analysis revealed a weak, positive but statistically insignificant relationship ($r = 0.118$, $p = 0.103$) between knowledge and preventive practices. This suggests that knowledge alone may not sufficiently influence behaviour, and that other factors such as risk perception and social norms may also play a critical role. Overall, the study indicates a generally high level of knowledge and good preventive practices among parents at

HPUSM. Nonetheless, targeted health education initiatives remain necessary to address knowledge gaps and promote sustained hygiene practices to curb the transmission of HFMD.

CHAPTER 1

INTRODUCTION

1.1 Introduction

This research aimed to investigate the knowledge and preventive practices regarding hand, foot and mouth disease (HFMD) among parents who visited Hospital Pakar Universiti Sains Malaysia (HPUSM). The initial chapter began by presenting the study's background, identifying the research problem, formulating research questions, outlining the study's objectives, and stating the research hypotheses. It also emphasised the significance of the study and clearly defined the key terms used throughout the study.

1.2 Background of the Study

Hand, foot, and mouth disease (HFMD) is a common infectious illness caused by various enteroviruses, including Coxsackievirus A16 (CVA16) and Enterovirus 71 (EV71) (Guerra & Waseem, 2019). It has emerged as a significant public health concern in the Asia-Pacific region, with its incidence increasing over the past two decades (Koh et al., 2016). While HFMD primarily affects children under the age of five, cases have also been reported among adults. Young children are particularly susceptible to EV71 due to their developing immune systems and the close contact they experience in nursery or childcare settings (Zhu et al., 2023). In most instances, HFMD is self-limiting, with affected children typically recovering from mild symptoms within one to two weeks. However, a small proportion of cases may develop serious complications, such as meningitis, encephalitis, acute flaccid paralysis, and neurorespiratory syndrome (Aswathyraj et al., 2016).

HFMD is primarily transmitted through direct person-to-person contact with nasal discharge, saliva, and vesicular fluid, or via the faecal-oral route, facilitating rapid spread within communities (Huang et al., 2015). Indirect transmission may also occur through contact with contaminated objects handled by infected individuals. Yang et al. (2016) identified attending kindergartens or childcare centres and visiting public playgrounds as significant risk factors for HFMD. Additionally, Xie et al. (2014) reported that frequent visits to public playgrounds and behaviours such as finger-sucking were commonly associated with a large proportion of HFMD cases. Living close to other HFMD cases or sharing the same classroom further increased the risk of infection beyond the risk posed by public areas alone (Thammasonthijarern et al., 2021).

Esposito and Principi (2018) described that patients with classic HFMD typically present with low-grade fever and general malaise, along with a maculopapular or vesicular rash or blisters on the hands, soles, and buttocks, as well as painful ulcerative lesions in the throat, mouth, and tongue. A study by Wang et al. (2020) found that a fever lasting more than three days was a risk factor for poor prognosis, whereas the presence of a rash lasting over three days or the appearance of herpes in the oral cavity or on the cheek appeared to act as protective factors. This may be because HFMD is often recognised by the presence of a rash. As skin rashes are visible signs, parents are more likely to seek medical attention for their children, enabling timely treatment. In contrast, patients without rashes or other visible symptoms are less likely to be brought to the hospital, as parents may be unaware of the illness, which can increase the risk of severe HFMD or even death (Peng et al., 2023).

Given its highly contagious nature, one of the most effective preventive measures against HFMD is frequent handwashing with soap and water for at least 20 seconds, especially after activities such as changing nappies, using the toilet, coughing, sneezing, or blowing the nose (Centers for Disease Control and Prevention (CDC), 2024). In a study by Guo et al. (2018), village doctors trained parents on various HFMD prevention practices, including the six steps of handwashing, when handwashing is necessary, preparing separate towels for each child and boiling them at least once a week, using individual eating utensils for each child, cleaning toys weekly particularly after being shared or taken home, and restricting outdoor activities for children with respiratory or gastrointestinal symptoms or HFMD. The isolation of sick children was also emphasised. Following the intervention, parents demonstrated significant improvements in their knowledge of HFMD, hand hygiene habits, and overall hygiene practices (Guo et al, 2018). Chan et al. (2017) additionally recommended public health measures such as promoting personal and hand hygiene, conducting regular body checks, environmental disinfection, temporary closure of facilities, and implementing sentinel surveillance to help control HFMD outbreaks.

1.3 Problem Statement

According to previous studies, researchers found that some parents had insufficient knowledge of HFMD, particularly regarding general information about the illness (Rajamoorthy et al., 2022b; Qi et al., 2019). Parents typically acquired information about HFMD from various sources, including the internet, newspapers, and healthcare facilities, which helped them stay informed. Although some parents

had previously received information about HFMD mainly from television but many still lacked adequate knowledge, especially regarding its causes and general characteristics (Charoenchokpanit & Pumpaibool, 2013). According to Mohd Hamirudin et al. (2021), this was concerning, as some parents were not well-informed about the basic aspects of HFMD, including its transmission, signs and symptoms, complications, prevention, and treatment.

In terms of preventive practices, the majority of parents were aware of the importance of cleaning their children's toys using liquid disinfectants. However, many remained unaware of the critical role that handwashing plays in preventing HFMD (Mansor & Ahmad, 2021). Additionally, Rajamoorthy et al. (2022b) noted that some parents did not view toy cleaning as an effective preventive measure. Suliman et al. (2017) reported that some parents found washing toys to be burdensome or inconvenient. A study by Wang and Pang (2022) further indicated that, according to teachers in childcare centres, some parents failed to keep their HFMD-infected children at home for the full duration specified on medical certificates. These findings highlighted the need to raise awareness among parents regarding the importance of adopting effective preventive practices against HFMD. High levels of knowledge and good hygiene practices were essential for parents in managing the disease and preventing its spread among children.

Furthermore, the importance of preventive practices needs to be emphasised to parents to reduce the transmission of HFMD among children. A study by Sun et al. (2016) identified the faecal-oral route as the primary mode of HFMD transmission in children. This was supported by Han et al. (2010), who found that the EV71 virus could survive longer in faeces than in throat swabs, indicating that it could persist on environmental surfaces. Therefore, parents and other family members needed to

possess strong knowledge of hygiene practices, particularly handwashing after handling nappies or using the toilet, as they could serve as vectors for HFMD transmission (Hamaguchi et al., 2008). Practising proper hygiene could reduce the incidence of HFMD and lower the risk of complications. Although complications from HFMD-related viral infections are rare, they require immediate medical attention when they do occur.

Since 2021, five studies on HFMD among parents in Malaysia have been conducted, mostly including rural and suburban regions such as Selangor, Melaka and Pulau Pinang (Abu et al., 2024; Mansor & Ahmad, 2021; Rajamoorthy et al., 2022a; Rajamoorthy et al., 2022b; Shahar et al., 2022). However, no specific study has explored the knowledge and prevention practices of HFMD among parents in Kelantan. According to a 2023 report by the Ministry of Health (MOH) Malaysia, Kelantan recorded 397 HFMD cases, highlighting the need for localised research. Therefore, the present study aimed to address this gap by assessing the level of knowledge and preventive practices regarding HFMD among parents who visited Hospital Pakar Universiti Sains Malaysia (HPUSM). By focusing on this specific population, the study sought to provide valuable insights into existing prevention strategies, identify areas in need of improvement, and ultimately contribute to more effective HFMD control efforts in Kelantan.

1.4 Research Questions

The research questions for this study were as follows:

1. What is the level of knowledge of HFMD among parents who visited HPUSM?

2. What is the level of prevention practices of HFMD among parents who visited HPUSM?
3. Is there any relationship between the level of knowledge and prevention practices of HFMD among parents who visited HPUSM?

1.5 Research Objectives

Research objectives indicated more details about the specific research topic or issues the project planned to investigate, hence paving the way for deciding the research project's design.

1.5.1 General Objective

The general objective of this study was to determine the level of knowledge and prevention practices of HFMD among parents who visited HPUSM.

1.5.2 Specific Objectives

The specific objectives for this study were as follows:

1. To assess the level of knowledge of HFMD among parents who visited HPUSM.
2. To assess the level of prevention practices of HFMD among parents who visited in HPUSM.
3. To determine the relationship between the level of knowledge and prevention practices of HFMD among parents who visited HPUSM.

1.6 Research Hypothesis

Null hypothesis (H_0):

There is no relationship between the level of knowledge and prevention practices of HFMD among parents visited HPUSM.

Alternative hypothesis (H₁):

There is a relationship between the level of knowledge and prevention practices of HFMD among parents visited HPUSM.

1.7 Significance of the Study

While many parents had a good understanding of the signs and symptoms of HFMD, some remained uncertain about how the disease was transmitted. This confusion likely stemmed from a lack of clear information regarding transmission routes, such as direct contact with infected individuals or contact with contaminated surfaces. These gaps in understanding hindered parents' ability to effectively protect their children, highlighting the need for targeted educational initiatives that clearly explain both the modes of HFMD transmission and appropriate prevention strategies. By providing comprehensive information on both aspects, such initiatives aimed to support parents in adopting more effective preventive measures. Enhancing parental knowledge was therefore a key strategy in reducing the incidence of the disease, promoting better health outcomes, and fostering a healthier community. This study was particularly significant as it sought to address these knowledge gaps, ensuring that parents in Kelantan were well-informed and better equipped to protect their children from HFMD.

The findings and implications of this study were centred on improving awareness of HFMD and promoting effective prevention practices among parents. Previous research, including a study by Suliman et al. (2017), indicated that there was a lack of published studies focusing specifically on how mothers in Malaysia

prevent HFMD. This highlighted a gap in the available information that could help parents safeguard their children against the disease. By undertaking this study, the researchers aimed to provide valuable data that could support future research into parental knowledge and prevention practices related to HFMD. The study's findings could contribute to enhanced educational efforts, enabling parents to better understand the illness and implement effective preventive measures to protect their children.

1.8 Definitions of Operational Terms

The operational terms used in this study were shown below:

Table 1.1 Conceptual and operational definitions

	Conceptual Definition	Operational Definition
Knowledge	An individual's capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Shikha et al., 2023).	This study assessed HFMD-related knowledge among parents using a self-administered questionnaire adopted from Mansor and Ahmad (2021).
Prevention Practices	Primary prevention consists of activities undertaken to prevent disease or injury before it occurs, such as immunisation, health education, hygiene measures, environmental sanitation, and lifestyle interventions (Tulchinsky	This study assessed HFMD-prevention practices among parents using a self-administered questionnaire adopted from Mansor and Ahmad (2021).

	& Varavikova, 2014).	
Hand, Foot and Mouth Disease (HFMD)	A common infectious disease that occurred most often in children but also affected adolescents and occasionally adults (World Health Organization, 2018).	In this study, HFMD referred to a contagious disease characterised by skin rash on the hands, soles, and buttocks, as well as fever and malaise.
Parents	Parents were the primary caretakers who were better informed about child care, especially in health decisions for young children (Elder et al., 2014).	In this study, parents referred to any adults with children under their care who visited HPUSM.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents a comprehensive review of the literature related to hand, foot, and mouth disease (HFMD). It begins with an overview of HFMD, including its definition, prevalence across different age groups, pathophysiology, and clinical manifestations. The chapter then explores existing research on parental knowledge of HFMD, followed by prevention practices among parents. In addition, it reviews studies that have investigated the relationship between parental knowledge and preventive behaviours. The final section outlines the theoretical and conceptual frameworks that underpin this study.

2.2 Hand, Foot and Mouth Disease (HFMD)

Outbreaks of HFMD often occur during the summer and early fall in countries such as Australia and the United States; however, seasonal patterns in the Asia-Pacific region vary according to climate zones (Koh et al., 2016). In temperate regions, cases tend to peak in early summer, whereas in tropical climates such as Hong Kong and Taiwan, outbreaks typically occur in late spring and fall. In other countries, including Malaysia, Singapore, Thailand, and Vietnam, HFMD outbreaks may occur sporadically throughout the year (Yee, 2024). Notably, only outbreaks involving a large number of severe cases are typically monitored, and the frequency of reports is influenced by increased public awareness and demand for diagnostic testing during outbreak periods.

A nationwide surveillance system was implemented in 2008, categorising HFMD as a Class C notifiable disease (Yuan et al., 2024). A notifiable disease refers

to any condition that, once diagnosed, must be reported by healthcare providers to local or state public health authorities due to its contagiousness, severity, or potential to cause widespread illness (CDC, 2022). Yuan et al. (2024) reported that a total of 24,559 HFMD cases were recorded in Jianshan, China, from 2016 to 2022. Except for 2020 and 2022, case numbers generally peaked between June and July, followed by a smaller secondary peak from October to December and a subsequent decline in February. In contrast, the trends observed in 2020 and 2022 showed a slower and more gradual increase in reported cases (Yuan et al., 2024).

2.3 Prevalence of HFMD According to Age Group

Hand, foot and mouth disease (HFMD) predominantly affects young children, particularly those under five years of age, although individuals of any age can be infected. According to the Ministry of Health Malaysia (2023), children aged one to six years recorded the highest number of HFMD cases, with 7,663 reported, followed by infants with 924 cases (Figure 2.1).

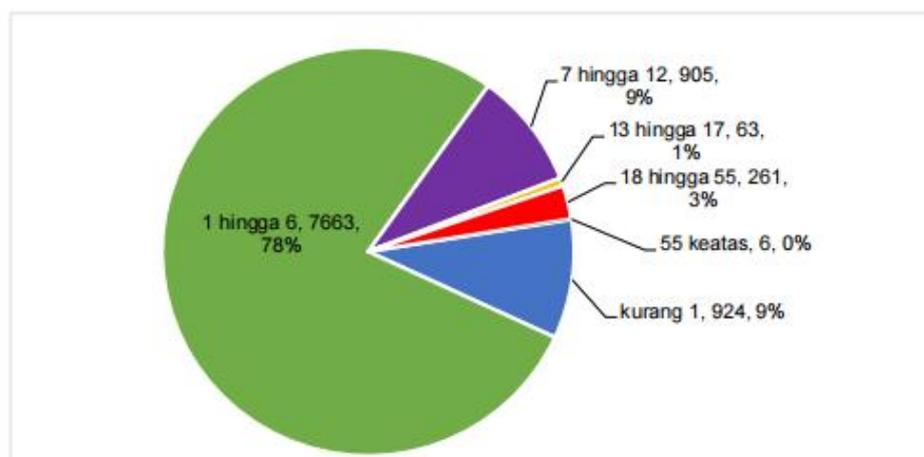


Figure 2.1 Number of HFMD cases in Malaysia based on the age group (MOH Malaysia, 2023)

A study conducted in Guangxi, China, reported 43,711 HFMD cases among children aged zero to five years in 2015 (Liu et al., 2019). Children under five years old often attend kindergartens, where they spend extended periods close to one another. Shared toys, utensils, and surfaces serve as common transmission vectors in such environments. Meanwhile, a study conducted in Bangkok, Thailand, found that the majority of severe HFMD cases occurred in infants under one year of age (Owatanapanich et al., 2015). This trend is likely since infants are still developing immunity to various pathogens, particularly Enterovirus 71 (EV71), which is a major causative agent of HFMD.

2.4 Pathophysiology of HFMD

Hand, foot, and mouth disease (HFMD) is primarily caused by viruses, most commonly Coxsackievirus A16 and Enterovirus 71. The main route of transmission is the faecal-oral route; however, the virus can also spread through contact with virally contaminated vesicular fluid, surfaces, fomites, oral secretions, and respiratory droplets (Solomon et al., 2010). Guerra and Waseem (2019) report that the virus can be detected in stool samples for up to six weeks following infection. The virus initially replicates in tissues of the tonsils, throat, and intestines. It infects immune cells such as M cells and lymphocytes located in Peyer's patches in the intestine. The virus's ability to survive stomach acids, enzymes, and bile enables it to disseminate to other organs. Following this, primary viremia occurs, during which the virus enters the bloodstream and spreads to target organs such as the brain, spinal cord, liver, spleen, and lymph nodes. The virus then multiplies further, leading to secondary viremia, which manifests clinically as rashes, fever, and mouth ulcers (Lavania & Tikute, 2023). Individuals with HFMD are most infectious during the

first week of illness, with an incubation period ranging from three to six days (Guerra & Waseem, 2019). Diagnosis of HFMD is confirmed based on epidemiological history, clinical symptoms, and laboratory nucleic acid testing (Xing et al., 2014).

2.5 Clinical Manifestations of HFMD

The clinical manifestations of HFMD vary from mild to moderate, and in some cases, severe symptoms. Tian et al. (2012), in a study conducted at Liaocheng People's Hospital, Shandong Province, China, reported that all HFMD patients presented with skin rashes. The most common locations of these rashes were the hands, feet, and oral mucosa. This study also found that all HFMD patients experienced fever above 38°C, with more than half (54.4%) having a high fever of 39°C or above. However, Lavania and Tikute (2023) noted that the most common clinical problem associated with HFMD is dehydration, caused by inadequate fluid intake secondary to odynophagia due to painful mouth ulcers. These ulcers, resembling aphthous ulcers, are usually located on the tongue, palate, buccal mucosa, gums, and lips. Additionally, most cases of HFMD related to diarrhoea (82.1%) are mild and do not present with severe gastrointestinal symptoms (Zhou et al., 2016). Therefore, parents should be aware of the signs and symptoms of HFMD and seek medical attention promptly when symptoms appear to prevent progression.

Severe complications of HFMD primarily involve the central nervous system (CNS), including aseptic meningitis, acute flaccid paralysis, and encephalomyelitis, with or without muscle weakness (Lavania & Tikute, 2023). Wang et al. (2016) found that some children develop significant systemic neurological symptoms, which can lead to neurogenic pulmonary oedema and cardiac and pulmonary failure.

Furthermore, Tian et al. (2012) reported that patients with severe HFMD exhibited CNS and cardiorespiratory symptoms such as myoclonic jerks (51.7%), tachypnoea (76.2%), and tachycardia (91.2%). Wang et al. (2014) highlighted that CNS involvement may present with vomiting, lethargy, limb weakness, gait disturbance, muscular convulsion, or flaccid paralysis, often requiring admission to the intensive care unit (ICU). If the disease progresses to cardiopulmonary failure, the mortality rate can reach approximately 80%. Thus, early identification of children at high risk for severe HFMD is essential to reducing mortality.

2.6 Knowledge of HFMD

Knowledge plays a critical role in the management and prevention of HFMD. Othman et al. (2012) reported that only 53.1% of parents were aware of the symptoms of HFMD. Children infected with HFMD may present with symptoms such as fever, ulcers in the throat, mouth, and tongue, rashes with vesicles on the hands, feet, and nappy area, as well as vomiting and diarrhoea. The study also found that 25% of parents were uncertain about the symptoms, while 21.9% did not know of them. This lack of awareness was attributed to parental confusion, as some mistook general fever-like symptoms such as diarrhoea and vomiting for unrelated illnesses. In contrast, Rajamoorthy et al. (2022b) reported that 96.5% of parents recognised red spots and blisters on the hands as clinical features of HFMD. This finding aligns with the guidance from the CDC (2024), which identifies red spots and blisters on the palms, soles, buttocks, legs, and arms as some of the most noticeable symptoms of HFMD.

In terms of transmission, significant gaps in knowledge were also observed. Charoenchokpanit and Pumpaibool (2013) found that 48.7% of parents had limited knowledge regarding how HFMD spreads. Furthermore, 47.1% of parents incorrectly believed that animals such as sheep, cattle, and pigs could transmit the disease to humans. Suliman et al. (2017) similarly reported that 52.8% of parents thought sheep could transmit HFMD a misconception likely stemming from confusion with foot-and-mouth disease, which has a similar name. Wang et al. (2020) also found that 46.0% of parents had inadequate understanding of HFMD transmission, with many failing to identify stool as a potential source of infection. Conversely, Rajamoorthy et al. (2022b) indicated that most parents demonstrated adequate knowledge regarding HFMD transmission routes; for example, 94% identified saliva as a primary transmission medium, while 75.5% recognised that contact with an infected individual could spread the disease (Wang et al., 2020).

2.7 Prevention Practices of HFMD

In this study, practice refers to the habitual behaviours of parents aimed at preventing HFMD, grounded in their daily routines. The CDC (2019) has outlined several preventive measures for HFMD, including regular handwashing, adherence to proper cough etiquette, avoidance of sharing personal items, frequent cleaning of toys, and refraining from visiting crowded public spaces, particularly playgrounds, during outbreaks, as well as keeping children at home during periods of illness.

Hand hygiene remains a fundamental strategy in the prevention of HFMD infection (Zhang et al., 2016). While many respondents in the study by Charoenchokpanit and Pumpaibool (2013) exhibited good preventive behaviour,

some concerning practices were reported. For example, 41.2% of respondents indicated that they rarely or never rubbed their hands for at least 20 seconds during handwashing. This is consistent with findings by Suliman et al. (2017), who reported that improper handwashing was the most commonly perceived barrier to effective prevention. Similarly, Mansor and Ahmad (2021) identified several under-practised behaviours related to hand hygiene, such as “washing hands before feeding children,” “thorough handwashing after using the toilet,” and “washing hands after changing children's nappies,” with mean scores of 6.51, 6.66, and 7.11, respectively. Increasing the frequency of handwashing with soap, along with daily bathing, has been shown to help prevent other communicable diseases, including diarrhoea and impetigo (Luby et al., 2005).

Another frequently overlooked preventive practice is the regular cleaning of children's toys. In Vietnam, mothers demonstrated a low frequency of this practice, with a mean score of 2.99 (Nga et al., 2016). Suliman et al. (2017) suggested that many parents may perceive cleaning fuzzy or delicate toys as time-consuming or tedious, serving as a barrier to consistent practice. Similarly, Rajamoorthy et al. (2022b) reported that some parents did not favour toy-cleaning practices. Supporting these findings, a study conducted in Thailand showed that 43.6% of respondents rarely or never cleaned toys after use. In contrast, Mansor and Ahmad (2021) found that cleaning children's toys was the second most frequently practised preventive behaviour among parents in Selangor, Malaysia. This observation is further supported by Wang and Pang (2022), who reported a high level of toy-cleaning practices, with a mean score of 4.72.

Avoiding crowded public areas and keeping children at home when ill are additional important preventive strategies. According to Rajamoorthy et al. (2022),

parents of children under the age of five recognised playgrounds and schools as major sources of HFMD transmission. However, Mansor and Ahmad (2021) observed that only a minority of parents were fully aware of the importance of avoiding public spaces during outbreaks. Similarly, a study conducted in Selangor, Malaysia, found that only 61.8% of respondents agreed with the practice of keeping sick children away from school, and 15.5% admitted to continuing to send their children to school during episodes of illness (Mohd et al., 2021).

2.8 Relationship between Knowledge and Prevention Practices of HFMD

Parents with higher knowledge tend to have higher preventive practice scores (Suliman et al., 2017). This supports the idea that a greater understanding of a disease encourages individuals to engage in preventive practices for HFMD. A previous study conducted in Vietnam reported a positive correlation between maternal knowledge about HFMD and maternal behaviour in preventing HFMD in young children (Nga et al., 2016). Mothers who are well-informed about HFMD are more likely to adopt strategies to protect their children from infection. Similarly, Charoenchokpanit and Pumpaibool (2013) identified knowledge as a significant predictor of preventive practices towards HFMD, indicating that knowledgeable parents are more likely to exhibit better preventive behaviours.

Conversely, other studies have reported only a weak positive relationship between knowledge and preventive practices (Mohd et al., 2021). This indicated that, while knowledge plays a role, it may not be the most influential factor in determining preventive behaviour. Moreover, Mahadzar and Abdul Rahman (2019) concluded that no significant association exists between knowledge of HFMD and actual

preventive practice. This suggests that even when parents possess knowledge about HFMD, it does not necessarily translate into behavioural changes to prevent the disease. Supporting this, Pang et al. (2015) argued that good knowledge and attitude do not always influence hygiene-related behaviour and daily preventive practices.

2.9 Conceptual Framework of the Study

One theoretical approach to understanding knowledge of HFMD and preventive practices is the Health Belief Model (HBM). This model is considered appropriate and has been selected as the theoretical framework for the present study. The HBM, developed by Glanz et al. (2008), aims to explain and predict individual health behaviour (Figure 2.2). According to the model, changes in health behaviour are influenced by six key domains: perceived susceptibility, perceived severity, perceived benefits of action, perceived barriers, cues to action, and self-efficacy. These domains interact to shape individuals' responses to health threats and address obstacles that may hinder their ability to take preventive action (Anuar et al., 2020).

The HBM focuses on two primary aspects of individuals' perceptions: threat perception and behavioural evaluation. Threat perception comprises two core beliefs: perceived susceptibility to illness and perceived severity of its consequences. Furthermore, the model proposes that cues to action can initiate health-related behaviour when these beliefs are present (Conner & Norman, 2015).

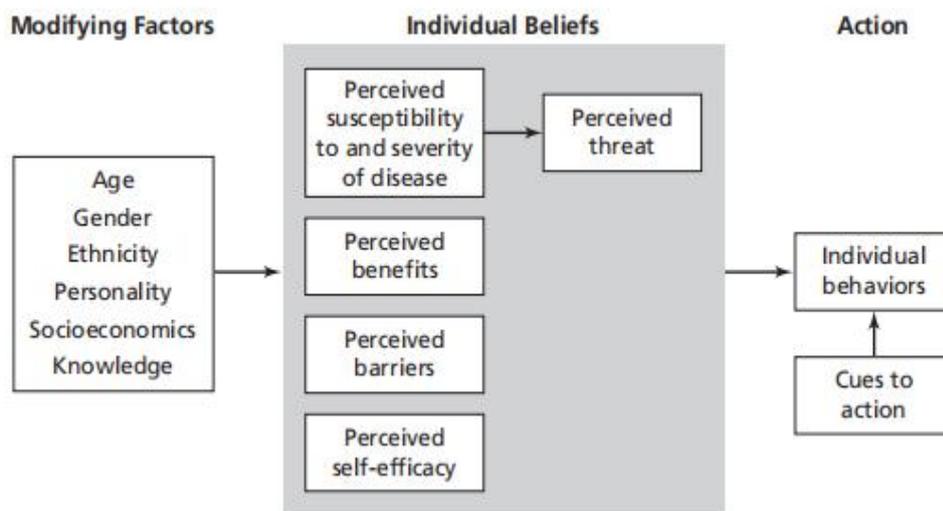


Figure 2.2 Health Belief Model (HBM) by Glanz et al. (2008)

Figure 2.3 illustrates the adapted Health Belief Model (HBM) as the conceptual framework for examining knowledge and preventive practices of HFMD among parents in this study. This framework outlines how individual perceptions of HFMD are influenced by several key constructs, including perceived susceptibility, perceived severity, perceived benefits of knowledge, perceived barriers, and self-efficacy. Knowledge of HFMD serves as the foundation upon which these beliefs are formed. These perceptions, in turn, influence the likelihood of adopting positive behaviours, such as engaging in HFMD prevention practices. Cues to action, such as recommendations from healthcare professionals, also play a critical role in prompting individuals to take preventive measures. Furthermore, the framework acknowledges the presence of moderating factors that may influence individual perceptions and subsequently shape behaviours related to HFMD prevention.

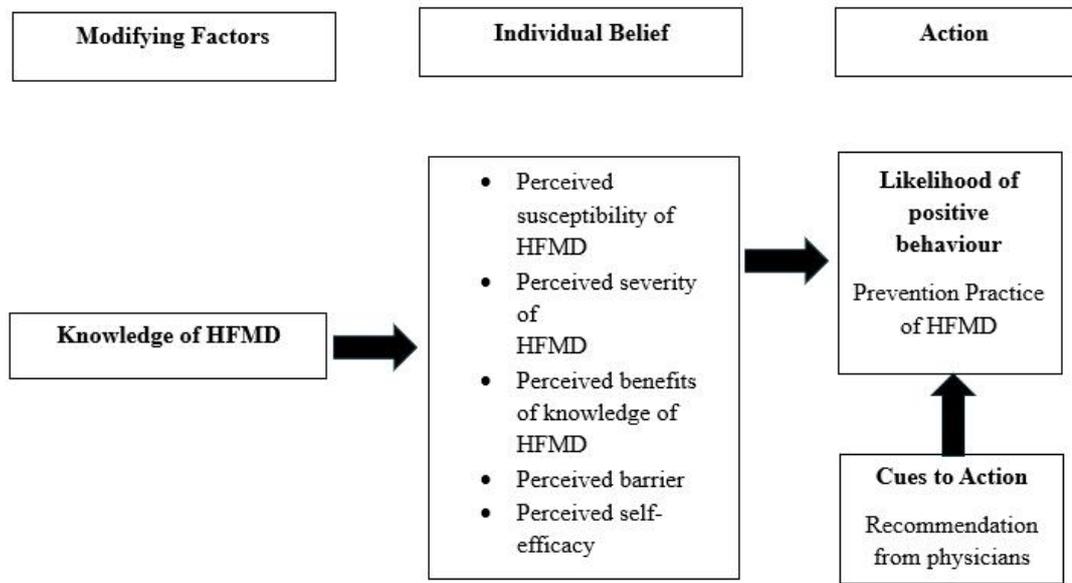


Figure 2.3 Conceptual framework adopted from the Health Belief Model (HBM)

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter explains the approach and rationale used to support the chosen research methodology. Determining and understanding an appropriate research design was crucial for achieving the aims of the study. The chapter began with a description of a cross-sectional design and a justification for using this approach. The section was followed by a description of the study setting, population, participant selection criteria, sampling plan, sample size determination, and instrumentation, including ethical considerations, right through data collection methods. This chapter also involved a section that explained the proposed statistical analyses used with the quantitative data.

3.2 Research Design

The research design selected for this study was a cross-sectional study utilising a questionnaire to assess parental knowledge of HFMD, HFMD prevention practices, and the relationship between knowledge and prevention practices among parents who visited Hospital Pakar Universiti Sains Malaysia (HPUSM).

3.3 Study Setting and Population

The study was conducted at HPUSM, a teaching hospital in Malaysia that offers a wide range of medical services. HPUSM was officially inaugurated on 26 August 1984 by Duli Yang Maha Mulia Tuanku Ismail Petra Ibni Al-Marhum Sultan Yahya Petra, the Sultan of Kelantan Darul Naim (Kamari, 2009). Some of the key services provided at HPUSM included outpatient clinics, inpatient care, diagnostic

services, specialised medical care, emergency services, and pharmacy services. For this study, participants were recruited from outpatient clinics, including the family medicine and paediatric clinics. These clinics were chosen because they served a broad population of parents, making them ideal settings to assess the level of knowledge and prevention practices related to HFMD. The target population of this study was parents who visited HPUSM. The participants were required to meet the inclusion and exclusion criteria.

3.3.1 Sample Criteria

Several criteria were specified and set to ensure that the subject's data were suitable for research purposes and could attain the targeted goals at the end of the study to meet the research objective.

3.3.1(a) Inclusion Criteria

The specific eligibility requirements for inclusion in this study required that each participant must be:

- Parent of a child or children aged one to 12 years old visiting HPUSM
- Able to understand and communicate in Malay

3.3.1(b) Exclusion Criteria

Subjects are excluded from this study if they:

- Have a neurological disorder that interferes with the completion of the questionnaires

3.4 Sampling Plan

The sample size was calculated for each objective. The highest reasonable sample size was taken as the study sample size.

3.4.1 Sample Size Estimation

Single formula proportion:

$$n = \left(\frac{z}{\Delta}\right)^2 p(1 - p)$$

n = sample size

p = anticipated population proportion

z = value of standard normal distribution = 1.96

Δ = precision = 0.05

Objective 1: To assess the level of knowledge of HFMD among parents who visited HPUSM

The prevalence of the knowledge for HFMD was 87.2%, taken from study by Mansur and Ahmad (2021). Thus,

$$p = 87.2\% = 0.872$$

$$n = \left(\frac{1.96}{0.05}\right)^2 (0.87)(1 - 0.87)$$

$$n = 173.8$$

$$n \approx 174$$

After considering a 10% response rate,

$$174 \times 10\% = 17.4$$

$$n = 174 + 17$$

$$n = 191$$

Therefore, the total sample size for objective 1 was 191 samples.

Objective 2: To assess the level of prevention practice of HFMD among parents who visited HPUSM

The prevalence of the preventive practice of HFMD was 90.1%, taken from a study by Ghani and Mansor (2024). Thus,

$$P = 90.1\% = 0.901$$

$$n = \left(\frac{1.96}{0.05}\right)^2 (0.90)(1 - 0.90)$$

$$n = 138.29$$

$$n \approx 138$$

After considering a 10% of response rate,

$$138 \times 10\% = 13.8$$

$$n = 138 + 14$$

$$n = 152$$

Therefore, the total sample size for objective 2 was 152 samples.

Objective 3: To determine the relationship between the level of knowledge and prevention practices of HFMD among parents who visited HPUSM