

Mothers' Knowledge, Beliefs, and Practices Regarding Hand, Foot, and Mouth Disease in El-Beheira Governorate

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Abstract

Background: The number of cases of hand, foot, and mouth disease increased in Egypt in 2022. However, no previous studies done in Egypt regarding this disease. **Aim of the study:** assess mothers' knowledge, beliefs, and practices regarding Hand, foot, and mouth disease in El-Beheira governorate. **Design:** A descriptive exploratory research design was adopted to conduct the study. **Subjects:** A convenient sample of 400 mothers was involved in the study. **Setting:** The study was conducted at 8 public primary health care facilities in four health directorates in El Beheira Governorate namely: Damanhour, Abo Humus, Itay Elbaroud, and Kom Hamada. **Data Collection Tools:** four tools were utilized; **Tool I:** Basic data structured interview schedule, **Tool II:** Mother's knowledge regarding HFMD scale, **Tool III:** Mothers' beliefs regarding HFMD scale, **Tool IV:** Mothers reported preventive practices regarding HFMD scale. **Results:** About three fifths of the respondents (59.25%) had good knowledge about HFMD. In addition, the highest total mean score was for the dimension of perceived susceptibility and perceived benefits (11.58 ± 3.373 and 11.51 ± 3.486 respectively) and the lowest total mean score was for the dimension of perceived barriers (7.4 ± 3.19). Also, the total mean percent score of mothers' beliefs about HFMD was (65.93 ± 16.350) which denotes that the mothers had more positive beliefs concerning HFMD. Moreover, more than half (54.8%) of the studied mothers had good preventive practices concerning HFMD. **Conclusion:** It can be concluded that more than half of the respondents had satisfactory knowledge, positive beliefs, and good practices concerning HFMD. **Recommendations:** Conducting educational programs to enhance mothers' knowledge and practices concerning HFMD.

Keywords: Beliefs, Hand, foot and mouth disease, Knowledge, Mothers & Practices

Introduction

Hand, foot, and mouth disease (HFMD) have been reported in various countries worldwide in the last years (WHO, 2018). Although HFMD can affect people of any age, it is most common in children under the age of five. Although the condition is typically not dangerous, it is extremely contagious (WHO, 2018; Wang et al., 2014). The virus is spread mostly by the oral-fecal pathway, although it can also spread through contact with surfaces, fomites, vesicular fluid, and oral secretions. Moreover, it can be spread by coming into contact with an individual who has aerosolized respiratory droplets (Peansukwech & Banchonhuttakit, 2014). Human enteroviruses from the Picornaviridae family are responsible for the systemic infection known as HFMD (Gonzalez et al., 2019). The symptoms of HFMD include fever, sore throat, loss of appetite, malaise, rash on the hands, feet, knees, elbow, and buttocks, as well as vesicles on the mouth and tongue. Vesicles typically fall off one to three weeks after the disease onset and exhibit the pathognomonic shape of

a football. When these symptoms worsen, onychomadesis can develop. Although HFMD is self-limiting, it can occasionally result in aseptic meningoencephalitis (Yuzana, et al., 2019). According to The Centers for Disease Control and Prevention's (CDC) Global Disease Detection (GDD) Operations Center's surveillance of infectious illnesses, HFMD was listed as one of the top five worldwide infectious disease concerns for 2020. Also, according to the Centers for Disease Control and Prevention (CDC), there are 10-15 million HFMD cases in the US each year that are symptomatic. Also, this communicable illness had shown to have a significant and disastrous economic burden (Christian et al., 2020). Several countries witnessed an upsurge in the prevalence of HFMD in 2021, which forced the closure of hundreds of kindergartens and pre-schools. HFMD outbreaks could be triggered by viruses. So, the Covid-19 pandemic is possibly a factor in the recent major HFMD outbreak. Young children are significantly impacted by HFMD. SARS-CoV-2 infections in children during the early

phases of the COVID-19 outbreak were infrequent because of reduced exposure. Yet, the newest novel viral mutation puts children at higher risk of infection (Zhao et al., 2021). The necessity of preventive measures for HFMD has been emphasized by the lack of a viable vaccination and targeted treatment (Liu et al., 2019). According to the World Health Organization, preventive measures against HFMD include frequent hand washing, practicing good cough hygiene, refraining from sharing personal equipment such as toothbrushes or towels, regularly sanitizing toys, tabletops, chairs, and floors, avoiding crowded public spaces, especially playgrounds during an outbreak, and avoiding going to school during illness (WHO, 2019). The primary caregivers of the under-five age children should have an accurate understanding of HFMD and its prevention measures as well as receptive attitudes given the significance of appropriate personal and environmental hygiene practices for HFMD prevention (Mansor & Ahmad 2021). A study done by Rajamoorthy, et al., 2022 illustrated that 65% of the studied sample had poor knowledge about HFMD. Additionally, a study done by Prakash, S 2021 illustrated that 50% of the studied mothers had inadequate knowledge concerning HFMD. Moreover, another study conducted by Suliman et al., 2017 revealed that there was unsatisfactory knowledge of HFMD among the studied mothers. The most practical, easy-to-use, and affordable strategy for halting HFMD outbreaks and infections is hand hygiene (Guo et al., 2018). Moreover, numerous interventional studies have revealed that improving hand cleanliness habits lowers the prevalence of HFMD (Liu et al., 2019). A cross-sectional study among the parents of preschool children done by Mohamed et al., 2016 revealed that despite having a good level of knowledge, parents' hand hygiene practices are still low. Also, three-quarters of parents were not aware of adequate hand washing procedures, and two-thirds of parents disagreed that they should wash their hands before contacting their children.

Previous studies differed in revealing the predictors of HFMD preventive practices. Several factors such as gender, income sufficiency, unemployment, and health belief were illustrated in previous studies as the determinants of HFMD preventive practices (Lou & Lin, 2018). Moreover, several evidences showed that knowledge was a significant predictor of preventive practices towards HFMD (Charoenchokpanit & Pumpaibool, 2019).

Because the Health Belief Model places a strong emphasis on modifying factors to the perception and self-efficacy components, it was used in the current study to evaluate mothers' beliefs on HFMD. The health belief model is a psychosocial model for

behavior modification that involves evaluating health behaviors in order to find characteristics that are related to peoples' beliefs that may influence their choice to engage in preventive health behaviors. Six components were added to the HBM over time, all of which were centered on the model's central tenet-that changing one's health beliefs is the key to changing one's behavior (WHO, 2019). According to HBM, how people view those elements affects their desire to take certain precautions for the prevention, early detection, and management of a given health issue. They must believe that they are vulnerable to the condition, even if they are asymptomatic (perceived susceptibility) that it is a serious public health concern that can lead to serious complications (perceived severity) and that taking the advised precautions will be helpful (perceived benefits). Additionally, be aware that these advantages outweigh any imagined obstacles that would prevent people from taking such action (perceived barriers). As a result, people think they have the drive to lead a healthy lifestyle and the necessary skills to engage in these preventive behaviors (self-efficacy). Additionally, the model hypothesized that cues to action might serve as behavior triggers, increasing the likelihood that people would practice these preventive health behaviors (Ghanbary et al., 2015; Chanay & Anderson, 2016). To lessen or even stop the occurrence of future HFMD epidemics, community health nurses and the medical community should play a crucial role in educating the public, especially mothers, about HFMD (Prakash et al., 2021). The community health nursing specialty is essential for HFMD prevention practices dissemination and health education. Implementing these preventive practices at the community level might be difficult due to a number of factors, including various cultures, significant socioeconomic disparities, and inequities in healthcare resources (Zhao et al., 2021).

Significance of the study

In July 2022 the world health organization reported an increased number of cases of hand, foot, and mouth disease in Egypt (WHO, 2022). However, there are no previous survey studies of HFMD in Egypt. Consequently, outcome from recent studies is needed to gather and update current public knowledge of this disease and subsequently leads to a better awareness and prevention practices among the public. Moreover, such studies can give some insight and awareness to the public about the disease and proper preventive practices can be planned to reduce the incidence rate of HFMD primarily among children. Besides, the ministry of health can gather more data on the public knowledge and prevention practices about HFMD in a particular location, especially in

rural areas. Therefore, this study aimed to assess mothers' knowledge, beliefs and preventive practices regarding HFMD in El-Beheira governorate.

Aim of the study: The aim of the study was to assess mothers' knowledge, beliefs and practices regarding Hand, foot, and mouth disease in El-Beheira governorate

Research question: What are the mothers' knowledge, beliefs and practices regarding Hand, foot, and mouth disease in El-Beheira Governorate?

Subjects and Methods

Research Design:

A descriptive exploratory research design was adopted to conduct the study.

Setting:

The study was conducted at eight public primary health care facilities in four health directorates namely: Damanhour, Abu Hummus, Itay-Elbaroud and Kom Hamada in El Beheira Governorate.

Subjects:

Mothers who attended the previously mentioned settings and met the following inclusion criteria were the study's target population.

- Have under five child
- Willingness to take part in the research

Sample size

Based on the following parameters, the total sample size was estimated using the EPi Info 7 software: total population 5500 (the last three months turnover) , The expected frequency was 50%, acceptable error was 5% , and confidence limit was 95%.So the minimum required sample size was 359. It was increased to 400 to account for possible non- response.

Table (1): Sample size estimation table

Health Directorates	Number of visiting mothers at the last 3 months	Sample size
Damanhour		
El-Helal MCH center	650	47
Naser Family health center	790	58
Kom Hamada		
Kom Hamada MCH center	570	41
Kom Hamada Family health center	870	63
Abu Hummus		
Abu Hummus MCH center	710	52
Abu Hummus Family health center	650	47
Itay -Elbaroud		
Itay-El baroud MCH center	760	55
Itay-Elbaroud Family health center	500	37

Sampling Technique

A multistage sampling technique was utilized as following:

- El Beheira Governorate has 16 health directorates; four of these (or 25%) were randomly selected.
- Using the equal allocation method, one MCH and one family health center were chosen from each health directorate.
- Four MCH centers and four family health centers were selected in total.
- A total sample of 400 mothers fulfilling the previously mentioned inclusion criteria were selected by the proportional allocation method from the previously mentioned settings.
- Mothers were selected conveniently from each center

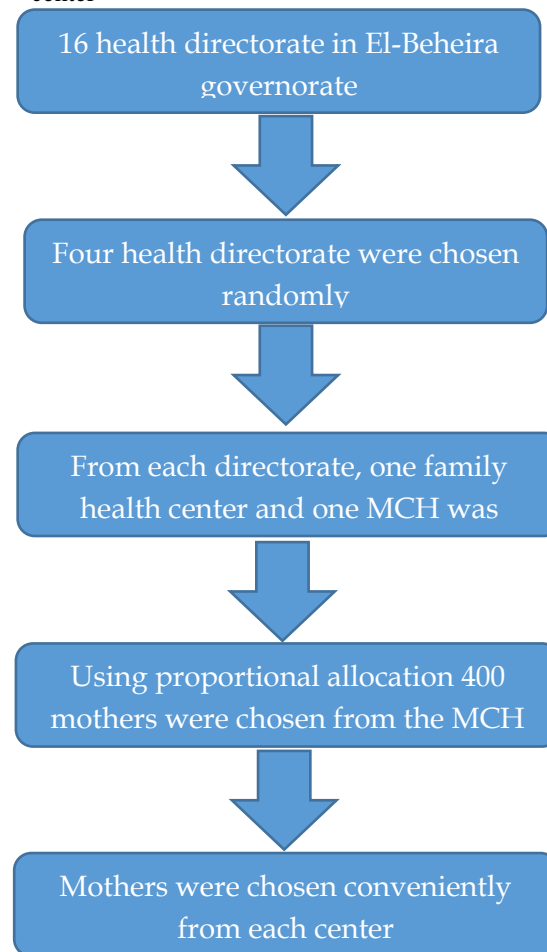


Figure (1): Sampling technique flow chart

Data collection tools:

Four tools were utilized as following:

Tool I: Basic Data Structured Interview Schedule: it included age, level of education, occupation, place of residence, marital status, family income, type of family and number of children in the family

Tool II: Mothers' Knowledge Regarding Hand, Foot, and Mouth Disease Scale

After reviewing the recent literature, the researchers developed this tool (CDC, 2022; Rajamoorthy et al, 2022; Shahar et al 2022). It consisted of 12 questions (true and false questions) concerning HFMD definition, incubation period, communicability period, manifestations, high risk group, isolation period, risk factors, mode of transmission, complication, prevention, treatment, and diet. The correct answer took (1) and the incorrect answer took (0). The total score ranged from zero to 12 and categorized as following:

- Poor: < 50% (<6)
- Fair: 50% <75% (6 < 9)
- Good: $\geq 75\%$ (≥ 9)

An additional question concerning their sources of information was added and not involved in the total score.

Tool III: Mothers' Beliefs Regarding Hand, Foot, and Mouth Disease Scale

After reviewing the recent literature, the researchers developed this tool. (Rajamoorthy et al., 2022; Charoenchokpanit & Pampaibool., 2019). It was utilized to investigate mothers' beliefs concerning HFMD. The scale involved 12 items rated on five point likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) and distributed over four subscales as following: perceived susceptibility (3 items), perceived severity (3 items), perceived barriers (3 items), perceived benefits (3 items). The total score of health belief model was calculated by summing up the score of each subscale that created a total score ranged from 12 to 60. The total mean percent score of mothers' beliefs was calculated by dividing their total response score (obtained by summing up their responses per item) by the maximum score (60) multiplied by 100. The total mean percent score was categorized as follows:

- Negative beliefs : < 60%
- Positive beliefs : $\geq 60\%$

Tool IV: Mothers' Reported Preventive Practices Regarding Hand, Foot, and Mouth Disease Scale

After reviewing the recent literature, the researchers developed this tool (Rajamoorthy, et al., 2022; Charoenchokpanit, et al., 2019; Lekha, 2019). It involved 13 items rated on 5 point likert scale ranging from 1 (never) to 5 (always). Examples of preventive practices includes washing hands before feeding the child, avoid bringing children to public places during the HFMD outbreak, and cleansing children's toys in the household with liquid disinfectant. The total score ranged from 13 to 65 and categorized as following:

- Poor preventive practices : < 50% (13 to <33)
- Fair preventive practices: 50% <75% (33 < 49)
- Good preventive practices: $\geq 75\%$ (≥ 49)

Methods

Administrative process

- A formal letter from the Faculty of Nursing Damanhour University was sent to the El-Beheira Governorate's health and population directorate to request their permission to conduct the study.
- Official letter from the Faculty of Nursing Damanhour University was directed to the directors of the primary health care facilities to obtain their approval for executing the study

Tools development

- The four tools were created by the researchers after reviewing the recent literature
- The tools were translated into Arabic language by the researchers
- Validity of the study tools was reviewed by five experts in the field of community health nursing to ensure its clarity and applicability
- Reliability of the tools was checked by the researchers to test the internal consistency. Reliability was done using Alpha Coefficient test (Cronbach alpha). The result of internal consistency was ($\alpha = 0.78, 0.81, 0.82$) for tool two, tool three and tool four respectively. The results indicated that the tools are reliable.

Pilot study

It was carried out on 10% of the subjects (40 mothers who were not included in the original sample) in order to assess the tools clarity and applicability, gauge the feasibility of the study, pinpoint potential challenges, and determine how long data collection would take.

Collection of data

- Each woman was individually interviewed after receiving a brief explanation of the study objectives
- The researchers interviewed about 10-15 mothers daily
- Each interview lasted between 20 and 30 minutes.
- The researchers visited the centers of data collection twice per week (scheduled days of vaccination).
- Data were collected over four months (from October 2022 to January 2023).

Data analysis

The collected data were analyzed using Statistical Package for Social Sciences (SPSS) program version 20. Descriptive statistics (e.g., frequency and frequency percentages, mean and standard deviations) were used. For the selection of the appropriate statistical tests, the data normality tests were performed. Accordingly, non-parametric tests such as Kruskal-Wallis and Mann-Whitney tests were selected to show the difference and associations among the study variables. The significance level of the p-value was at <0.05.

Ethical Considerations

- This study was approved by the Ethics committee of Faculty of Nursing Damanhour University
- The date and time of data collection were disclosed to each director of the chosen setting.
- The respondents gave oral and written consent after explaining the purpose of the study
- By using code numbers rather than names, the respondents' anonymity and confidentiality were maintained.

Results**Table (1): Distribution of the studied mothers according to their socio- demographic characteristics (n=400)**

Demographic Data	(No. 400)	(%)
Age (years)		
20-< 25	114	28.5
25-<30	111	27.7
30 - < 35	127	31.8
35 – 40	48	12.0
Level of education		
Illiterate	47	11.7
Basic education	34	8.5
Secondary	121	30.3
University	198	49.5
Occupation		
Not working	170	42.5
Professional job	173	43.2
Handcrafts	40	10.0
Trader	17	4.3
Marital status		
Married	363	90.7
Divorced	26	6.5
Widowed	11	2.8
Place of residence		
Urban	232	58.0
Rural	168	42.0
Type of family		
Nuclear	221	55.2
Extended	179	44.8
Number of children		
One child	115	28.7
Two children	133	33.2
Three children	103	25.8
Four children	49	12.3
Family Income		
Enough	195	48.7
Enough & save	104	26.0
Not enough	101	25.3

Table (2): Distribution of the studied mothers according to their level of knowledge about hand, foot, and mouth disease (n= 400)

Items	Correct		Incorrect	
	No.	(%)	No.	(%)
1. Hand, foot, and mouth disease is a contagious viral infection	281	70.2	119	29.8
2. Hand, foot, and mouth disease is common in infants and children younger than 5 years old	281	70.2	119	29.8
3. Fever, malaise, sore throat, red rash, blisters are the main symptoms of Hand, foot, and mouth disease	249	62.2	151	37.8
4. Children can sometimes spread the virus to others for days or weeks after symptoms go away or if they have no symptoms at all.	240	60.0	160	40.0
5. There are vaccines that can prevent the infection of Hand, foot, and mouth disease	288	72.0	112	28.0
6. Hand washing with soap and water can prevent the infection with hand, foot, and mouth disease	276	69.0	124	31.0
7. Dehydration is one of Hand, foot, and mouth disease complications	210	52.5	190	47.5
8. Children can assume their routine like attending to nursery school when fever and blisters subside	277	69.2	123	30.8
9. Spicy foods are not recommended during infection with Hand, foot, and mouth disease	316	79.0	84	21.0
10. Aspirin should be given to children with hand, foot, and mouth disease to relieve pain and fever.	292	73.0	108	27.0
11. Children with hand, foot, and mouth disease are usually most contagious during the first week that they are sick.	298	74.5	102	25.5
12. Children with hand, foot, and mouth disease should be isolated for at least 7 days	269	67.2	131	32.8
Min – Max	2-12			
Mean + SD	8.19 + 2.85			

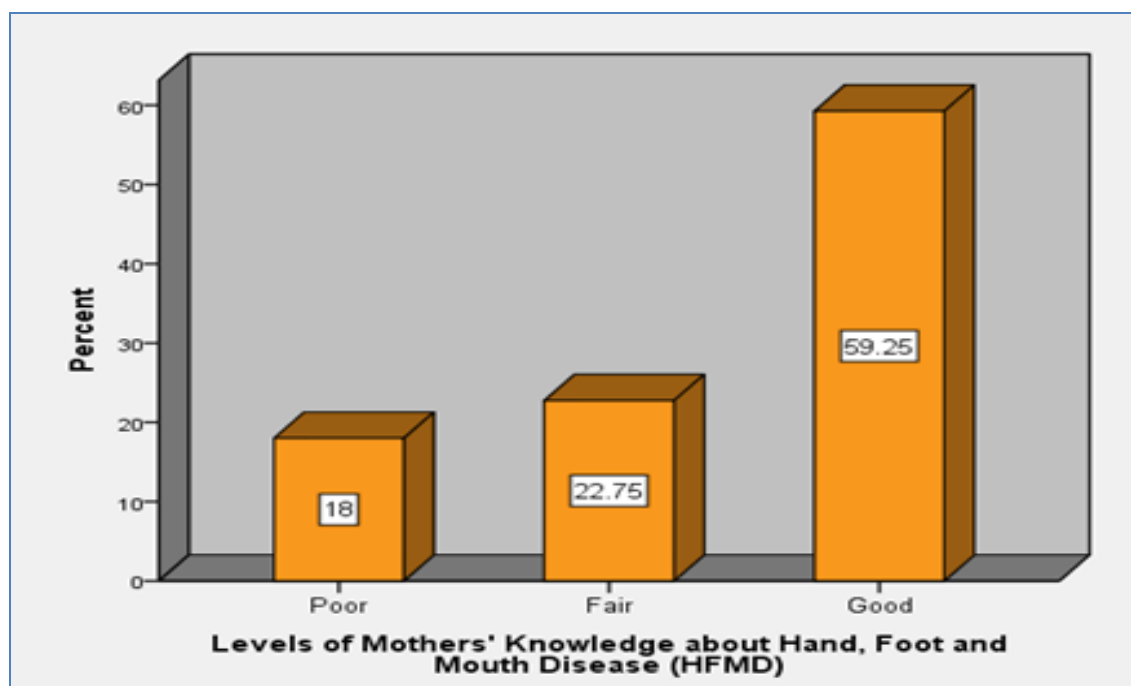


Figure (1): Distribution of the studied mothers according to their total score of knowledge about hand, foot, and mouth disease

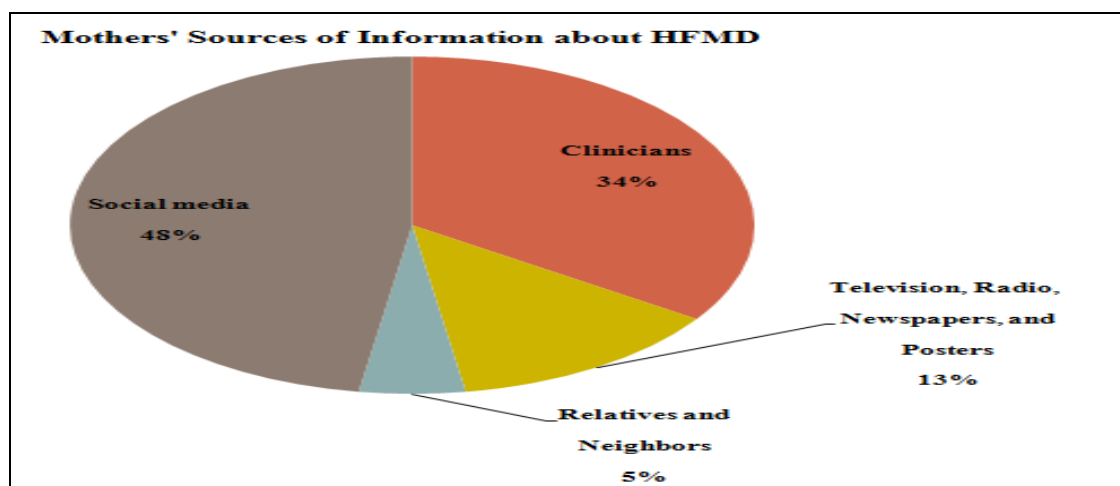


Figure (2): Distribution of the studied mothers according to their sources of information about Hand, Foot, and Mouth Disease

Table (3): Distribution of the studied mothers according to their beliefs about hand, foot, and mouth disease (n= 400)

Beliefs about HFMD according to the dimensions of the health belief model:	Mothers (N= 400)
	Mean ± SD
Perceived susceptibility	
I believe that under-five children are at greater risk for HFMD than older children	3.81 ±1.189
I feel worried to send my child to nursery school during the HFMD outbreak.	3.90 ±1.217
I feel anxious to let my child playing with others during the HFMD outbreak.	3.87±1.240
Mean ± SD	11.58±3.373
Perceived severity	
I believe that HFMD is a very serious contagious disease	3.01±1.415
I believe that all HFMD cases will need to be hospitalized	2.46±1.322
I am confident that HFMD can be treated by the physician.	3.57±1.349
Mean ± SD	9.05±3.044
Perceived barriers	
It is time wasting to wash my child's toys frequently using the disinfectant.	2.19±1.331
I am afraid that I could not be able to wash my hands correctly.	2.83±1.525
My family will refuse if I separate my HFMD infected child's utensil like cup from the use of other family members.	2.42±1.406
Mean ± SD	7.43±3.188
Perceived benefits	
I can stop transmission of HFMD by not sending my infected child to nursery school.	3.79±1.360
Hand washing utilizing soap can prevent HFMD infection.	3.71±1.326
I have a benefit to gain by monitoring my child's health status during HFMD outbreak.	4.02±1.202
Mean ± SD	
Total mean score of mothers' beliefs about HFMD:	12-60
Min - Max	39.56±9.810
Mean ± SD	
Total mean percent score of mothers' beliefs about HFMD:	65.93±16.350
Min - Max	20-100

Table (4): Distribution of the studied mothers according to their reported preventive practices regarding hand, foot, and mouth disease

Reported Preventive practices regarding HFMD:	Mothers(N= 400)				
	Never	Rarely	Sometimes	Often	Always
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
1. Covering mouth and nose whenever sneeze or cough.	24 (6.0)	37 (9.2)	79 (19.8)	65 (16.2)	195 (48.8)
2. Washing hands before feeding the child.	23 (5.8)	35 (8.7)	56 (14.0)	56 (14.0)	230 (57.5)
3. Washing hands thoroughly after using toilet.	14 (3.5)	38 (9.5)	41 (10.2)	50 (12.5)	257 (64.3)
4. Washing hands after changing child diapers.	19 (4.7)	44 (11.0)	55 (13.7)	59 (14.8)	223 (55.8)
5. Rubbing for at least 20 seconds whenever wash your hands.	23 (5.8)	50 (12.5)	102 (25.5)	92 (23.0)	133 (33.2)
6. Using soap for hand washing	20 (5.0)	33 (8.2)	75 (18.8)	112 (28.0)	160 (40.0)
7. Avoid bringing children to public places during the HFMD outbreak	22 (5.5)	50 (12.5)	68 (17.0)	63 (15.7)	197 (49.3)
8. Let the child share the utensils such as cup or spoon with other family members during illness.	105 (26.2)	168 (42.0)	46 (11.5)	32 (8.0)	49 (12.3)
9. Preventing the child from putting thing in to his/her mouth.	26 (6.5)	52 (13.0)	65 (16.2)	71 (17.8)	186 (46.5)
10. Cleansing children’s toys in the household with liquid disinfectant	60 (15.0)	90 (22.5)	86 (21.5)	77 (19.2)	87 (21.8)
11. Cleaning the table, chairs and floor surfaces regularly	33 (8.2)	61 (15.2)	84 (21.0)	75 (18.8)	147 (36.8)
12. Staying alert to children’s physical health during the HFMD outbreak	22 (5.5)	45 (11.2)	48 (12.0)	68 (17.0)	217 (54.3)
13. Avoid sending the kids to nursery school during her/his illnesses.	24 (6.0)	39 (9.8)	61 (15.3)	71 (17.8)	205 (51.3)
Min-Max	14-65				
Mean ± SD	48.73 ± 12.41				

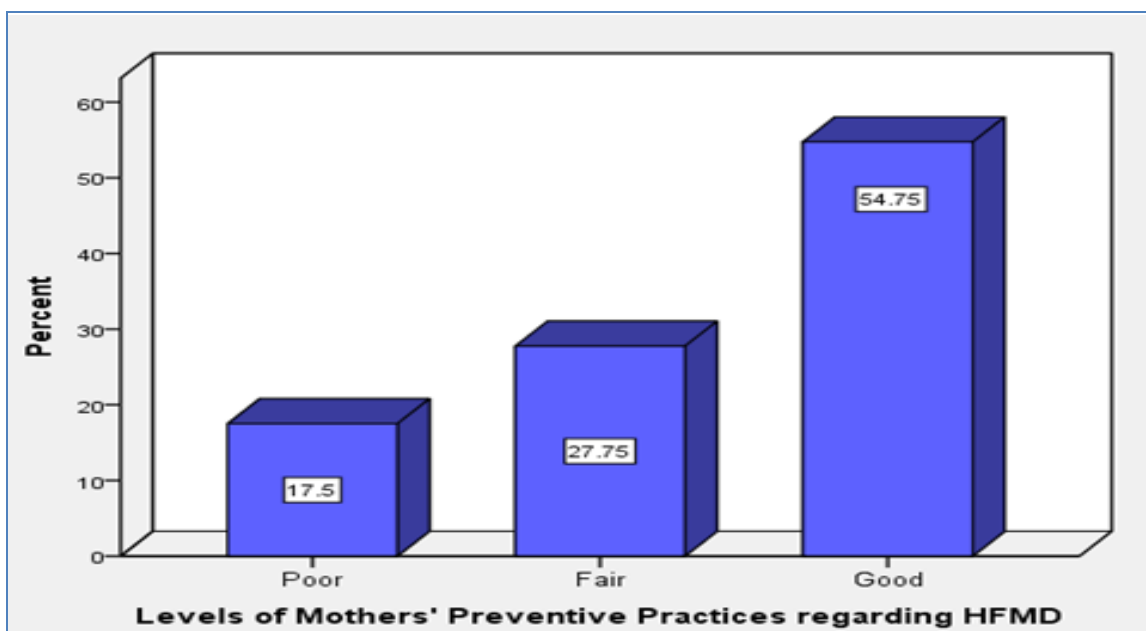


Figure (3): Distribution of the studied mothers according to their total score of reported preventive practices regarding hand, foot, and mouth disease

Table (5): Association between Mothers' Socio-demographic characteristics and Their Knowledge, beliefs, and reported Preventive Practices regarding HFMD.

Socio-demographic characteristics	Mothers' Knowledge	Mothers' Beliefs	Mothers' reported Preventive Practices
	Mean ± SD	Mean ± SD	Mean ± SD
Age (years)			
20-< 25	8.15±2.74	39.73±9.16	49.56±11.91
25-<30	7.94±3.07	38.16±10.73	45.87±14.04
30 - < 35	8.32±2.84	39.87±9.54	49.58±11.30
35 - 40	8.52±2.60	41.58±9.63	51.08±11.59
Test of sig.(p)	H^{KW}=1.49 (p=0.684)	H^{KW}=1.38 (p=0.502)	H^{KW}=5.69 (p=0.058)
Level of education			
Illiterate	8.89±1.94	42.02±7.65	52.53±6.91
Basic education	8.47±2.53	39.62±7.02	45.65±13.13
Secondary	7.12±3.08	36.36±11.09	43.89±13.72
University	8.62±2.76	40.92±9.41	51.31±11.45
Test of sig.(p)	H^{KW}=24.15 (p<0.0001*)	H^{KW}=17.34 (p=0.001*)	H^{KW}=32.56 (p<0.0001*)
Occupation			
Not working	7.88±2.75	39.90±9.50	48.01±12.19
Professional job	8.82±2.60	40.65±9.22	51.41±10.79
Handcrafts	7.87±3.28	37.35±9.81	46.33±13.89
Trader	5.71±3.42	30.24±13.43	34.29±15.12
Test of sig.(p)	H^{KW}=22.42 (p=0.001*)	H^{KW}=4.193 (p=0.123)	H^{KW}=7.972 (p=0.019*)
Marital status			
Married	8.28±2.80	40.05±9.42	49.45±11.94
Divorced	7.50±3.15	35.12±13.19	42.04±15.24
Widowed	6.91±3.39	33.82±9.83	40.73±14.02
Test of sig.(p)	H^{KW}=3.420 (p=0.181)	H^{KW}=9.23 (p=0.01*)	H^{KW}=7.972 (p=0.005*)
Place of residence			
Urban	8.52±2.92	40.71±9.20	50.92±11.58
Rural	7.96±2.78	38.73±10.16	47.14±12.77
Test of sig.(p)	Z= 2.52 (p=0.012*)	Z= 2.03 (p=0.043*)	Z= 3.41 (p<0.001*)
Family Income			
Enough	8.61±2.69	41.31±8.71	51.46±9.86
Enough & save	9.04±2.13	42.26±6.52	53.00±7.94
Not enough	6.52±3.14	33.41±11.89	39.05±15.26
Test of sig.(p)	H^{KW}=41.11 (p<0.0001*)	H^{KW}=43.57 (p<0.0001*)	H^{KW}=54.74 (p<0.0001*)

*H^{KW}: Kruskal Wallis test**Z: Mann-Whitney U test***Significant at p≤0.05***Table (1): Distribution of the studied mothers according to their socio-demographic characteristics**

A total of 400 mothers with a range of ages between 20 and 40 years old were involved in the study. Slightly less than one third (31.8%) were between the ages of 30 to less than 35, less than half (49.5%, 43.2%) were highly educated and had professional jobs respectively. Additionally, the majority (90.7%) of the respondents were married. More than half

(58%, 55.2%) were urban residents and were from nuclear families respectively. Moreover, around one third (33.2%) had two children. Furthermore, slightly less than half (48.7%) had enough income to meet their basic needs.

Table (2): Distribution of the studied mothers according to their level of knowledge about hand, foot, and mouth disease

The table portrays that more than two-thirds of the studied mothers gave correct answers to all questions

pertaining to disease definition, high risk group, vaccine, preventive measures, isolation period and treatment (70.2%, 70.2%, 72%, 69%, 67.2%, and 73% respectively). Besides, more than half of the studied mothers gave correct answers concerning manifestations, communicability period, complications (62.2%, 60%, and 52.5% respectively). Moreover, more than three quarters (79%) provided correct answer regarding the diet.

Figure (1): Distribution of the studied mothers according to their total score of knowledge about hand, foot, and mouth disease. The figure portrays that about three fifths of the studied mothers (59.25%) had good knowledge about HFMD.

Figure (2): Distribution of the studied mothers according to their sources of information about hand, foot, and mouth disease

The figure portrays that social media was the primary source of the studied mothers information about HFMD

Figure (3): Distribution of the studied mothers according to their total score of reported preventive practices regarding Hand, Foot, and Mouth Disease

It is evident from the figure that more than half (54.7%) of the studied mothers had good preventive practices concerning HFMD.

Table (3): Distribution of the studied mothers according to their beliefs about hand, foot, and mouth disease

The table depicts that the total mean percent score of mothers' beliefs about HFMD was (65.93±16.350) that indicates positive beliefs regarding the diseases. The highest total mean score was for the dimension of perceived susceptibility and perceived benefits (11.58±3.373, 11.51± 3.486 respectively) and the lowest total mean score was for the dimension of perceived barriers (7.4±3.19).

Table (4): Distribution of the studied mothers according to their reported preventive practices regarding hand, foot, and mouth disease

The table shows that less than half of the respondents reported that they always covering their mouth and nose whenever sneeze or cough, using soap for hand washing, avoid bringing children to public places during the HFMD outbreak, preventing child from putting thing in to his/her mouth (48.8%, 40%, 49.3%, 46.5% respectively). Additionally, more than half of the studied mothers stated that they always washing hands before feeding the child, washing their hands thoroughly after using toilet, washing their hands after changing child diapers, staying alert to children's physical health during the HFMD outbreak, avoid sending the kids to nursery school during her/his illnesses (57.5%, 64.3%, 55.8%, 54.3%, 51.3% respectively). Moreover, nearly one

third (33.2%) reported that they always rubbing for at least 20 seconds whenever wash their hands. Furthermore, more than one third of the studied mothers (36.8%) stated that they always cleaning the table, chairs and floor surfaces regularly. Only 21.8% of the studied mothers reported that they always cleansing children's toys in the household with liquid disinfectant. The total mean score was 48.73 ± 12.41.

Table (5): Association between mothers' socio-demographic characteristics and their knowledge, beliefs, and preventive practices regarding hand, foot, and mouth disease

The table show that there is a statistically significant relation between mothers' knowledge and level of education ($H^{KW}=24.15$, $p<0.0001$), occupation ($H^{KW}=22.42$, $P=0.001$), place of residence ($Z=2.52$, $P=0.012$) and family income ($H^{KW}=41.11$, $p<0.0001$). Additionally, the table depicts that there is a statistically significant relation between mothers' beliefs and level of education ($H^{KW}=17.34$, $P=0.001$), marital status ($H^{KW}=9.23$, $P=0.01$), place of residence ($Z=2.03$, $P=0.043$), and family income ($H^{KW}=43.57$, $P= p<0.0001$). Moreover, the table depicts that there is a statistically significant association between mothers' preventive practices and level of education ($H^{KW}=32.56$, $p<0.0001$) occupation ($H^{KW}=7.972$, $P=0.019$) marital status ($H^{KW}=7.972$, $P=0.005$), place of residence ($Z=3.41$, $p<0.001$) and family income ($H^{KW}=54.74$, $p<0.0001$).

Discussion

Hand, foot, and mouth disease has become an emerging infectious disease and presents serious public health problems all over the world in the last years (Koh et al., 2018). To the best of our knowledge, this is the first study done in Egypt to assess mothers' knowledge, beliefs and preventive practices concerning HFMD.

The present study depicted that around three fifths of the studied mothers had good knowledge about HFMD. This might be attributed to the fact that highly educated mothers are more knowledgeable and experienced ones whereas most of the studied mothers were highly educated and had professional jobs. Contrast findings were portrayed by recent four evidences. First, the study done in Malaysia by Rajamoorthy et al., (2022) illustrated that most of the studied sample had unsatisfactory knowledge concerning HFMD. Second, the study conducted in Malaysia by Mansor & Ahmad (2021) revealed that a minority of the participants had good knowledge about HFMD. Third, the study done in India by Prakash (2021) showed that half of the respondents had poor knowledge about HFMD. Finally, the study carried out in Klang by Suliman et al., (2017) portrayed that most of the respondents had

unsatisfactory knowledge about HFMD. These differences might be due to the variation in participants' geographic area and socio-demographic characteristics.

The present study revealed that social media was the main source of information of the studied mothers. This finding could be attributed to increasing accessibility to the internet in urban areas as most of the studied mothers were urban residents and also the high percentage of online seeking information particularly among the highly educated mothers who constitute nearly half of the respondents in this study. Similar findings were reported by **Rajamoorthy et al., (2022)**.

A theoretical model known as the health belief model can be used to predict and explain individual changes in health behaviors. One of the most popular models for comprehending health behaviors is this one. According to a widely accepted idea proposed via the lens of health beliefs, perceived vulnerability and perceived severity were supposed to work as a driving force, and perceived benefit (reduced barrier), on the other hand, served as the direction of action (**Rosenstock IM, 2018**). Perceived vulnerability and perceived severity are frequently classified as perceived threats in the context of health beliefs, whereas perceived benefit and perceived barrier constitute behavioral evaluation (**Conner, & Norman, 2019**). When deciding whether to engage in preventive practice, the anticipated advantage should take precedence over the perceived barrier.

The current study revealed that the mothers had positive beliefs about HFMD. The highest total mean score was for the dimension of perceived susceptibility and perceived benefits and the lowest total mean score was for the dimension of perceived barriers. This could be attributed to the higher level of knowledge the studied mothers have concerning the HFMD. Also, most of the respondents were highly educated and were professional workers. Corresponding evidence was depicted by the study done in Malaysia by **Suliman et al., (2017)** who reported that the studied sample had positive beliefs concerning the disease and the highest mean score was for the dimension of perceived susceptibility and perceived benefits.

Children under the age of five are primarily affected by hand, foot, and mouth disease. Focusing on hand hygiene, disinfection of premises, and cough etiquette can help to prevent the disease. Instilling healthy hygiene practices in children is largely the responsibility of mothers (**Sun, et al., 2018**). A study done in China by **Guo, et al., (2018)** revealed that providing extensive hand hygiene instruction could reduce the occurrence of HFMD. This suggests that in order to reduce HFMD in children, a sustained hand

hygiene intervention is essential. Therefore, this measure should be emphasized in the earliest phase of a child's education.

The present study illustrated that more than half of the studied mothers had good preventive practices concerning HFMD. This finding could be attributed to a recent outbreak of HFMD and series of talks on preventive measures conducted by the Ministry of Health and population to curb the disease spread. Also, it can be because most of the respondents had satisfactory knowledge about HFMD preventive measures.

Similar findings were reported by three recent studies. First, the study done in Singapore by **Wang & Pang (2022)** showed that most of the studied parents had good level of preventive practices concerning HFMD. Second, the study done in Malaysia by **Mohamed et al., (2020)** showed that more than half of the respondents had decent level of practices concerning HFMD. Third, the study conducted by **Mahadzar, & Rahman (2019)** who investigated the level of knowledge, attitude and practices toward HFMD in Malaysia, revealed that most of the respondents had satisfactory level of preventive practices.

The current study portrayed that certain socio-demographic characteristic such as level of education, occupation, place of residence, and family income showed significant association with HFMD knowledge. Regarding education, this is due to the possibility that mothers with higher levels of education may know more about the availability and usage of healthcare or exhibit better health-related behaviors that are advantageous to their offspring. Additionally, mother's occupation is another factor affecting the knowledge because most of the studied mothers in the current study had professional jobs. Moreover, urban residents have better access to the internet that could foster their online seeking information behaviors and enhancing their knowledge. Furthermore, family income can affect the mothers' knowledge because the higher the income, the easier seeking health care facilities and obtaining the needed information from the health care providers. Congruent findings were reported by **Mansor & Ahmad (2021)** who found significant correlation between the respondents' knowledge about HFMD and their level of education, residence, occupation and income.

It also worth mentioning that the current findings revealed significant correlation between the studied mothers preventive practices concerning HFMD and their level of education, occupation, marital status, place of residence and family income. Likewise, **Lou, & Lin (2018)**; **Charoenchokpanit & Pumpaibool (2019)** reported that there was significant correlation

between the respondents' preventive practices and their occupation, education and family income. On the other hand, **Suliman et al., (2017)** reported that socio-demographic characteristics were not significantly associated with the respondents' preventive practices toward HFMD. These differences might be due to the variation in participants' geographic area and socio-demographic characteristics.

Furthermore, the current study showed significant relation between mothers' beliefs concerning HFMD and their level of education, marital status, place of residence, and family income. This finding is congruent with **Rajamoorthy et al., (2022)** who reported that there was significant association between the studied mothers' beliefs and their education, residence, marital status and income.

Inclosing, ministry of health and population should conduct health education programs in the primary health care facilities to raise the mothers' awareness and improve their preventive practices concerning HFMD and consequently promoting health of the children and achieving sustainable development goals related to the child health.

Conclusion

According to the current findings, it can be concluded that about three fifths of the respondents (59.25%) had good knowledge about HFMD. Additionally, the total mean percent score of mothers' beliefs about HFMD was (65.93±16.350) which denotes that the mothers had positive beliefs concerning HFMD. Also, more than half (54.8%) of the studied mothers had good preventive practices concerning HFMD. Furthermore, level of education, occupation, place of residence and family income were significantly correlated with mothers' knowledge. In addition, a statistically significant relation was found between mothers' beliefs and level of education, marital status, place of residence, and family income. Moreover, a statistically significant association was found between mothers' preventive practices and level of education, occupation, marital status, place of residence, and family income.

Recommendations

- Health education sessions in primary health care facilities to improve mothers' knowledge concerning HFMD
- The health authorities should take the necessary actions to inform the public about the risk of HFMD in their children and the advantages of practicing HFMD prevention measures through various platforms, including social media, posters in public

spaces, social networking, or video-sharing sites like YouTube and Facebook.

- Conducting educational programs to raise mothers' awareness regarding HFMD
- Creating web-based educational sites for mothers to enhance their knowledge and practices regarding HFMD
- Conducting community mobilization campaigns to raise the mothers awareness concerning HFMD
- Replication of the same study using large sample for generalization
- Conduct training programs for mothers about the correct technique of hand washing.

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