

## Original Article

# Application of Health Belief Model for Hygienic Behavior of Mothers of Hospitalized Children in Alexandria

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## Abstract

**Background:** Health Belief Model (HBM) explains different health behaviors, including hygienic practices, in light of different perceptions about health risks and related behaviors.

**Objective(s):** To assess mothers' perceptions about childhood infections and hygienic behavior based on the constructs of the Health Belief Model.

**Methods:** A convenient sample of 300 mothers admitted with their children at El Anfoushy paediatrics hospital was interviewed. Data was collected using an interviewing questionnaire investigating mothers' knowledge, health beliefs, self-efficacy and practices regarding hygienic behavior. The total beliefs' score was graded as high if exceeded 75% of the maximum score or low if score is below 50%. Hygienic practices of a subsample of 100 mothers were assessed using a structured observational checklist covering data about the cleanliness of mother, child and area surrounding their hospital bed.

**Results:** The mean age of the interviewed mothers was 26.18±3.99 years. About 40% of them had basic education and almost half of them were of middle socioeconomic standard. The level of mothers' knowledge about hygiene was fair in 47.7% and poor in 36% of the mothers. The majority of mothers showed a high level of perceived susceptibility (86.3%), severity (88.7%) and benefits (96.7%). Less than half of the mothers (44.3%) showed a high level of perceived barriers to adhering to hygienic behavior. Almost 60% of the sample showed a high level of self-efficacy. Reported level of mothers' hygienic practices was high in 50.3% of the sample, while observation showed a high level of practice in only 11% and low practice level in 57% of the subsample. Multiple regression analysis showed a positive significant influence of knowledge, self-efficacy, perceived susceptibility, severity and benefits on hygienic behavior of mothers. Perceived barriers had a significant negative influence on the studied behavior.

**Conclusion:** The hygienic behavior of mothers is markedly influenced by their beliefs regarding the relation between health and hygiene as well as their beliefs regarding their ability to and cost of performing these behaviors.

**Keywords:** Health Belief Model, Perceptions, Susceptibility, Severity, Benefits, Barriers, Self-efficacy, Hygiene, Behavior.

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## INTRODUCTION

Inadequate water, sanitation and hygiene have been estimated to account for 2.2 million deaths annually or 4% of the global total. Most of these deaths are in children under the age of five.<sup>(1)</sup> The WHO has estimated that around a quarter of the global disease burden is associated with environmental risk factors. The key environmental risks include unsafe water, air pollution (indoor and outdoor), lack of food hygiene, poor sanitation, inadequate waste disposal, absent or unsafe disease vector control, exposure to chemicals, and injuries.<sup>(2)</sup> It is widely

understood that poor living conditions and poor hygiene are major factors underlying the high burden of infection experienced by children living in developing communities.<sup>(3)</sup> Interrupting the pathways of infection implies the preservation and promotion of personal and environmental hygiene across the different links of the infection chain.<sup>(4)</sup> Care of a sick child involves a multitude of hygienic activities to prevent the transmission of infection from the sick child to other family members. It also serves to improve the health of the sick child aiding its recovery. Home cleaning and disinfection as well as proper ventilation and proper waste disposal will be required to keep the

indoor environment unfavorable for infection transmission.<sup>(5, 6)</sup> Mother's hygiene has to be ensured every time before and after she cares for the sick child.<sup>(7)</sup>

The Health Belief Model (HBM) was originally developed by social psychologists at the US public health services in an attempt to explain why individuals fail to engage in preventive health measures.

According to the HBM, the likelihood that someone will take action to prevent illness depends upon the individual's perception that: i) they are personally vulnerable to the condition. ii) the consequences of the condition would be serious. iii) the precautionary behavior effectively prevents the condition. iv) the benefits of reducing the threat of the condition exceed the costs of taking action.<sup>(8)</sup> or that v) they can successfully execute the behavior required to produce the outcomes.<sup>(9)</sup>

The four key components of the model are conceptualized as; perceived susceptibility, perceived severity, perceived effectiveness/ benefits, and perceived cost/ barriers.<sup>(10)</sup> Self-efficacy has been included as another key factor in the model.<sup>(11,12)</sup> Mediating variables (e.g. educational level) are believed to indirectly affect behavior by influencing an individual's perceptions of susceptibility, severity, benefits, and barriers.<sup>(8)</sup> "Cues to action" are the stimuli that are believed to trigger the behavior under influence of different perceptions. "Cues to action" and the "Value of health" have also been added in some forms of HBM.<sup>(10,13,14)</sup> Psychological characteristics such as personality, peer pressure and perceived control over behavior, later added to the model, are also thought to play a role in influencing health behavior.<sup>(11)</sup>

The current study aimed at assessing the different constructs of the HBM underlying the practices of mothers regarding their personal, child and home hygiene.

## METHODS

A cross-sectional study was carried out at the in-patient wards of El Anfoushy Pediatrics Hospital in Alexandria, targeting mothers of admitted children. A minimum required sample size of 289 mothers was calculated based on the hypothetical assumption that 25% of the mothers adhere to healthy hygienic practices with a confidence level of 95%. This number was rounded to 300. The enrolled mothers were interviewed face-to-face using a structured interviewing questionnaire. For observation, a subsample of 100 mothers from the original study sample was selected by systematic random sampling to be monitored using a structured observational checklist.

The designed interviewing questionnaire was composed of five sections:

I- Personal data including reason and duration of admission as well as socioeconomic data that were used to estimate the family's socioeconomic level using modified Fahmy and El Sherbini social score.<sup>(15)</sup>

II- Knowledge of the mothers regarding different hygienic practices through a set of 20 True-or-False questions.

Mothers' knowledge level was considered "Good" if their total score exceeded 80% of the total score and "Poor" if the score is below 60%.

III- The third section assessed the mothers' beliefs about hygiene and health via 24 health belief statements based on the principles of the HBM.<sup>(13)</sup> Each belief statement was given a three-point Likert scale optioning one of the following choices for each belief; either "Agree", "Not sure" or "Disagree". Responses were scored as follows; "Agree=3", "Not sure=2" and "Disagree=1". Scoring was reversed for negative statements. For each of the four constructs of the HBM; perceived susceptibility, severity, benefits and barriers a total score was calculated. Level of perception of each construct was then graded as high if the total score exceeded 75%, moderate if ranging from 50% to 75%, or low if the score was below 50%.

IV- Self efficacy was evaluated in the fourth section in 10 statements assessing the mothers' perceived ability to perform hygienic behavior. Each statement was given a three-point Likert scale with "Agree", "Not sure" or "Disagree" as its possible choices. Self efficacy responses were scored from "1" to "3" with "3" given to positive responses. Mothers whose score was above 80% of total score were considered with high self efficacy, and low when the score was below 60%.

V- The final section investigated some of the mothers' hygienic practices via 15 practice statements measured by a three-point frequency rating with the options "always", "sometimes" and "rarely/never". The measured practices include hand-washing, feeding practices, diaper changing, home, utensil and cloth cleaning. Mothers' total practice was graded as high if total practice score was above 75%, moderate if the total score ranged between 50% to 75%, and low if the total score fell below 50%.

The used observational checklist was composed of 24 items. Each item had one of two choices, either "Yes/Satisfactory" or "No/Unsatisfactory". Observations were grouped as mother's hygiene involving the cleanliness of the mother's face and hands, child's hygiene by observing cleanliness of the child's different body parts, cleanliness of the child's and mother's clothes and the surrounding area, and some hygienic practices related to feeding the child, cleaning the child and garbage disposal. The total observation score was graded as "good practice" if score exceeded 75% of the total score, and poor practice if below 50%.

### Statistical Analysis

Pearson's test of association was used to investigate correlations between knowledge, health beliefs and practice. The primary hypothesis of the study was tested using a multiple regression analysis with the primary dependent variable being adherence to hygienic practices to examine the relative importance of health belief variables, knowledge and socioeconomic status in predicting the probability of hygienic behavior.

### Ethical Considerations

The study protocol was approved by the Institutional Review Board and the Ethics Committee of High Institute of Public Health, Alexandria University. The study conformed to the International Guidelines for Research Ethics. A verbal consent was obtained from all mothers before enrollment in the study after explanation of the purpose and benefits of the research. Confidentiality of the participants' data was ensured. Mothers were reassured that the researcher is completely independent from the hospital and its management, that their participation in the research is totally voluntary, and would have nothing to do on their children's admission and treatment course or costs. One ethical issue that faced the researcher was the observation bias where the data collection involved the observation of the mothers' practices. To avoid such bias the researcher was obliged to watch the mothers unknowingly by them. And so, to overcome this ethical barrier the researcher limited their observation to the behaviors and features of interest in the study and maintained a neutral nonjudgmental attitude towards the mothers regardless of the results of observation.

## RESULTS

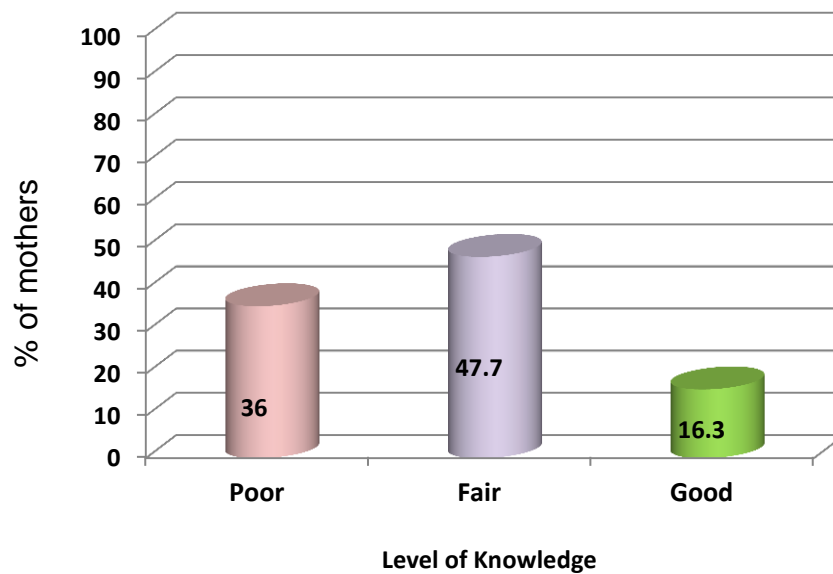
Table 1 summarizes the socio-demographic characteristics of the study sample including the reason for admission. The majority of the mothers in the studied sample were in their mid-twenties with a mean age of  $26.18 \pm 3.99$  years. The higher majority of mothers (44.3%) lied in the age group between 25 to 30 years. The higher percentage of mothers (39.7%) had preparatory education as their highest educational level. Based on socio-demographic characteristics of the family, almost half of the sample (49%) fell in the middle socio-economic class. Mothers with low socio-economic level presented 44% whereas those with high socio-economic level comprised 7% of the studied sample. The vast majority of children (93.3%) were

admitted due to infection, of which 57% were respiratory, and 36.3% were gastro-intestinal infections. Almost half of the mothers in the studied sample (47.7%) had a fair knowledge level about the importance, effect and measures of hygiene while over one third of them (36%) had a poor knowledge level (Figure 1).

Table (2) presents the different perceptions of mothers about susceptibility of their children to contracting different infections, severity of such infections, and benefits of adhering to hygienic practices in reducing and barriers to adhering to such practices. The mean percent score of perceived susceptibility was  $83.61 \pm 9.056$  indicating generally high perceived susceptibility among mothers. Almost the entire sample agreed that any child will get diarrhea during its early childhood years. As for seasonal susceptibility, about one third of the sample (32.7%) believed that children are more susceptible to diarrhea during summer and 42% of the mothers believed that children are more susceptible to respiratory diseases during winter. Regarding insects, 96.7% agreed that flies can cause eye infections and an even higher percentage, comprising 97.7% agreed that head lice are contagious from one person to another. More than half of the sample (60.7%) believed that infections can be fatal to the child. Seventy percent of mothers believed that diarrhea can have serious complications. The majority of the mothers (88.7%) believed that pneumonia is not easily treated. About 44% of the sample believed that eye infection can lead to loss of vision. A mean percent score of  $85.33 \pm 12.683$  denoted a high level of perceived severity among mothers. Perceived benefits of hygiene obtained a high mean percent score of  $90.28 \pm 9.533$ . Invariably, the entire sample agreed on the benefit of keeping the house clean in reducing infection transmission. Similarly, all mothers agreed on the benefit of washing the mother's hands in protection of the child from different infections.

**Table (1): Socio-demographic characteristics and cause of admission of the studied sample**

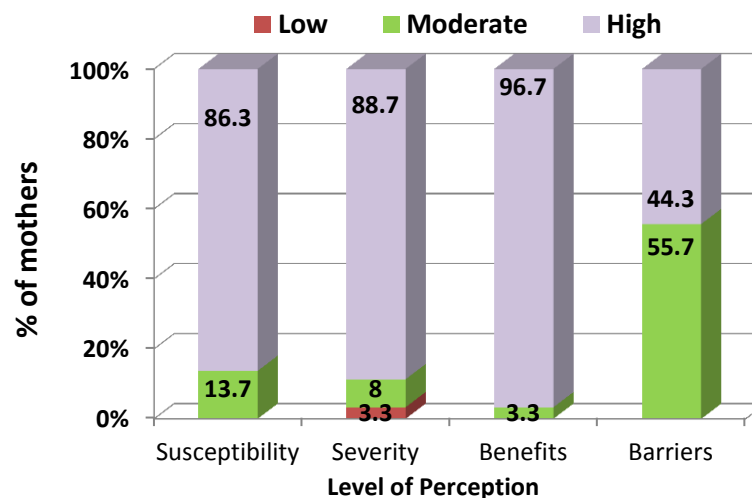
Socio-demographic characteristics		No.	%
<b>Mothers' age</b>	Less than 20	20	6.6
	20- <25	56	18.7
	25- <30	133	44.3
	30- <35	89	29.7
	35 +	2	0.7
<b>Mothers' education</b>	Illiterate	6	2.0
	Read & write	33	11.0
	Primary	46	15.3
	Preparatory	119	39.7
	Secondary	75	25.0
<b>Mothers' occupation</b>	University	21	7.0
	Working	115	38.3
	Not working	185	61.7
<b>Socioeconomic level</b>	Low	132	44.0
	Middle	147	49.0
	High	21	7.0
<b>Cause of admission</b>	Respiratory infection	171	57.0
	GIT infection	109	36.3
	Chronic disease	20	6.7



**Figure 1: Distribution of the studied mothers according to their knowledge levels based on their total knowledge scores**

A majority of mothers (79.3%) believed that washing the hands and face can protect from eye infections. Regarding barriers to adhering to hygienic practices, the financial burden was the most confirmed barrier; as the whole sample agreed that regular diaper changing is costly. Also, 73.3% of the mothers agreed that soap is a financial load. About 60% of the sample believed that maintaining the child's hygiene demands a lot of effort from the mother. Less than half of the mothers (45.3%) believed that it requires a lot of time to adhere to hygienic practices. Forty-nine percent of the sample believed that a shower can harm a sick child followed closely by 46.7% who believed that soap is harmful to the child's skin. A mean percent score of

$77.61 \pm 12.722$  was obtained for perceived barriers. A great majority of mothers (86.0%) had a high level of total belief score while the remaining 14% showed a moderate level. Figure (2) compares the four major constructs of the HBM. Expectedly, the greatest majority of the mothers had a high level of perceived susceptibility (86.3%), severity (88.7%) and benefits (96.7%). As for perceived barriers, more than half of the mothers (55.7%) showed a moderate level of perception compared to 44.3% with high level of perceived barriers. With a mean percent score for self-efficacy of  $83.13 \pm 8.483$ , 59.7% of mothers in the sample showed a high level of self-efficacy and about one third (37%) had a moderate one (Figure 3).

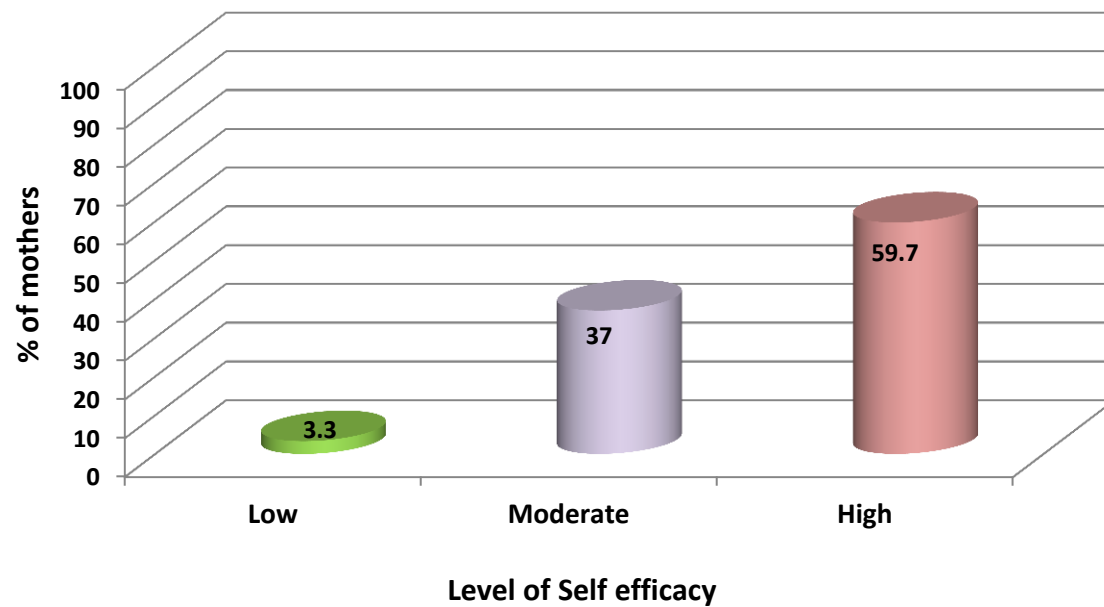


**Figure (2): Distribution of the studied mothers according to their levels of perception of major constructs of the Health Belief Model.**

**Table (2): Distribution of the studied mothers according to their perceptions of different constructs of the Health Belief Model**

<b>HBM construct</b>	<b>Statements “I believe that...”</b>	<b>Agree</b>	<b>Not Sure</b>	<b>Disagree</b>
<b>Child susceptibility to infection</b>	... any child must get diarrhea during its early childhood	96.7%	0.0%	3.3%
	... diarrhea is not contagious from one person to another *	39.3%	44.3%	16.4%
	... the child is more susceptible to diarrhea during summer	32.7%	67.3%	0.0%
	... children are more susceptible to respiratory diseases during winter	42.0%	44.3%	13.7%
	... flies can cause eye infections	96.7%	0.0%	3.3%
	... head lice are contagious from one person to another	97.7%	2.3%	0.0%
<b>Severity of condition on child's health</b>	... infectious diseases can threaten the child's life	60.7%	14%	25.3%
	... diarrhea can have severe complications	70.0%	4.7%	25.3%
	... recovery from pneumonia is not easy	88.7%	8.0%	3.3%
	... fever can cause convulsions	30.3%	62.7%	7.0%
	... eye infections can lead to loss of vision	44.3%	52.4%	3.3%
	... dehydration only affects the look of the child not its health *	7.0%	15.0%	78.0%
<b>Benefits of hygienic practices</b>	... maintaining home hygiene reduces the transmission of infection among family members	100.0%	0.0%	0.0%
	... I believe that ventilation of the house does not protect against respiratory diseases in children *	46.7%	12.6%	40.7%
	... washing the mother's hands protects the child from different infections	100.0%	0.0%	0.0%
	... cutting the child's finger nails reduces the incidence of diarrhea	58.3%	27.7%	14.0%
	... washing the face and hands reduces the incidence of eye infections	79.3%	20.7%	0.0%
	... combing the child's hair reduces the incidence of head lice infestation	89.7%	10.3%	0.0%
<b>Barriers against adherence to hygienic practices</b>	... maintaining the child's hygiene and its belongings demands a lot of effort	59.3%	3.3%	37.4%
	... adhering to hygienic practices needs a lot of time	45.3%	0.0%	54.7%
	... regular diaper changing is financially costly	100.0%	0.0%	0.0%
	... using soap forms a financial burden on the family	73.3%	3.3%	23.4%
	... having a shower harms a sick child	49.0%	22.0%	29.0%
	... using soap is harmful to the child's skin	46.7%	21.0%	32.3%

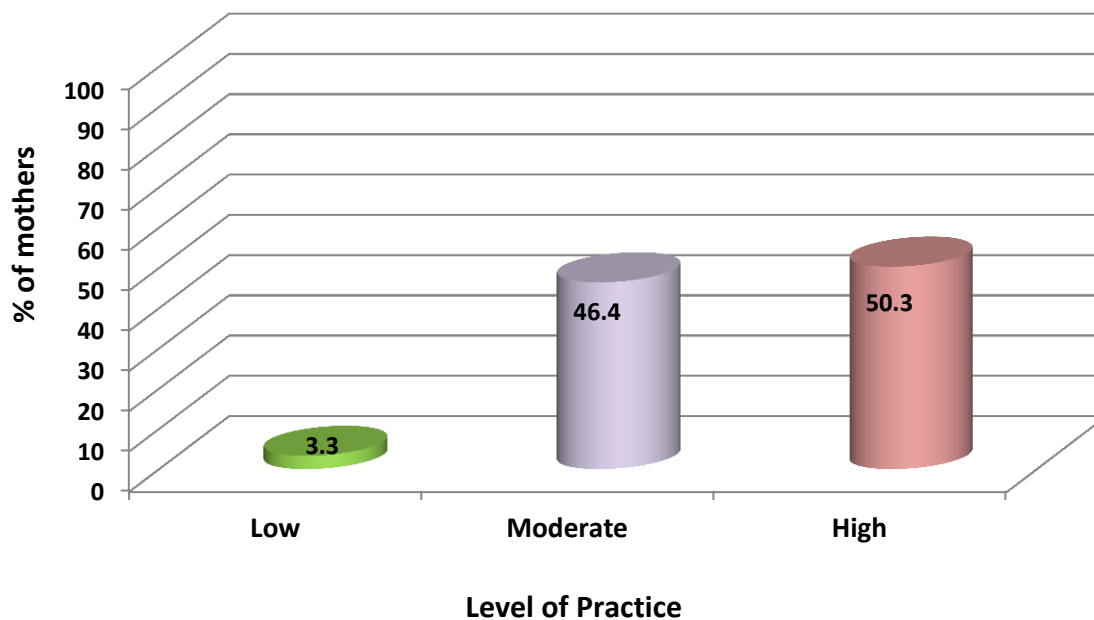
\* Negative statement



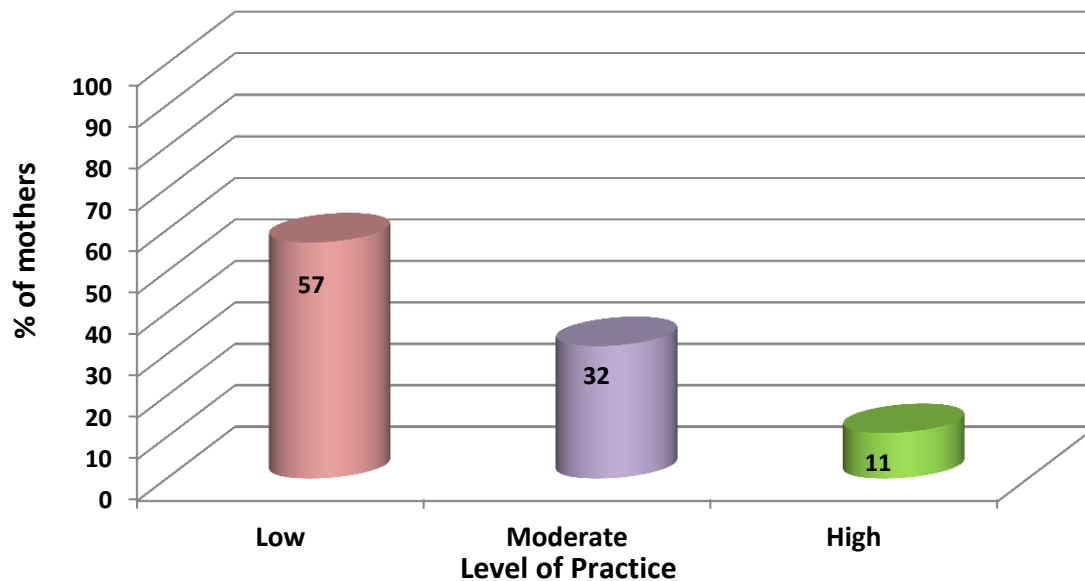
**Figure (3): Distribution of the studied mother according to their self-efficacy levels**

Regarding mothers' self-reported practice of hygienic behavior, figure (4) shows that about one half of the sample (50.3%) gave responses that showed a high level of hygienic practice, while the responses of 46.4% of the mothers showed a moderate level of practice. Only 3.3% reported an overall low level of practice. Figure (5) shows

the distribution of the studied subsample of mothers according to their observed practice levels. By observation, more than half of the sample (57%) demonstrated a moderate level of hygienic practices followed by 32% of the mothers having low hygienic practices and 11% with a high level.



**Figure (4): Distribution of the studied mothers according to the overall level of hygienic practice as reported by the mothers**



**Figure (5): Distribution of the studied subsample according to their observed hygienic practice levels**

Table (3) shows the summary of multiple regression models examining the effects of knowledge and the different constructs of the HBM on the mothers' hygienic practice. Significantly, knowledge together with all the elements of the HBM had an effect on the mothers' self-reported practice level. Increasing scores of knowledge, perceived susceptibility, perceived severity, perceived benefits and self-efficacy positively affected the practice

scores of mothers. Self-efficacy significantly had the strongest positive influence on hygienic practice with a  $\beta$  value of 1.333. On the other hand, increasing scores of perceived barriers decreased the hygienic practice scores by 0.684. The proportion of the variance in the mothers' hygienic practices that is predictable from their knowledge and health beliefs was equal to an R-squared value of 0.764.

**Table (3): Summary of stepwise multiple regression model for mothers' hygienic practice by knowledge and the different constructs of the Health Belief Model**

VARIABLE	Std. Error	Beta	t	Sig
Knowledge	0.023	0.160	7.029	<0.0001*
Perceived susceptibility	0.071	0.188	2.647	0.009*
Perceived severity	0.066	0.284	4.280	<0.0001*
Perceived benefits	0.142	1.233	8.699	<0.0001*
Perceived barriers	0.042	-0.684	-16.113	<0.0001*
Self efficacy	0.062	1.333	21.671	<0.0001*
<b>R square= 0.764</b>				

## DISCUSSION

Hygiene is considered as one of the basic means to prevent infection at household, healthcare, and different community settings and therefore has long been a topic of interest to

various studies. The present study was designed and performed to answer the questions of "If and why do mothers adhere to hygienic practices?". Mothers' beliefs

about children's susceptibility to diarrhea were high in most of the mothers of the present study sample. Likewise, the majority of the mothers believed that diarrhea has serious consequences. Nonetheless, these figures were still lower than those of reported in a study performed in an urban slum area in Kenya where more than 99% of the mothers in the sample had both high perceived susceptibility and severity when asked about childhood diarrhea.<sup>(16)</sup> Although in the present sample the majority of the mothers affirmed the role of hygiene in reducing infections and minimizing the risk of childhood diarrhea, still a small percentage of the mothers believed diarrhea to be contagious from one individual to another. Perhaps the contamination pathway via which infection is transmitted is ambiguous to the mothers. In other words, mothers may know that poor hygiene can cause infection, but they do not fully understand how the carrier of infection passes it on. The majority of the mothers in the present study agreed that hygiene protects from gastroenteritis and a similar percentage knew that the mothers' nail hygiene protects the child from diarrhea. Such common agreement on the relation between hand hygiene and diarrhea prevention, was further highlighted in the present study as one of the perceived benefits of trimming the child's fingernails as was reported by more than half of the sample. Washing the mother's hands was perceived by the entire sample to protect the child from different infections.

Apparently, there is a global agreement on the relation between hygiene and diarrhea. However, the relationship between hygiene and respiratory infection is still ambiguous to mothers. A minority of the mothers in the present study related hygiene to reduction of respiratory infection. Despite such mere percentage of mothers who linked hygiene to respiratory diseases, a percentage of 40.7% perceived home ventilation as protective from respiratory infections. This could be attributable either to mothers' inadequate knowledge about the pathways of infection, or to the fact that mothers do not consider aeration as a hygienic practice, rather, a habit, a source of light, or a temperature control.

As for the perceived barriers to proper hygienic practices, the effort and time costs of hygiene were highly perceived by approximately half of the studied mothers'. Although socioeconomic grade was shown to have no significant effect on the overall health perceptions of the mothers<sup>(17)</sup>, the financial expenses of soap and diapers were the most perceived barriers to hygiene in the present study. The socioeconomic score, however, was proved in previous studies to significantly affect the mothers' self efficacy regarding adhering to hygienic practices.<sup>(17)</sup> Self efficacy in turn proved to be a significant predictor of hygienic behavior. A study performed on care givers in Vietnam included self efficacy as one of the determinants of certain childcare practices, one of which is washing the child's hands before every meal. More than half of the mothers reported that they do it and those all possessed generally high level of self-efficacy regarding such practice. Some of the difficulties perceived by Vietnamese care givers as

barriers to washing the child's hands included time constraints, the effort in obtaining clean water due to lack of easy access or having to boil the available water. Other barriers reported by 15% of the Vietnamese mothers who do not wash their children's hands included forgetting, the fear that children might get cold and that soap might damage children's thin skin.<sup>(18)</sup> These barriers resemble some of the mothers' false perceptions in the present study about the harmful effect of soap or bathing to the child which were agreed upon by almost half of the sample. Some of the incorrect conceptions in the knowledge of mothers also include the alleged harmful effect of soap on the breast milk.<sup>(17)</sup> Such misconceptions are more likely to have cultural origins as mothers seemed to have inherited these facts from the older generations.

The great majority of the mothers in the present study had generally high level of health perceptions. The different elements of the HBM were proved to significantly affect the practice of mothers. The more the mother believes that her child is at risk and the more she believes that hygiene can effectively minimize that risk, the more likely she is to adhere to hygienic measures. On the contrary, the more the mother believes there are barriers or difficulties to performing that behavior, the probability of hygienic practices is reduced by 0.684 grades. This can be a clear illustration of the HBM that explains behavior as the net outcome of health beliefs.

## CONCLUSION AND RECOMMENDATIONS

Mothers' beliefs about childhood infection and the effectiveness of hygienic practices in preventing such infections are significant determinants of their hygienic behavior. Furthermore, mothers' belief regarding their efficacy in maintaining hygiene is an even stronger determinant of hygienic practice. Educational programs action is advised to work on undermining possible barriers to adherence to hygienic behavior.

**Limitations of the study:** The questionnaire was deemed lengthy by some mothers and they were reluctant to respond to the remaining questions. Some mothers were stressed out by their children's health status that they were not willing to engage in any activity unrelated to their children's particular health condition. Some mothers considered questioning their hygienic information and practice a sensitive matter and were apprehensive about the effect of their responses on their social image. They felt they'd rather give a right answer rather than a true answer.

**Conflict of Interest:** None to declare, aiming at promoting hygienic behavior as recommended to foster the perceived benefits of hygiene and creating a positive attitude towards hygiene as an effective measure for prevention and control of infection. Skills development is crucial to enhance the self-efficacy of mothers regarding key hygienic practices.



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