

FACTORS ASSOCIATED WITH HAND WASHING PRACTICES AMONG ADOLESCENTS YEMENI STUDENTS IN KLANG VALLEY, MALAYSIA

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<https://doi.org/10.32827/ijphcs.5.6.164>

ABSTRACT

Background: Handwashing is a cornerstone of public health and the practice of handwashing with soap tops the international hygiene agenda. Handwashing with soap is among the most effective and inexpensive ways to prevent infections. This study aims to determine the level of hand washing practices and the factors associated with hand washing practices among adolescent Yemeni students in Malaysia.

Materials and Methods: A cross-sectional study was conducted among Yemeni adolescent in Malaysia using stratified random sampling. Data was collected using validated and self-administrated questionnaire which comprises eight sections. Data collected was analysed using IBM Statistical Package for Social Science (SPSS) version 23. Descriptive, chi square and binary logistic regressions was used for analysis. All the association and predictors were considered significant at $P < 0.05$.

Result: In this study out of 221 respondents, most of them (65.6 %) were more than the age of 14 and 57.9% of them were males. Most of the students' parents had a university level of education: 39.8% of mothers and 70.1% of the fathers. Majority of the respondents (64.7%) stayed for more than 36 months in Malaysia. The predictors of poor hand washing practice were only older age ($P = 0.002$), poor knowledge ($P = 0.001$), no influence of sociocultural and family factors ($P = 0.023$) and absence of clean running tap water ($P = 0.001$).

Conclusion: The students had good handwashing practice. However, there should be ongoing health education about hand washing practice to students and the parents as well.

Keywords: Hand washing, practice, adolescent, Yemeni

1.0 Introduction

Hand washing is a general term involving activity or action of cleaning the hand. It is an important aspect of personal health care. Hand washing involves five simple and doable steps. They are wetting hands, lathering, scrubbing, rinsing with water and drying with a clean towel. These simple steps can reduce the spreading of the common communicable diseases like diarrhea (CDC, 2017a) and respiratory diseases (Wong & Cowling, 2014). Hand washing is the easiest, the most affordable and the most efficient way to halt the transmission of diseases through germs and can stop pathogenic microorganisms from spreading (CDC, 2009). The use of hand washing is more highlighted among the younger age group, as younger age are more vulnerable to contamination if the hands are left unwashed as they stay most of their time in schools which is a setting for disease transmission (Besha et al., 2016).

Handwashing is a cornerstone of public health and the handwashing practice with soap is the target that should be met in order to fulfil the international hygiene plan. Hand washing behaviours and other hygienic and sanitary services have influenced the decrease of infections since the 19th century (Davies Kodi. Mwachiro, 2014; McKeown, 2009). Around the world many of people die every day from infections acquired through which the hands are believed to be one of the main pathways of infectious agent transmission during different activities (WHO, 2009). There are several viral and bacterial diseases that can be transmitted through hand (Mathur, 2011). Several studies have proven that 1 in 3 diarrheal diseases and 1 in 5 respiratory diseases like flue can be prevented just by proper hand washing (CDC, 2017b).

Many studies had proven that most of the people worldwide practice hand washing with water, but few people wash the proper way with water and soap. The regional mean prevalence of handwashing with soap ranges between 13% and 17% in low- and middle-income regions, and between 42% and 49% in high-income regions. Country means in low- and middle-income regions vary between 5% and 25% of handwashing after contact with excreta, and between 48% and 72% in high-income countries. It has been proven that handwashing is advantageous after contact with excreta, however research has concluded that the peoples' hand washing practice is still unsatisfactory all over the world (Freeman et al., 2014). Additionally, UN reported that every year, more than 3.5 million children die before they reach the age of five due to diarrhoea and pneumonia (UNICEF, 2008). Therefore, handwashing with soap can limit the transmission of respiratory disease, which is one of the top mortality cause of children (Cairncross et al., 2010; Freeman et al., 2014). Until now, even though many practical and theoretical studies proved that hand washing prevent a number of infectious diseases, it is difficult to educate or do health promotion of handwashing (UNICEF, 2008).

It is reported that the global burden of infectious disease is mostly carried out by the developing countries and most of these infectious diseases in low to middle- income countries are entirely avoidable and simply preventable by self-hygiene which is effective (Bhutta, Sommerfeld, Lassi, Salam, & Das, 2014). Yemen is one of these low-income countries in which the prevalence of infectious disease are high and can be simply prevented by proper sanitation and good personal hygiene (Hotez, Savioli, & Fenwick, 2012) because there are more than 50% of Yemenis, 25 million people living below poverty line (World Bank, 2017).

The consequence of poor hand washing is countless in terms of rising different diseases such as water-borne diseases: acute gastroenteritis caused by campylobacter, cholera, hepatitis A, shigellosis and so on (Nicole, 2015). Acute gastroenteritis as a result of the water-born causes is common among children in developing countries and causes 600 000-875 000 deaths per year (Revelas, 2015). In Yemen also, there is high prevalence of water-borne diseases, which are mainly transmitted by hand (Lopour, 2017). Out of the total population 12 million were living without decent sanitation (world report, 2015) and the hospital visits of children due to acute gastroenteritis were very high, for instance in, (Hadhramaut, Al-Mahra, and Shabwa) (Bahartha & Alezzi, 2015).

Currently there is limited literature related to hand washing done among Yemeni, in particular among adolescents. Study among these groups of population is important because the adolescents are the most important part of the population. This group of population will soon be adults as well as parents with more responsibilities. Hence this study will contribute to the level of hand washing practices among Yemeni adolescent students in Klang Valley, Malaysia.

2.0 Materials and Methods

This study was a cross-sectional study conducted among Yemeni adolescents in Malaysia. The study area for this research was in three selected international schools in Klang Valley-Malaysia namely; New Generation International School, International Modern Arabic School (IMAS) and Global modern international school. The sampling method of this study was conducted using stratified sampling proportional to the number of students in three schools which were then randomly sampled. There were two strata: primary and secondary level students. There were a total of 700 students in New Generation International School, IMAS International School and Global Modern International School with 250, 150 and 300 Yemeni students in each school respectively. Therefore, the list of students was taken, and the number of students was proportionally selected according to the level of the students. For the random sampling computer generated random sampling method which is called research randomizer was used (<https://www.randomizer.org/>). The Yemeni students who were not present at the time of data collection due to long leave, long period vacation or those who were sick were excluded from the study.

A self-administrated paper based questionnaire was used to assess the level of handwashing practice. The questions are adopted from several articles but mainly taken from a study done in Ethiopia among primary school students (Besha et al., 2016). The questionnaire was written in Arabic and English language since the respondents are Yemeni but some of them were born in Malaysia and can only speak English language. The front page of the questionnaire had a consent form followed by seven sections (sociodemographic information, socioeconomic information, knowledge of handwashing, school hygiene facilities, socio-cultural and family practices, personal attitude and hand washing practice).

The knowledge of hand washing assessment section had 8 questions with three response options, “yes”, “no”, and “not sure”. The scoring was “1” for those who correctly answered

the question and 0 for those who answered wrong and not sure. There were several negatively worded items however, they were reversed and re-coded during the data analysis. The cut-off point was based on the median with the maximum score of eight and minimum zero. The personal attitude questions had eight questions and had 5-point Likert's responses. They were "strongly agree", "agree", neutral", "disagree" and "strongly disagree". They were coded from "5" to strongly agree up to "1" to the strongly disagree. The maximum score was 35 and minimum 7 and median was used as the cut- off point between satisfactory and unsatisfactory. The availability of school hygiene facilities section had six question with present/yes or absent/no responses. Socio-cultural and family practices section, there were three questions and the response options are 5-point Likert's scale" namely "strongly agree", "agree", neutral", "disagree" and "strongly disagree" and was coded from five down to one respectively. Finally, the hand washing practice which the dependent variable is had 16 questions. The respondents had five options to answer "almost always", "sometimes", "every once in a while", "rarely" and "never".

Face and content validation took place after approval from the UPM Ethics Committee and from the four different schools including the Alyemenia School. Revision and minimal correction in question structures was made based on the comments and feedbacks from the respondents during the pretesting phase before the actual data collection. Additionally, the content of the questionnaire was reviewed by two experts in the field of study including the supervisory committee. Pretesting was conducted on 10% of the sample size in Alyemenia School in Malaysia. This research used internal consistency which involves correlating the response to questions in the questionnaire with each other. The Cronbach's alpha measured the consistency of responses to the set of questions (scale items) that are combined as a scale to measure a concept. Values of 0.7 and above indicate that the questions combined in the scale are measuring the same thing (Bland & Altman, 1997). The data collected was not included with the results of the study. The Cronbach's alpha coefficient of knowledge of handwashing, personal attitude and handwashing practice was 0.71, 0.845 and 0.763 respectively. The results were within the acceptable range.

Data were analysed using the IBM Statistical Package for Social Science (SPSS) version 23 for windows. Descriptive statistics, Chi square and binary logistic regression were used to analyse the data. Normality test for the continuous data such as age, duration of stay and the scores of knowledge, personal attitude, socio-cultural and family factors and total score of handwashing practice were analysed using Kolmogorov-Smirnov and Shapiro-Wilk and it revealed the *P*- value less than 0.05 for all the continuous data which shows that they are not normally distributed. Therefore, median was used to explain the central tendency with inter quartile range (IQR). The significance level was set at $P < 0.05$.

Ethics approval was obtained from the Ethical Committee for Research involving Human Subjects of Universiti Putra Malaysia (JKEUPM) with reference number UPM/TNCPI/RMC/JKEUPM/1.4.18.2 and the principals in New Generation International School, IMAS, Global Modern International School and Al-Yemenia School Malaysia or approvals from each school after the approval letter was given from the Yemeni embassy. In addition, an informed individual written consent was obtained from each respondent along with their parents prior to recruitment into the study and the respondents will be offered that the information was analysed in anonymity throughout the study.

3.0 Result

There were 230 eligible respondents out of which 221 questionnaires were filled appropriately and returned to the researcher. The response rate was 96%. The nine questionnaires excluded were due to extensive missing answers, respondents did not return the questionnaire or couldn't be traced back.

3.1 Socio-demographic characteristics of the Respondents

As shown in table 1, most of the respondents (65.6 %) were more than the age of 14 with median of 14 and 57.9% of them were males. Most of the students' parents have a university level of education: 39.8% of mothers and 70.1% of the fathers. Majority of the respondents (64.7%) stayed for more than 36 months in Malaysia with median 36 and IQR of 45. The socio-economic distribution of the respondents is depicted in Figure 4.2 and Figure 4.3. Most fathers (79%) are employed whereas only 21% of the mothers are not employed. As depicted in figure 4.3, 64% of the mothers are not employed. The other 36% of the mothers are employed. Most of the students refused to disclose the monthly income of the household due to privacy issue.

Majority of students (54.8%) scored more or equal to 75% of the total score whereas 100 (45.2%) students categorized as having poor knowledge regarding handwashing. The level of personal attitude in relation to hand washing was categorized based on the median value (26) in to satisfactory and unsatisfactory. Among the total respondents, 56.6% had unsatisfactory attitude whereas 96 (43.4%) had satisfactory personal attitude towards handwashing. Those who responded agree or strongly agree categorized as influenced and those who responded the other options were categorized as not influenced. Most of the respondents (58.8%) scored more than 12 and grouped as influenced while the 41.2% respondents as not influenced.

The students reported that the schools have hand washing stations (81.9%), located inside (79%) and hand washing station in canteen (62%). Most of the students (64.35) also reported that there is no soap for hand washing and no posters of hand hygiene (not included in Table 1).

Table 1: Sociodemographic distribution of respondents (N= 221)

Variable	Frequency	Percentage	Median (IQR)
Age			
10-14	145	65.6	14 (2)
15-17	76	34.4	
Gender			
Male	128	57.9	
Female	93	42.1	
Mother's level of education			
None educated	14	6.3	
Primary	17	7.7	
Secondary	78	35.3	
Diploma	24	10.9	
University	88	39.8	
Father's level of education			
None educated	6	2.7	
Primary	2	0.9	
Secondary	27	12.2	
Diploma	31	14	
University	155	70.1	
Duration of stay (in Months) min 3, max 192			
≤36 months	132	40.3	36 (45)
>36- months	89	59.7	
Fathers employment status			
Employed			
Unemployed			
Mothers employment status			
Employed			
Unemployed			
Knowledge (Min=0, max=8)			
Good (6-8) >75%	121	54.8	6(3)
Poor (0-5)	100	45.2	
Attitude (Min=14, max=35)			
Satisfactory (26-35)	96	43.4	26(6)
Unsatisfactory (7-25)	125	56.6	
Socio-cultural and family factors (Min=5, max=15)			
Not influenced (5-11)	91	41.2	12(3)
Influenced (12-15)	130	58.8	
Hand washing practice (Min=29, max=65)			
Poor (29-55)	106	48	56(12)
Good (56-65)	115	52	

IQR=interquartile range

3.2 Associated Factors of Practice on Prevention of Dengue Infection

There were several factors associated with the hand washing practice among Yemeni students in international schools of Malaysia (see Table 2). Age and handwashing practice were significantly associated ($\chi^2 = 8.939$, $df = 1$, $P = 0.003$) in which 59.3% of the students aged 10-14 and 38.2% of older students (15-17) had good handwashing practice. The maternal ($\chi^2 = 9.800$, $df = 4$, $P = 0.044$) and paternal ($\chi^2 = 11.574$, $df = 1$, $P = 0.021$) level of education were significantly associated with handwashing practice. The schools where the respondents came from and the duration of stay in Malaysia was not significantly associated with handwashing practice. Sixty percent of the respondents with employed mothers had a good handwashing practice but only 47.2% of the respondents with non-working mothers had good perception. However, these findings were not statistically significant. There was no significant association between father's employment and handwashing practice.

Most respondents with good knowledge (63.6%) had good handwashing practice and 38% of students with poor knowledge had good handwashing practice and this finding was significant ($\chi^2 = 14.417$, $df = 1$, $P < 0.001$). Personal attitude was also significantly associated with handwashing practice ($\chi^2 = 4.776$, $df = 1$, $P = 0.029$). The influence of socio-cultural and family factors is significantly associated with the handwashing practice. ($\chi^2 = 11.574$, $df = 1$, $P = 0.021$). Most of the students (57.7%) with influence of socio-culture and family factors had good level of handwashing practice.

In regard to the availability of handwashing materials and handwashing practice, out of 6 materials only two are significantly associated with the level of perception. The presence or absence of handwashing station in school was significantly associated with the level of handwashing practice ($\chi^2 = 5.679$, $df = 1$, $P = 0.017$) and the availability of clean running tap water within the school was also significantly associated with the handwashing practice ($\chi^2 = 10.935$, $df = 1$, $P = 0.001$).

Table 2: Associated Factors of Practice on Prevention of Dengue Infection

Variables	Practice		Test statistics	
	Poor	Good	χ^2	P-value
	n(%)	n(%)		
Age				
10-14	59(40.7)	86(59.3)	8.939	0.003**
15-17	47(61.8)	29(38.2)		
Gender				
Male	72(56.3)	56(43.8)	8.368	0.004**
Female	34(36.6)	59(63.4)		
Mother's level of education				
None educated	9(64.3)	5(35.5)	9.800	0.044*
Primary	12(70.6)	5(29.4)		
Secondary	29(37.2)	49(62.8)		

Diploma	10(41.7)	14(58.3)		
University	46(52.3)	42(47.7)		
Father's level of education				
None educated	6(100)	0	11.574	0.021*
Primary	0	2(100)		
Secondary	13(48.1)	14(51.9)		
Diploma	14(45.2)	17(54.8)		
University	73(47.1)	82(52.9)		
Duration of stay (in Months)				
≤36 months	43(48.3)	46(51.7)	0.007	0.932
>36- months	63(47.7)	69(52.3)		
Mother's employment status				
No	75 (52.8)	67(47.2)	3.749	0.053
Yes	31 (39.2)	48(60.8)		
Father's employment status				
No	24(52.2)	22(47.8)	0.413	0.521
Yes	82(46.9)	93(53.1)		
Knowledge Score level				
Poor	62(62.0)	38(38.0)	14.417	<0.001**
Good	44(36.4)	77(63.6)		
Attitude Score level				
Unsatisfactory	68(54.4)	57(45.6)	4.776	0.029*
Satisfactory	38(39.6)	58(60.4)		
Socio cultural and family factors Score level				
Not influenced	51(56.0)	40(44.0)	4.047	0.044*
Influenced	55(42.3)	75(57.7)		
Is there a hand washing station in the school?				
Absent	14(35.0)	26(65.0)	5.679	0.017*
Present	101(55.8)	80(44.2)		
Is there clean running tap water within washing area?				
No	45(64.3)	25(35.7)	10.935	0.001**
yes	61(40.4)	90(59.6)		

Significant at * $P < 0.05$, ** $P < 0.01$

3.3 Predictors of Good Practice in on Prevention of Dengue Infection

To detect the predictors of poor handwashing practice, logistic regression was used to analyses it. As a preliminary model, all the variables (age, gender, schools, fathers' and mothers' level of education, parent's employment status, knowledge of handwashing, personal attitude towards handwashing, and the factors in the availability of hand hygiene materials in school and socio-cultural and family factors) were identified using simple logistic

regression one by one independently. Nine out of the total variables were significant. Variables with $P < 0.25$ were included in the model (Hosmer & Lemeshow, 2000).

All included variables were analysed using ENTER, FORWARD-LR and BACKWARD-LR methods. The FORWARD-LR method was selected as it generated more significant predictors. The logistic regression model was valid ($\chi^2 = 38.027$, $df = 4$, $P < 0.001$) and Hosmer and Lemeshow test was not significant which is a sign of good model of fitness ($\chi^2 = 3.019$, $df = 8$, $P = 0.697$), although the total variation of the predictors showed 21.1% (Nagelkerke $R^2 = 0.211$). The model correctly classified 67.9% of the poor handwashing practice.

The older aged students were more likely (aOR = 2.623, 95% CI = 1.415-4.863, $P = 0.002$), to have poor hand washing practice compared to the younger respondents. Moreover, those respondents who had poor knowledge of hand washing (aOR = 2.726, 95% CI = 1.523-4.882, $P = 0.001$), and those who are not influenced by the socio- cultural and family factors regarding hand washing (aOR = 2.724, 95% CI = 1.099- 3.572, $P = 0.023$) were more likely to have a poor hand washing practices when compared to those who had good knowledge and those influenced by the socio-cultural and family factors respectively. The students that reported that there is no clean running water within the washing area in their school were more likely to have poor hand washing practice (aOR = 2.772, 95% CI = 1.478-5.200, $P = 0.001$). Hence, the equation of the final predictive model derived from this multivariate logistic regression is illustrated in Table 3 below:

Table 3: Predictors of poor handwashing practice

	B	S.E.	Wald	P	aOR	95% C.I.	
						Lower	Upper
Age							
[10-14]	.964	.315	9.376	.002*	2.623	1.415	4.863
15-17					1		
knowledge							
Poor	1.003	.297	11.389	.001*	2.726	1.523	4.882
[Good]					1		
socio-cultural and family factor							
Not influenced	.684	.301	5.166	.023*	1.981	1.099	3.572
[Influenced]					1		
Is there clean running tap water within washing area?							
No	1.020	.321	10.097	.001*	2.772	1.478	5.200
[Yes]					1		
Constant	-1.480	.298	24.620	.001**	.228		

* $P < 0.05$, ** = $P < 0.001$; [] = Reference group; CI = confidence interval

4.0 Discussions

In this study it was reported that most of the students were males, but this could be only by a chance of the random selection. The finding of male to female ratio is similar to that of hand washing study among students in Indonesia (Setyautami, Sermisri, & Chompikul, 2014). Their parents also have university level education because as an expatriate most of them come here to work or continue working here after they completed their tertiary education. This could also be the reason that most of the students stayed in Malaysia more than three years or born here. The level of education of parents is opposite to the study reported in India regarding handwashing practices that most of the parents were at the secondary level (Tamilarasi et al., 2016). Most of the fathers are employed and the mothers are not employed which is a general truth that the mothers mostly are responsible for taking care of their children.

This study showed that females had good perceived hand washing practice and it was significantly associated. However, in other study in Iran among students showed the contrary in which males did more hand washing than females when entering the ward ($P = 0.001$). This study showed significant association between age and perceived hand washing practice but in other studies showed that there was no significant relationship between hand washing practice when entering the ward and the variables of age ($P = 0.641$), (Fesharaki, Rahmati-Najarkolaei, Aghamiri, & Mohamadian, 2014). In this study the younger were reported better handwashing. This could be due to the supervision they get from family and teachers because they are relatively younger than their schoolmates. And other study reported that gender $b=7.1$ (3.9-10.4, $P < 0.001$) and age 1.3 (0.4-2.2) $P= 0.004$ were significantly associated with practice of hand washing (A Ergin, Bostanci, Önal, Bozkurt, & Ergin, 2011).

Even though our study found significant association between knowledge and practice of hand washing, several studies reveal a gap between knowledge about handwashing with soap and optimal handwashing behavior by students in schools (Rabbi & Dey, 2013). Studies have also found a discrepancy between knowledge and practice of handwashing (Aigbiremolen, Abejegah, Ike, Momoh, & Abah, 2015). Improving handwashing with soap knowledge alone is typically insufficient to change handwashing behavior. Handwashing behavior and practice is associated with having both an improved sanitation facility and improved water source (Global Handwashing Partnership, 2017).

Culture and family not only influence handwashing but almost every aspect of youngsters' daily activity. This study identified that the socio-cultural and family influence was associated factor of hand washing practice which was similar to other studies (Ghanim et al., 2016; Nazliansyah, Wichaikull, & Wetasin, 2016). This study also showed that there was significant association with the availability of hand washing area and availability of clean running water with hand washing practice. It is well understood that the availability, quality and its proper utilization of hand washing facilities and toilets are the most important determinant for the compliance of handwashing for school children (Chittleborough, Nicholson, Basker, Bell, & Campbell, 2012).

There are several strengths in this study. Primarily the response rate was very high (96%), The questionnaires were reviewed during data collection and had minimal missing data.

Additionally, the study was the first of its kind among Yemeni students in Malaysia which could be used as a base for further studies.

However, the cross-sectional study design is one of the limitations because the exposure and outcome are simultaneously assessed, there is generally no evidence of a temporal relationship between exposure and outcome. There is also potential of information bias since the students tend to give socially desirable answers and recall bias since the respondents were self-reporting on their hand washing practice.

5.0 Conclusion and recommendation

This study identified that most of the Yemeni students studying in three schools in Malaysia has good handwashing practice. The older age, poor knowledge, no influence of sociocultural and family factors and absence of clean running tap water were predictors of poor handwashing practice. Therefore, there should be deeper and further study which is practical and interventional to assess the outcome and identify the hindering factor behind it. The public health studies and interventions should not only focus on the students but at the parents and friends as they have an impact to change ones' habitual activity on a daily basis. The health education should also include the demonstration and training on how to do proper hand washing. Lastly, for the schools, there should be rules and regulations set for the availability of hand washing materials and should be monitored on regular basis.

Acknowledgement

We would like to thank UPM, Embassy of Yemen, New Generation International School, IMAS, Global Modern International School and Al-Yemenia School Malaysia for their cooperation. We would also like to pay our gratitude to the respondents and parents for assisting in successful completion of this paper.

Declaration

Authors declare that there is no conflict of interest.

Author's contribution

Author 1: Research topic, proposal, data analysis, drafting manuscript

Author 2: Data analysis, drafting manuscript

Author 3: Review manuscript

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