

Association between handwashing practices and quality of toilets with diarrhea among under-five years children

Yesvi Zulfiana,¹ Luh Seri Ani,^{2*} Ni Wayan Arya Utami²

ABSTRACT

Background and purpose: The incidence of diarrhea among under-five years children in Indonesia is considerably high. Studies exploring risk factors of diarrhea have been extensively conducted in Indonesia. However, the association between handwashing practices of the mother and quality of toilets with diarrhea among under-five years children are still inconsistent across studies. This study aims to examine the association between handwashing practices of the mother, quality of toilets and the episodes of diarrhea among under-five years children.

Methods: A cross-sectional survey was conducted involving 104 under-five years children in Selagalas Village. Samples were selected using systematic random sampling. Data were collected in July 2017 by observation and face-to-face interviews using questionnaires. Bivariate analysis and logistic regression were conducted to examine the association between hand washing practices, quality of toilets and diarrhea among under-five years children.

Results: We found more than half of under-five years children (64.42%) had experienced at least one episode of diarrhea over the last three months. We found a significant association between diarrhea with unhygienic toilets with an adjusted odds ratio (AOR) of 2.84 and poor handwashing practices of the mother with AOR of 2.46, however, both have a lower limit of AOR confidence interval that close to one, namely 95%CI: 1.05-5.97 and 95%CI: 1.03-5.87.

Conclusion: Poor hand washing practices and unhygienic toilets are associated with the episodes of diarrhea among under-five years children, however, both have a low programmatic importance. Further study should be carried out to understand the association between handwashing practices and quality of toilets with diarrhea. Despite of the low programmatic importance, good hand washing practice should be promoted and access to toilets that meet the health standard must be enhanced.

Keywords: diarrhea, under-five years children, hand washing, unhygienic toilets

¹Yarsi Health Higher Education Mataram,

²Department of Public Health and Preventive Medicine, Faculty of Medicine, Udayana University

INTRODUCTION

Diarrhea is the second highest contributor for morbidity and mortality among under-five years children in Indonesia. The 2013 Indonesia Basic Health Research or *Riset Kesehatan Dasar (Riskesdas)* revealed that the proportion of diarrhea among under-five years children was 6.7% national wide, and 6.6% in West Nusa Tenggara Province.¹

A high incidence of diarrhea among under-five years children is contributed by several factors including poor sanitation and lack of hygiene facilities, poor personal hygiene, and inadequate handwashing practices. The 2013 *Riskesdas* found that only 47.2% of respondents perform adequate handwashing practices, and 18.1% of households have unhygienic toilets.¹

Studies exploring risk factors of diarrhea among under-five years children in Indonesia have been extensively conducted, however, the association between handwashing practices of the mother and quality of toilets with diarrhea among under-five years children remains inconsistent. A study conducted in Semarang City in 2013 found

a significant association between handwashing practices of the mother prior to feeding the children and the episodes of diarrhea.² However, a study conducted in Bekasi in 2014 found that there is no significant association between the episodes of diarrhea and handwashing with soap and clean water.³ This study aims to examine the association between handwashing practices of the mother, quality of toilets and the episodes of diarrhea among under-five years children.

METHODS

A cross-sectional survey was conducted in Selagalas Village, Cakranegara Sub-District, Mataram City, West Nusa Tenggara in July 2017. Three out of seven sub-villages were randomly selected. A total of 104 households were selected from these three sub-villages using systematic random sampling. Data were collected by observation and face-to-face interviews using questionnaires with the mothers who have under-five years children. The number of samples was calculated with 95% confidence level,

*Correspondence to:
Luh Seri Ani, Department of Public Health and Preventive Medicine, Faculty of Medicine, Udayana University
luhsariani@yahoo.com

power of 90%, anticipated proportion of diarrhea among children with household unhygienic toilet of 51% and anticipated proportion of diarrhea among children with household hygienic toilet of 30%.⁴

We collected data on diarrhea, mother and children characteristics, knowledge and perception about diarrhea, exclusive breastfeeding, measles immunisation and handwashing practices of the mother (using soap and clean water before and after activities). We also observed the drinking water treatment, clean water facilities, waste management (bins/areas), and quality of toilets based on healthy toilets indicators which include gooseneck toilets, odourless, appropriate distance to clean water sources (10 metres), plastered tightly to prevent soil contamination, and non-slippery floor. Bivariate and multivariate analysis with logistic regression were conducted to examine the association between hand washing practices, quality of toilets and diarrhea among under-five years children. This study has been approved by the Human Research Ethics Committees of Mataram University in May 2017.

RESULTS

Table 1 presents the characteristics of respondents (mothers) and under-five years children. The average of mother's age was 29 years and the majority of respondents were primary school graduates (66.35%) and unemployed (70.04%). The median age of the children was 30 months, and the majority of under-five years children were female (60.58%), with normal birth weight (75.90%) and 64.42% experienced at least one episode of diarrhea in the last three months. About a half (50.96%) of respondents have poor hand washing practices and 64.42% were found to have unhygienic toilets.

Table 2 shows the results of bivariate and multivariate analysis between episodes of diarrhea in the last three months among under-five years children and various independent variables. All independent variables with $p < 0.25$ in the bivariate analysis were included in the multivariate analysis model. These variables were birth weight, measles immunisation history, drinking water treatment, handwashing practices of the mother, clean water

Table 1 Characteristics of mothers and children, hand washing practices and quality of toilets

Variables	n	%
Mean age of the mothers (years)±SD	29.2±6.8	
Mean age of the children (months)±SD	30.2±4.0	
Mother's education		
>Junior high school	35	33.65
≤Junior high school	69	66.35
Mother's employment		
Employed	27	25.96
Unemployed	77	74.04
Sex (children)		
Male	41	39.42
Female	63	60.58
Birth weight of the children		
Low birth weight	25	24.04
Normal birth weight	79	75.96
Episodes of diarrhea		
Yes	67	64.42
No	37	35.58
Mother's handwashing practices		
Good	51	49.04
Poor	53	50.96
Quality of toilets		
Hygienic (meet the minimum health requirements)	37	35.58
Unhygienic (did not meet the minimum health requirements)	67	64.42
Total	104	100.00

Table 2 Association between diarrhea among under-five years children and various variables

Variables	Bivariate			Multivariate		
	Diarrhea n (%)	No diarrhea n (%)	p	Adjusted OR	95%CI	p
Mean age of mother (years) \pm SD	29.46 \pm 6.84	28.67 \pm 6.3	0.86			
Employment						
Employed	18 (66.67)	9 (33.33)	0.78			
Unemployed	49 (63.64)	28 (36.36)				
Education						
>Junior high	23 (65.71)	12 (34.29)	0.84			
\leq Junior high	44 (63.77)	25 (36.23)				
Sex (children)						
Male	28 (68.29)	13 (31.71)	0.51			
Female	39 (61.90)	24 (38.10)				
Birth weight						
Low	20 (80.00)	5 (20.00)	0.06	2.84	0.96-9.22	0.05
Normal	47 (59.49)	32 (40.51)		1.00		
Knowledge						
Good	59 (62.77)	35 (37.23)	0.28			
Poor	8 (80.00)	2 (20.00)				
Perceived barriers						
Yes	63 (64.29)	35 (35.71)	0.90			
No	4 (66.67)	2 (33.33)				
Perceived susceptibility						
Yes	54 (62.07)	33 (37.93)	0.26			
No	13 (76.47)	4 (23.53)				
Perceived severity						
Yes	60 (63.83)	34 (36.17)	0.69			
No	7 (70.00)	30 (30.00)				
Perceived benefits						
Yes	62 (65.26)	33 (34.74)	0.56			
No	5 (55.56)	4 (44.44)				
Exclusive breastfeeding						
Yes	42 (65.63)	22 (34.37)	0.75			
No	25 (62.50)	15 (37.50)				
Measles immunisation						
Yes	43 (60.56)	28 (39.44)	0.22	1.11	0.39-3.15	0.22
No	24 (72.73)	9 (27.27)		1.00		
Drinking water treatment						
Good	35 (56.45)	27 (43.55)	0.03	2.31	0.91-5.81	0.07
Poor	32 (76.19)	10 (23.81)		1.00		
Hand washing practices						
Good	28 (54.90)	23 (45.10)	0.04	2.46	1.03-5.86	0.04
Poor	39 (73.58)	14 (26.42)		1.00		

Table 2 Continue

Variables	Bivariate			Multivariate		
	Diarrhea n (%)	No diarrhea n (%)	p	Adjusted OR	95%CI	p
Clean water facility						
Good	11 (52.38)	10 (47.62)	0.19	1.55	0.53-4.55	0.41
Poor	56 (67.47)	27 (32.53)		1.00		
Waste management						
Good	21 (58.33)	15 (41.67)	0.34			
Poor	46 (67.65)	22 (32.35)				
Toilets quality						
Hygienic	19 (51.35)	18 (48.65)	0.03	2.84	1.05-5.97	0.02
Unhygienic	48 (71.64)	19 (28.36)		1.00		

facilities and quality of toilets. Our multivariate analysis using logistic regression showed that diarrhea among under-five years children was associated with poor handwashing practices of the mother with adjusted odd ratio (AOR) of 2.46 (95%CI: 1.03-5.87) and unhygienic toilets with AOR of 2.84 (95%CI: 1.05-5.97).

DISCUSSION

Our study found that poor handwashing practices was significantly associated with episodes of diarrhea among under-five years children, however, the lower limit of the AOR confidence interval was close to one. This means that the finding is not programmatically significant. Other studies conducted in Semarang and Jakarta found a positive association between handwashing with soap and diarrhea among school-aged children, however, both studies only provides the results of bivariate analysis.^{2,5} An experimental study found that hand washing practices with soap and water reduced the presence of bacteria from hands.⁶ However, the other study in Bekasi (West Java) found no significant relationship between handwashing practices with soap and clean water with diarrhea among under five years children.³ An intervention study in Pakistan also found that hand washing practices with soap was not significantly associated with the episodes of diarrhea among households.⁷

Our study also found that poor quality of toilets is associated with the episodes of diarrhea among under-five years children, however, the lower limit of the AOR confidence interval was also close to one. This means that the finding is neither programmatically significant. A study in Gorontalo found a significant association between diarrhea

among under-five years children and toilets that do not meet the health standard.⁴ A study in Mojokerto also found a significant association between diarrhea among pre-school children and the quality of toilets.⁸ Another study in Sleman District found that families with unhygienic toilets have a higher proportion of diarrhea among under-five years children.⁹ However, a study in Medan found no significant association between diarrhea among under-five years children and the quality of toilets ($p > 0.05$).¹⁰

The limitation of our study is that we only include the episodes of diarrhea in the last three months. In addition, there was a possibility of recall bias for variables measured retrospectively through interviews such as history of breastfeeding, measles immunization, hand washing practices and also the episodes of diarrhea. This is a cross-sectional study, therefore this study does not explain a causal association. This study was conducted only in one village therefore the generalization of the results into a wider population needs to be taken in caution.

CONCLUSION

Poor handwashing practices and unhygienic toilets were statistically significant associated with the episodes of diarrhea among under-five years children, however both have a low programmatic importance. Further study should be carried out to understand the association between handwashing practices and quality of toilets with diarrhea. Despite of the low programmatic importance, good hand washing practice should be promoted and access to toilets that meet the health standard must be enhanced.

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