

Factors Associated with Personal Hygiene, use of Personal Protective Equipment, and the Risk of Contact Dermatitis among Scavengers: A Path Analysis Evidence from Surakarta, Central Java

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ABSTRACT

Background: Scavengers with poor personal hygiene and do not use complete personal protective equipment (PPE) are at risk of developing contact dermatitis. This study aimed to analyze factors associated with personal hygiene, use of personal protective equipment, and the risk of contact dermatitis among scavengers using path analysis and health belief model.

Subjects and Method: This was an analytic observational study with a cross sectional design. The study was conducted at Putri Cempo landfill, Surakarta, Central Java. A sample of 203 scavengers was selected by total sampling. The dependent variable was contact dermatitis. The independent variables were personal hygiene, PPE, perceived susceptibility, perceived severity, perceived benefit, self-efficacy, cues to action, social support, education, and age. The data were collected by questionnaire and analyzed by path analysis.

Results: The risk of contact dermatitis was directly and positively affected by poor individual hygiene ($b= 4.58$; 95% CI= 1.42 to 3.55; $p<0.001$) and incomplete PPE ($b= 5.52$; 95% CI= 2.38 to 5.01; $p<0.001$). The risk of contact dermatitis was indirectly affected by and ages 15-35 years, perceived benefit, cues to action, self-efficacy, perceived susceptibility, perceived severity, low education, and social support.

Conclusion: The risk of contact dermatitis is directly and positively affected by poor individual hygiene and incomplete PPE. The risk of contact dermatitis is indirectly affected by and ages 15-35 years, perceived benefit, cues to action, self-efficacy, perceived susceptibility, perceived severity, low education, and social support.

Keywords: personal protective equipment, contact dermatitis, personal hygiene, health belief model, path analysis

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BACKGROUND

Scavengers make a living by collecting consumable materials and turning them into economic value goods by recycling. Final Place (TPA) is one of the scavenger work targets. Scavengers are at risk of developing skin diseases caused by exposure in the work environment. The most common type of skin disease suffered by workers including scavengers is contact dermatitis by

80% (Nyathi et al., 2018; Carder et al., 2017)

Contact dermatitis is an inflammatory condition because it comes in contact with hazardous chemicals combined with general waste. The national prevalence for dermatitis is 6.8%. Epidemiological studies in Indonesia show that 97% of 389 occupational dermatoses are contact dermatitis, 66.3% are irritant contact dermatitis and 33.7% are allergic contact dermatitis. The

prevalence of contact dermatitis in Central Java is 7.95% (Silvestre and Reis, 2018; Suryani et al., 2017).

Surakarta is one of the cities that has increased in its population, resulting in an increase in the amount of waste production. According to data from the Surakarta City Sanitation and Parks Department in 2017, it is estimated that an average of around 291 tons of waste is produced every day. This means that on average in the year 106,279 tons of garbage are produced by Surakarta City. The waste is transported to Putri Cempo Mojosoongo TPA, Jebres Subdistrict, Surakarta City (Department of Environment, 2018).

Scavengers need to use and equip personal protective equipment (PPE) when working to protect against the risk of disease. Minister of Manpower and Transmigration Regulation No. 1 Article 1 states that workers must use PPE to isolate the body from potential hazards in the workplace. PPE scavengers include head protectors, hand protectors, body armor and leg protectors. Scavengers who do not use PPE 63.4% experience contact dermatitis. (Permenker, 2010; Zolnikov et al., 2018; Pardiansyah, 2015; Bhoynul et al., 2019).

Poor personal hygiene can affect contact dermatitis. Personal hygiene is an effort to enhance the degree of his own health by cleaning all members of the body as prevention of diseases including skin hygiene, foot, nail and hand hygiene, cleanliness of clothing and cleanliness of PPE (Campbell et al., 2017; Aunger et al., 2016; Nivianingrum and Mulasari, 2017).

A preliminary study conducted at Putri Cempo TPA, authors found several scavengers who do not use PPE. Authors also found complaints of skin diseases in scavengers because of contact with garbage. This can be influenced by various factors including the behavior of pemlung to per-

form personal hygiene, the use of PPE, perceptions of scavengers related to the benefits of personal hygiene and APD, the originator of the action of implementing individual hygiene and using PPE, self-efficacy of implementing individual hygiene and using PPE, social support implementing individual hygiene and using PPE, perception of vulnerability, perception of severity, education, and age.

This study aims to analyze waste collectors in the implementation of personal hygiene and the use of PPE to the risk of contact dermatitis in the TPA Putri Cempo Surakarta City associated with the theory of health belief model (HBM).

SUBJECTS AND METHOD

a. Study Design

This was an analytic observational study with a cross sectional design. The study was conducted at Putri Cempo landfill, in Surakarta, in March until April 2019.

b. Population and Samples

The accessible population of this study was all scavengers (207) in TPA Putri Cempo. A sample of 203 scavengers aged 15 to 65 years was selected by total sampling.

c. Study Variables

The dependent variable was contact dermatitis. The independent variables were age, education, personal hygiene, perceived benefit, perceived susceptibility, perceived severity, self-efficacy, cues to action, and social support.

d. Operational Definition of Variables

Personal hygiene was an effort to enhance the degree of his health by cleaning all members of the body as disease prevention. Data collection was carried out using a questionnaire. The measurement scale was dichotomous.

Perceived benefit was health behavior that is influenced by scavenger's perceptions about the benefits of doing personal

hygiene and using PPE when compared to the risk of contact dermatitis. Data collection was carried out using a questionnaire. The measurement scale was dichotomous.

Cues to action was social and environmental influences to trigger the decision making process to carry out individual hygiene and use PPE. Data collection was carried out using a questionnaire. The measurement scale was dichotomous.

Self-efficacy was a belief in one's own ability to control motivation, behavior, and social environment in implementing personal hygiene and using PPE. Data collection was carried out using a questionnaire. The measurement scale was dichotomous.

Social support was the availability of resources that provide physical and psychological comfort obtained through the knowledge that he is loved by others so that he supports personal hygiene and uses PPE. Data collection was carried out using a questionnaire. The measurement scale was dichotomous.

Perceived susceptibility was the subjective perception of a scavenger about the possible risk of having contact dermatitis. Data collection was carried out using a questionnaire. The measurement scale is a dichotomous.

Perceived severity was the perception of the severity of contact dermatitis according to the circumstances that might occur. Data collection was carried out using a questionnaire. The measurement scale was dichotomous.

Personal protective equipment use is a device to protect someone whose function is to isolate the body from potential hazards in the workplace. Criteria for PPE scavengers include head protectors, hand protectors, body armor, and leg protectors. Data collection was carried out using a questionnaire. The measurement scale is a dichotomy.

Age was the age of the subject when doing research based on the criteria of date of birth and year of birth. Data collection was carried out using a questionnaire. The measurement scale is a dichotomy.

Education was a formal education that has ever been undertaken by subjects, based on the last diploma held ranging from elementary, junior high school or senior high school level. Data collection was carried out using a questionnaire. The measurement scale was dichotomous.

Contact dermatitis was an inflammatory reaction of the skin due to direct contact with dangerous agents, causing the phenomenon of sensitization or toxic. Data collection was carried out using questionnaires, case photos and was consulted with Eko Irwanto, dr. Sp.KK to establish a diagnosis. The measurement scale was categorical.

e. Data Analysis

Univariate analysis illustrates the characteristics of variables based on research results. Bivariate analysis in the study was conducted to determine the effect between independent variables with the dependent variable using the chi-square test. Multivariate analysis was performed using path analysis to determine the magnitude of the effect directly or indirectly on a variable.

f. Research Ethics

The research ethics in this study included the consent sheet, anonymity, confidentiality, and ethical eligibility. Ethical eligibility in this study came from the Health Research Ethics Committee of Dr. Moewardi Hospital Surakarta with number: 251 / III / HREC / 2019.

RESULTS

1. Sample Characteristics

Table 1 shows the sample characteristics using categorical data.

Table 1. Sample Characteristics (dichotomous data)

Characteristics	N	%
Personal Hygiene		
Not good	50	24.6
Good	153	75.4
Perceived benefit (personal hygiene)		
Low	50	24.6
High	153	75.4
Self-Efficacy		
Low	61	30
High	142	70
Cues to action (personal hygiene)		
Low	66	32.5
High	137	67.5
Social Support		
Low	154	75.9
High	49	24.1
Perceived susceptibility		
Low	65	32
High	138	68
Perceived severity		
Low	61	30
High	142	70
PPE use		
Incomplete	67	33
Complete	136	67
Perceived benefit (PPE use)		
Low	68	33.5
High	135	66.5
Self-Efficacy		
Low	68	33.5
High	135	66.5
Cues to action (PPE use)		
Low	70	34.5
High	133	65.5
Social support		
Low	127	62.6
High	76	37.4
Contact dermatitis		
Not experiencing	157	77.3
Experiencing	46	22.7
Education		
<Junior high school	90	44.3
≥Junior high school	113	55.7
Age (Year)		
15-35	64	31.5
36-65	139	68.5

2. Bivariate Analysis

Table 2 showed the results of bivariate analysis. Table 2 shows that the risk of contact dermatitis decreased with with poor personal hygiene (OR= 0.03; p<0.001), low

perceived benefit, poor personal hygiene (OR= 0.04; p<0.001), low cues to action (OR= 0.10; p <0.001), weak self-efficacy (OR= 0.04; p <0.001), weak social support (OR= 0.16; p <0.001), and low perceived

susceptibility (OR= 0.02; p= 0.001), perceived severity (OR= 0.07; p<0.001), incomplete PPE (OR= 0.01; p<0.001), low perceived benefit (OR= 0.06; p <0.001), low cued to action (OR= 0.06; p <0.001),

low self-efficacy (OR= 0.05; p <0.001), low social support (OR= 0.11; p <0.001), low education (OR= 0.19; p <0.001), and age 15-35 years (OR= 0.24; p <0.001).

Table 2. The results of bivariate analysis

Independent Variable	Dermatitis		Not Dermatitis		OR	p
	n	%	n	%		
Personal Hygiene						
Poor	35	70	15	30	0.03	<0.001
Good	11	7.2	142	92.8		
Perceived benefit (personal hygiene)						
Low	33	66	17	44	0.04	<0.001
High	13	8.5	140	91.5		
Cues to action (personal hygiene)						
Low	33	50	33	50	0.10	<0.001
High	13	9.5	124	90.5		
Self-Efficacy						
Low	43	60.6	111	39.4	0.16	<0.001
High	3	21.4	46	78.6		
Social Support						
Low	37	27.9	24	72.1	0.04	<0.001
High	9	6.1	133	93.9		
Perceived susceptibility						
Low	40	61.5	25	38.5	0.02	<0.001
High	6	1.4	132	98.6		
Perceived severity						
Low	34	55.7	27	44.3	0.07	<0.001
High	12	8.4	130	91.6		
PPE						
Incomplete	43	64.2	24	35.8	0.01	<0.001
Complete	3	2.2	133	97.8		
Perceived benefits (PPE use)						
Low	37	54.4	31	45.6	0.06	<0.001
High	9	6.7	126	93.3		
Cues to action (PPE use)						
Low	37	52.8	33	47.2	0.06	<0.001
High	9	6.8	124	93.2		
Self-efficacy						
Low	38	55.8	30	44.2	0.05	<0.001
High	8	5.9	127	94.1		
Social Support						
Low	42	33.1	85	66.9	0.11	<0.001
High	4	5.1	75	94.9		
Education						
<JHS	34	37.8	56	62.2	0.19	<0.001
≥JHS	12	10.6	101	89.4		
Age (years)						
15-35	26	40.6	38	59.4	0.24	<0.001
36-65	20	14.5	119	85.5		

3. Path Analysis

a. Model Spesification

The specification of the model would illustrate the influence between the variables to be examined. In this study, there were 15 measured variables, including personal hygiene, perceived benefit of, cues to action, self-efficacy, social support, perceived susceptibility, perceived severity, self efficacy, social support, education, and age.

b. Model Identification

1. Measured variables : 15

2. Endogenous variable : 9
 3. Exogenous variable : 6
 Total of parameter : 18

The degree of freedom (df) formula is:
 $df = \text{number of measured variables} \times (\text{number of measured variables} + 1) / 2 - (\text{endogenous variables} + \text{exogenous variables} + \text{number of parameters})$

$df = 15 \times (15 + 1) / 2 - (9 + 6 + 18)$

$df = 87$. The result of the degree of freedom (df) is 87 which means that over identified or path analysis can be done.

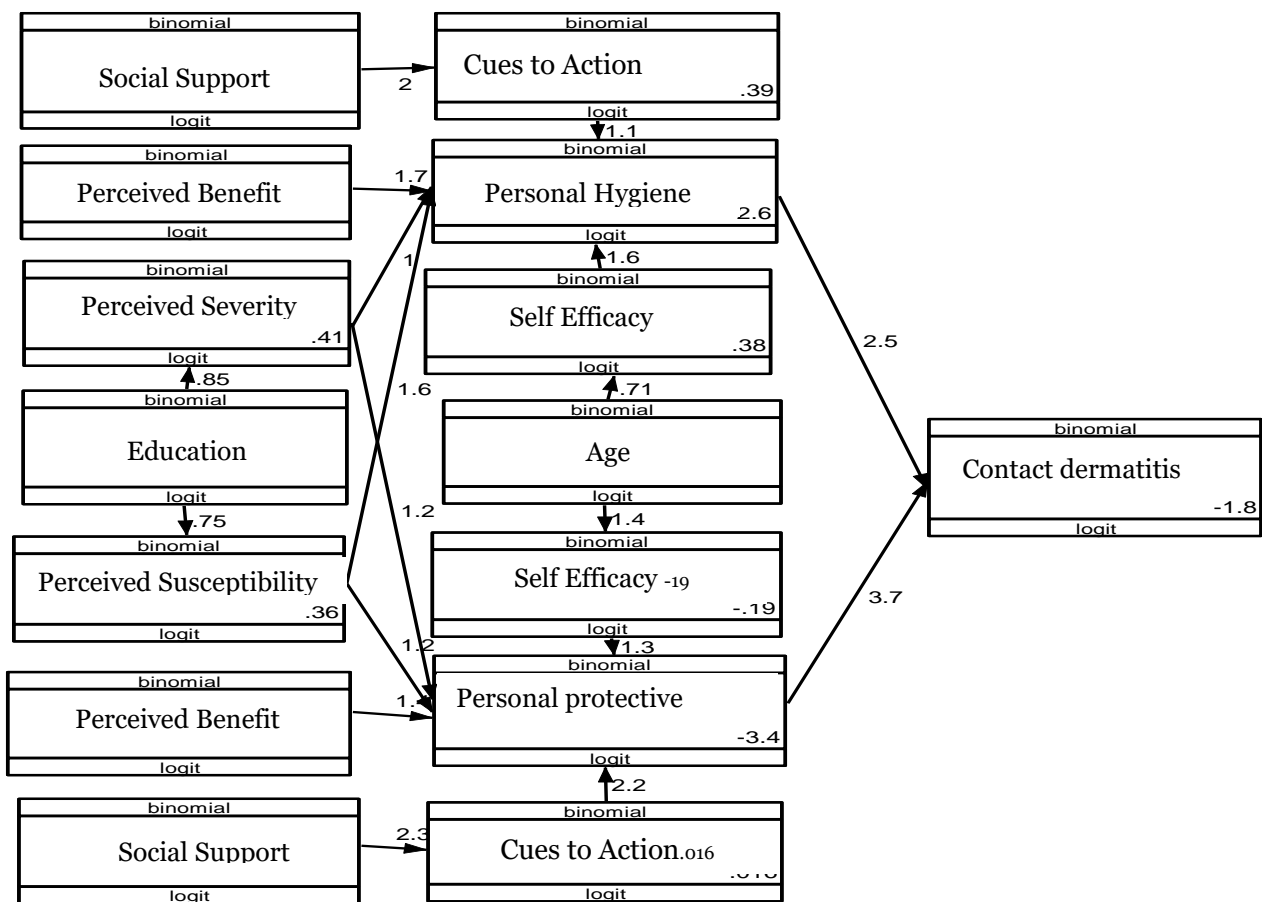


Figure 1. Structural Model of Path Analysis

Table 3. The results of the path analysis of factors that affect the risk of contact dermatitis on scavengers

Variables		b	CI 95%		p	
			Lower Limit	Upper Limit		
Direct Effect						
Contact Dermatitis	← Personal Hygiene	4.58	1.42	3.55	<0.001	
	← Personal Protective Equipment	5.52	2.38	5.01	<0.001	
Indirect Effect						
Personal Hygiene	← Perceived Susceptibility	2.63	0.40	2.76	0.009	
	← Perceived Severity	1.77	-0.10	2.13	0.076	
	← Perceived Benefit	3.03	0.59	2.78	0.002	
	← Cues of Action	1.97	0.00	2.27	0.049	
Cues to action	← Social Support	3.70	0.95	3.09	<0.001	
	← Self Efficacy	2.65	0.40	2.70	0.008	
Self Efficacy	← Age (15-35 years)	2.21	0.08	1.33	0.027	
	← Perceived Susceptibility	1.99	0.02	2.36	0.046	
		← Perceived Severity	1.97	0.00	2.34	0.048
		← Perceived Benefit	2.45	0.27	2.49	0.014
Cues to action	← Cues of Action	3.96	1.09	3.24	0.001	
	← Social Support	5.23	1.42	3.12	<0.001	
	← Self Efficacy	2.08	0.70	2.43	0.038	
Personal Protective Equipment	← Age (15-35)	4.23	0.72	1.98	<0.001	
	← Education	2.46	0.15	1.34	0.014	
Susceptibility	← Education	2.73	0.24	1.46	0.006	
	← Perceived Severity					

N Observation = 203
 Log likelihood = -861.53473

The risk of contact dermatitis was directly and positively affected by poor personal hygiene and incomplete use of PPE. The risk of contact dermatitis was affected indirectly and positively by the perceived benefits of personal hygiene and low PPE, the originator of individual hygiene actions and low PPE, self-efficacy of personal hygiene and low PPE, social support of personal hygiene and low PPE, low perceived vulnerability, low perceived severity, <Middle school education, and age 15-35 years old.

Scavengers who have poor personal hygiene have contact dermatitis by 4.58 units higher than scavengers who have good

personal hygiene (b= 4.58; CI95%= 1.42 to 3.55; p <0.001).

Scavengers who did not use complete PPE would suffer from contact dermatitis by 5.52 units higher than scavengers who use full PPE (b= 5.52; CI95%= 2.38 to 5.01; p <0.001).

Scavengers with low perceived susceptibility were not good in carrying out personal hygiene and the risk of experiencing contact dermatitis was 2.63 units higher than scavengers with high perceived susceptibility (b= 2.63; CI95%= 0.40 to 2.76; p = 0.009).

Scavengers with low perceived susceptibility were not good in carrying out perso-

nal hygiene and the risk of experiencing contact dermatitis was 1.99 units higher than scavengers with high perceived susceptibility ($b = 1.99$; $CI_{95\%} = 0.02$ to 2.36 ; $p = 0.046$).

Scavengers with low perceived severity were not good in carrying out personal hygiene and the risk of experiencing contact dermatitis was 1.77 units higher than scavengers with high perceived severity ($b = 1.77$; $CI_{95\%} = 0.10$ to 2.13 ; $p = 0.076$).

Scavengers with low perceived severity using incomplete PPE and the risk of experiencing contact dermatitis was 1.97 units higher than scavengers with high perceived severity ($b = 1.97$; $CI_{95\%} = 0.00$ to 2.34 ; $p = 0.048$).

Scavengers who have low perceived benefit were not good in carrying out personal hygiene and the risk of experiencing contact dermatitis was 3.03 units higher than scavengers who have high perceived benefits ($b = 3.03$; $CI_{95\%} = 0.59$ to 2.27 ; $p = 0.002$).

Scavengers with low perceived benefit using incomplete PPE and the risk of experiencing contact dermatitis was 2.45 units higher than scavengers with high perceived benefit ($b = 2.45$; $CI_{95\%} = 0.27$ to 2.49 ; $p = 0.014$).

Scavengers with low cues to action in performing personal hygiene and the risk of experiencing contact dermatitis was 1.97 units higher than scavengers with high cues to action ($b = 1.97$; $CI_{95\%} = 0.00$ to 2.27 ; $p = 0.049$).

Scavengers with low cues to action using incomplete PPE and the risk of experiencing contact dermatitis was 3.96 units higher than scavengers with high cues to action ($b = 3.96$; $CI_{95\%} = 1.09$ to 3.24 ; $p = 0.001$).

Scavengers with low self efficacy were not good in carrying out personal hygiene and the risk of experiencing contact derma-

titis was 2.65 units higher than scavengers with high self efficacy ($b = 2.65$; $CI_{95\%} = 0.40$ to 2.70 ; $p = 0.008$).

Scavengers with low self efficacy using incomplete PPE and the risk of experiencing contact dermatitis was 2.08 units higher than scavengers with high self efficacy ($b = 2.08$; $CI_{95\%} = 0.70$ to 2.43 ; $p = 0.038$).

Scavengers with low social support in performing personal hygiene and the risk of experiencing contact dermatitis was 3.70 units higher than scavengers with high social support ($b = 3.70$; $CI_{95\%} = 0.95$ to 3.09 ; $p = 0.001$).

Scavengers with low social support using incomplete PPE and the risk of experiencing contact dermatitis was 5.23 units higher than scavengers with high social support ($b = 5.23$; $CI_{95\%} = 1.42$ to 3.24 ; $p = 0.001$).

Scavengers with education $<JHS$ have low perceived susceptibility so that they were not good in implementing personal hygiene and were incomplete in using PPE and the risk of experiencing contact dermatitis was 2.46 units higher than scavengers with education $\geq JHS$ ($b = 2.46$; $CI_{95\%} = 0.15$ to 1.34 ; $p = 0.014$).

Scavengers who were $<JHS$ have low perceived severity so that it was not good in carrying out personal hygiene and incomplete in using PPE and the risk of experiencing contact dermatitis was 2.73 units higher than scavengers who were $\geq JHS$ ($b = 2.73$; $CI_{95\%} = 0.24$ to 1.46 ; $p = 0.006$).

Scavengers who were 15-35 years old have low self-efficacy so that they were not good in carrying out personal hygiene and the risk of experiencing contact dermatitis was 2.21 units higher than scavengers who were 36-65 years old ($b = 2.21$; $CI_{95\%} = 0.08$ to 1.33 ; $p = 0.027$).

Scavengers who were 15-35 years old have low self-efficacy so that they were not good in carrying out personal hygiene and

the risk of experiencing contact dermatitis was 4.23 units higher than scavengers who were 36-65 years old ($b = 4.23$; $CI_{95\%} = 0.72$ hingga 1.98 ; $p = 0.038$).

DISCUSSION

1. The Direct Effect of Personal Hygiene on the Risk of Contact Dermatitis

The analysis showed that the risk of contact dermatitis had a direct effect on personal hygiene. The effect was statistically significant with a path coefficient of 4.58 and a p value of <0.001 . Scavengers who were not good at carrying out personal hygiene would experience contact dermatitis by 4.58 units higher than scavengers who were good at carrying out personal hygiene.

The result of this study was in line with Campbell et al. (2017) who states that there was a relationship between individual hygiene and irritant contact dermatitis, logistic regression test obtained p value = 0.054. Scavengers have the risk of being exposed to dust, chemicals, heat, toxic elements and so on. Implementing personal hygiene properly and maintaining clean PPE was an effort to prevent primary contact dermatitis due to work (Zolnikov et al., 2018; Adisesh et al., 2013).

2. The Direct Effect of Personal Protective Equipment (PPE) on the Risk of Contact Dermatitis

The analysis showed that the risk of contact dermatitis had a direct effect on PPE. The influence was statistically significant with a path coefficient of 5.52 and a p value of <0.001 . Scavengers who use incomplete PPE have the risk of developing contact dermatitis by 5.52 units higher than scavengers that use complete PPE.

This study was in line with Bhojrul et al. (2019) who states that subjects who did not use PPE had contact dermatitis by 63.4%. Avoiding allergens and irritants was

an effort to avoid contact dermatitis. PPE was one of the ways to prevent contact dermatitis from exposure to irritants or allergens in the workplace (Johnston et al., 2017; Otaibi et al., 2015).

3. The Indirect Effect of Perceived Susceptibility on the Risk of Contact Dermatitis

The analysis showed that perceived susceptibility had an indirect effect on the risk of contact dermatitis through personal hygiene and PPE. The influence of individual hygiene was statistically significant with a path coefficient of 2.63 and $p = 0.009$ and the effect of using PPE was statistically significant with a path coefficient of 1.99 and $p = 0.046$. Scavengers with low perceived susceptibility are not good in carrying out personal hygiene so that the risk of experiencing contact dermatitis was 2.63 units higher than scavengers with high perceived susceptibility and scavengers with low perceived susceptibility did not use complete PPE so the risk of experiencing contact dermatitis was 1.99 units higher than scavengers with high perceived susceptibility.

A study of Siswandwika et al. (2017) stated that there was an effect between perceived susceptibility to individual hygiene with a value of $p < 0.001$. Perceived susceptibility was a belief that someone would suffer from certain diseases, so that someone changed their behavior to avoid the disease. The results of the study of Wright et al. (2019) explained the positive correlation between perceived susceptibility to compliance with PPE use.

4. The Indirect Effect of Perceived Severity on the Risk of Contact Dermatitis

The analysis showed that perceived severity had an indirect effect on the risk of contact dermatitis through personal hygiene and PPE. The value of the path coefficient of the individual hygiene was 1.77 and the value of

$p = 0.076$ and the influence of PPE was statistically significant with a path coefficient of 1.97 and a value of $p = 0.048$. Scavengers with low perceived severity were not good in carrying out personal hygiene and were incomplete in using so the risk of experiencing contact dermatitis was 1.77 units higher than scavengers with high perceived severity. Scavengers with low perceived severity used incomplete PPE so that the risk of experiencing contact dermatitis was 1.97 units higher than scavengers with high perceived severity.

A study of Siswandwika *et al.* (2017) stated that there was an effect of perceived severity on personal hygiene. Perceived severity was a person's belief about the level of illness or the seriousness of the disease. The result of a study done by Wright *et al.* (2019) showed that there was an effect between perceived severities of compliance with the use of PPE.

5. The Indirect Effect of Perceived Benefit on the Risk of Contact Dermatitis

The results of the analysis showed that perceived benefits has an indirect effect on the risk of contact dermatitis through personal hygiene and PPE. The influence of individual hygiene was statistically significant with a path coefficient of 3.03 and $p = 0.002$. Scavengers with low perceived benefit were not good in carrying out personal hygiene and the risk of experiencing contact dermatitis was 3.03 units higher than scavengers with high perceived benefit. The effect was statistically significant with a path coefficient of 2.45 and $p = 0.014$. Scavengers with low perceived benefit would use incomplete PPE and the risk of experiencing contact dermatitis was 2.45 units higher than scavengers with high perceived benefit.

A study of Siswandwika *et al.* (2017) stated that there was a direct and positive effect of perceived benefit on personal hy-

giene as disease prevention. The perceived benefit was confidence in taking disease prevention measures and self-protective measures to reduce disease vulnerability. Sari *et al.* (2018) stated that there was an effect between perceived benefits on healthy behavior as disease prevention.

6. The Indirect Effect of Cues to action on the Risk of Contact Dermatitis

The results of the analysis showed that the trigger for action had an indirect effect on contact dermatitis through personal hygiene and PPE. The effect through personal hygiene was statistically significant with a path coefficient of 1.97 and $p = 0.049$. Scavengers with low cues to action were not good at carrying out personal hygiene and the risk of experiencing contact dermatitis was 1.97 units higher than scavengers with high cues to action. Influence through the use of PPE with a path coefficient of 3.96 and $p < 0.001$. Scavengers with low-cues to action would use incomplete PPE by 3.96 units higher than scavengers with high-cues to action so that the risk of having contact dermatitis.

Agustin *et al.* (2018) stated that there was a positive effect on the originator of actions on the adherence to healthy behaviors as disease prevention. Research by Wright *et al.* (2019) shows the influence of the originator of actions on the use of PPE. The originator of action was a factor that drove a person to make decisions and improve healthy behavior influenced by social and environmental (Siswandwika, 2017).

7. The Indirect Effect of Self Efficacy on the Risk of Contact Dermatitis

The results of the analysis showed that self-efficacy has an indirect and positive effect on the risk of contact dermatitis through personal hygiene and PPE. The effect on individual hygiene was statistically significant with a path coefficient of 2.65 and $p =$

0.008. Scavengers with low self-efficacy were not good in carrying out personal hygiene, so the risk of experiencing contact dermatitis was 2.65 units higher than scavengers with high self-efficacy. The influence on PPE was statistically significant with a path coefficient of 2.08 and a p value of 0.038. Scavengers with low self-efficacy would use incomplete PPE so that the risk of experiencing contact dermatitis was 2.08 units higher than scavengers with high self-efficacy.

The results of a study done by Siswandwika et al. (2017) stated that there was a positive effect of self-efficacy on personal hygiene as disease prevention. Research by Sari et al. (2018) stated that there was a direct effect between self-efficacy on healthy behavior as disease prevention. Self-efficacy was a belief in someone's own ability to perform healthy behaviors referring to an individual's perception of changes in health behavior (Arisa et al., 2017).

8. The Indirect Effect of Social Support on the Risk of Contact Dermatitis

The result analysis showed that social support has an indirect and positive effect on the risk of contact dermatitis through the originator of actions to carry out individual hygiene and use of PPE. Scavengers with low social support were not good in carrying out personal hygiene, therefore, the risk of experiencing contact dermatitis was 3.70 units higher than scavengers with high social support. Scavengers with low social support using incomplete PPE and the risk of having contact dermatitis was 5.23 units higher than scavengers with high social support.

Christopher et al. (2014) stated that there was a positive relationship between social support and healthy behavioral intentions. The interaction of co-workers or families who live together helped to improve

healthy behavior. Social support social, psychological and economic assistance was a moderator of behavior change (Lee et al., 2017; Albayrak et al., 2018).

9. The Indirect Effect of Education on the Risk of Contact Dermatitis

The analysis showed that education has an indirect effect on the risk of contact dermatitis through perceived susceptibility of the scavenger to carry out personal hygiene and using PPE. Scavengers with <JHS education were not good in implementing personal hygiene and were incomplete in using PPE so that the risk of experiencing contact dermatitis was 2.46 units higher than that of scavengers who were ≥JHS. The analysis showed that education has an indirect and positive effect on the risk of contact dermatitis through the perceived severity of scavengers for carrying out personal hygiene and using PPE. The effect of education on perceived severity was statistically significant with a path coefficient of 2.73 and p = 0.006. Scavengers who were <JHS were not good in implementing personal hygiene and were incomplete in using PPE so the risk of experiencing contact dermatitis by 2.73 units higher than scavengers who were ≥JHS.

Thirarattanasunthon et al. (2012) stated that 55% of scavengers with elementary school education who were not disciplined in using PPE experienced several illnesses while working. Scavengers with low levels of education experience health risks related to employment. Education influenced someone's mindset in healthy behavior (Ren et al., 2018).

10. The Indirect Effect of Age on the Risk of Contact Dermatitis

The results of the analysis showed that ages 15-36 years old have an indirect and positive effect on personal hygiene and PPE through self-efficacy. Scavengers aged 15-36 years old were not good in carrying out per-

sonal hygiene and the risk of experiencing contact dermatitis was 2.21 units higher than scavengers aged 36-65 years old. The effect on PPE was statistically significant. Scavengers aged 15-35 years old were prone to not using complete PPE and the risk of having contact dermatitis was 4.23 units higher than scavengers who were 56-65 years old.

Thirarattanasunthon et al. (2012) stated that most scavengers did not use PPE. The average age of scavengers in TPA was 15 years old. The older the age, the level of ability and maturity of a person would be more mature in thinking. Older age would avoid the risk than young age (Sproten *et al.*, 2018).

AUTHOR CONTRIBUTION

Niken Kartika Sari played a role in collecting and analyzing research data. Setyo Sri Rahardjo examined the conceptual framework and research methodology. Vitri Widyarningsih examined the data analysis and interpretation of the results of the analysis.

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This study used personal costs from the main author.

CONFLICT OF INTEREST

The authors did not have any conflict of interest.

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