Determination of Environemntal Health Indicator Related to Environmental-Based Diseases

by Nurjazuli Nurjazuli

Determination of Environmental Health Indicator Related to Environemntal-Based Diseases

Nurjazuli[*)]
*) Faculty of Public Health Diponegoro University
Email: nurjzl_fkmundip@yahoo.co.id
Mobile: 082133023107

ABSTRACT

Background: Environmental-Based Disease (EBD) was still to be attention for controlling. The high incidence of EBD was supposed to have relation with poor condition of environmental health (EH). This research aimed to know the suit EH indicator due to EBD.

Method: It was an exploratory study using survey method. The public health center (PHC) was determined as unit of analysis with the number of 37 unit. Variables were devided into two latent varibles, namely exogen variable of EH. While, endogen variable was EBD. Data was collected through documentation study (annual report) in public health center in Semarang City during the year of 2012. The data would be analyzed descriptively and statistically using Structural Equation Modeling.

Results: This research showed that Bangetayu PHC had the highest unhealthy excreta disposal and no Waste Water Disposal Facility (WWDF) of 70% respectively. While, Ngesrep PHC had a high level of diarrea and upper respiratory infection. Statistically analysis using SEM indicated that EH had affected EBD significantly with estimate parameter and T value of 0.360 and 2.530 respectively.

Conclusion: The WWDF and solid waste disposal were good indicator of EH to predict EBD incidence (diarrea)

Keywords: Environmental health indicator, environmental-based disease, Semarang

Introduction

Healthy Indonesia 2010 has long been proclaimed as the Indonesia's Vision of Health Development. However, Indonesian felt that this vision has not been evenly spread. It is proved by the large number of Indonesian suffering from diseases, particularly environmental-based diseases such as: diarrhea, dengue fever, chicken pox, respiratory infections, malaria and so forth.

High morbidity of those diseases thought to be caused by the low quality of environmental health which shown by the low coverage of health facilities owned by the community, such as clean water, Waste Water Disposal Facility (WWDF), garbage disposal, and ownership of household latrines. Lacking basic sanitation facilities makes people can not implement the clean and healthy behavior. This condition causes people vulnerable to environmental-based infectious diseases.

Nowadays, environmental-based diseases remain a public health problem that can not be reduced maximally. In some certain dimension of time, those diseases are fluctuating. Some environmental-based diseases which remain developing in Semarang City are described below (Dinkes Kota Semarang, 2011):

(1) Dengue Fever

1

In 2011, the highest Incidence Rate (IR) of Dengue Fever (DHF) per 100,000 was in Gajahmungkur Village for as much as 400.51/100,000 people. The next highest IR were Tembalang Village, Srondol Kulon, Karangrejo, Sampangan, Lamper Lor, Mijen, Brumbungan, Jomblang, and Meteseh. Gajamungkur Sub District has 3 Villages with high IR, they are Gajahmungkur Village, Karangrejo Village and Sampangan Village. Tembalang Village returned to be the 10 highest IR of DHF in Semarang City in 2011, after becoming the seventh highest IR of DHF in 2010.

The IR of DHF in Pegandan Primary Health Care was the highest IR among Primary Health Care which as much as 169.82/100,000 people. The lowest IR of DHF was in Karang Malang Primary Health Care (19.40 per 100,000 people).

As much as fifteen or 40.4% of Primary Health Care had higher IR of DHF than Semarang City's IR. Twenty three or 62.1% of Primary Health Care have not achieved National IR of DHF's target yet (≤ 55/100,000 people).

(2) Pulmonary Tuberculosis (TB)

Suspect discovery in 2011 found 15,001 people; it was increasing compared to the discovery in 2010. The discovery of smear-positive pulmonary TB patients were 989 people (61%), was increasing 110 cases (8%) compared to the discovery in 2010 (53%). The discovery of TB cases among children was as much as 356 cases (13%), was decreasing 2% compared to the discovery among children in 2010 (15%).

The highest percentage of the discovery of new smear-positive pulmonary TB was achieved by Mangkang Primary Health Care (155%), the target was to find 11 cases, Mangkang Primary Health Care could find 17 cases of smear-positive pulmonary TB. The lowest percentage was in Karang Malang Primary Health Care of 0%, the target was to find 8 cases, but they did not find any cases at all. The problem was that the health officers were not active in implementing community empowerment in their region.

(3) Diarrhea

The number of patients with diarrhea who visited health care facilities were 48,051 people, was increasing compared to 2010. It might be due to the increased of public awareness of clean and healthy behavior, so when people felt of diarrhea, they will go to the primary health care. In 2011, the IR of diarrhea in Semarang City was 32 per 1,000 people. It was increasing compared to the previous year which was 24 per 1,000 people.

(4) Pneumonia

The number of pneumonia patients < 1 year old in 2011 was increasing 152 cases from 1,448 to 1,600 cases. However, the number of pneumonia patients 1-4 years old and severe pneumonia < 1 year old in 2011 was decreasing compared to the previous year. The number of pneumonia patients 1-4 years old was 2,900 patients; severe pneumonia patients <1 year old was 15 patients; and severe pneumonia 1-4 years old was 12 patients. The IR of pneumonia and severe

pneumonia in 2011 was 304 per 10,000 toddlers, it was decreasing compare to 2010. The reduction of pneumonia's IR means the number of pneumonia patients and severe pneumonia patients which found was decreasing.

(5) Leptospirosis

Leptospirosis cases in Semarang City was increasing since 2007 until 2009, and then decreasing in 2010 and 2011, while the mortality rate has increased from 2010 to 2011. This was likely due to the ignorance of patient's or the lack of public's knowledge about Leptospirosis resulting in delays of the treatments.

Based on the IR or morbidity rate of Leptospirosis in 2011, there were 21 Primary Health Care with IR of 0.1-10/100,000 people, they are Poncol Primary Health Care, Miroto, Bandarharjo, Bulu Lor, Halmahera, Lamper Tengah, Karang Ayu, Manyaran, Ngemplak Simongan, Candi lama, Pegandan, Genuk, Telogosari Wetan, Telogosari Kulon, Kedung Mundu, Rowosari, Ngesrep, Padangsari, Srondol, Pudak Payung, and Gunungpati, while 4 Primary Health Care have IR>10/100,000 people, they are Bangetayu Primary Health Care, Bugangan, Kagok, and Pandanaran.

The incidence of those diseases allegedly linked to the lack of basic sanitation facilities owned by each family in the community. Basic sanitation facilities which are closely related to environmental-based diseases are the provision of clean water, garbage disposal, WWDF, and housing conditions.

Based on the description of environmental-based diseases and factors thought to be related described above, this study aims to determine the environmental health indicators that have a role in the incidences of environmental-based diseases. The data of this study is a secondary data sourcing from the annual report of Primary Health Care and the Health Office of Semarang City.

Method

This is an exploratory study with a survey method. The unit of analysis in this study is the area of Primary Health Care in Semarang City (37 units). Variables analyzed consist of the exogenous latent variables of environmental health, using the indicators of healthy housing, household latrines, clean water, WWDF, garbage disposal, and clean and healthy behavior. The endogenous latent variables are public health, using diseases indicators such as measles/chicken pox, scabies, diarrhea, respiratory infections, pneumonia, tuberculosis, dengue fever, and leptospirosis. Data was collected by using documentation study (reports) of Primary Health Care activities in 2012. Data was analyzed descriptively to describe the environmental health condition and calculate the incidence rate (IR) of environmental-based diseases. The determination of environmental health indicators and environmental-based diseases was analyzed with *Structural Equation Modeling* (SEM) using *Visual Partial Least Square* (VPLS) *Regression version 1.40* software.

Results and Discussion

Research Site Description

Semarang City has 373.70 square km area. Administrative area in Semarang City composed of 16 districts and 177 villages. Semarang City has several hospitals (both central and local), and 37 Primary Health Care that provide health services to the community. The total population is 1,544,358 people comprise of 767,884 males and 776,474 females. The environmental health condition in Semarang City is varying based on each area's characteristics, they are coastal areas (lowland) and highland. Likewise, the condition of the diseases that occurs are fluctuating both communicable diseases and non-communicable diseases.

The Description of Environmental Health Factors

There are several environmental health factors discussed in this study, they are:

(1) Healthy Housing.

House is a place to foster family life that has a major influence to its inhabitants. House can serve as the medium of diseases transmission that can affect the health of those who live in it. The survey result showed that not all housing condition in Semarang City is healthy houses.

Some Primary Health Care areas still have unhealthy houses. The highest percentage of unhealthy houses was around 20%. Only a small proportion of Primary Health Care areas have low percentage of unhealthy housing (under 5%). Gayamsari Primary Health Care area has the highest percentage of unhealthy housing in Semarang City (>20%).

(2) Household Latrine.

Household latrine is one of vital sanitation facilities for family life. The function of household latrine is as human garbage disposal place that they will not pollute the environment, which in turn can lead to public health problems. Therefore, the coverage of families who have household latrine facility is a crucial healthy environment indicator. However, an area that has a high percentage of not having household latrine deserves more attention by the stakeholders.

The survey result indicates that a lot of Semarang City's residents already have household latrines. The percentage of residents of who do not have household latrine facilities was relatively low (on average of 10%). However, there was one Primary Health Care area which has the highest percentage of residents of who do not have household latrine facilities (almost 70%), it is Bangetayu Primary Health Care. This condition needs attention. This area is suburbia and as the city border with Demak District. Its social characteristics are like rural areas. The existence of close river give the opportunity to local people to defecating into the river and cause them (low economy) to have not been able to make a healthy household latrine for their families.

(3) Waste Water Disposal Facility (WWDF).

Waste Water Disposal Facility (WWDF) is important to prevent contamination of the environment (especially groundwater for the population), moreover the groundwater is used to fulfill daily need of clean water. The residents' contaminated wells can cause health problems for people who are using them.

The result of this survey shows that in general, the percentage of residents who do not have WWDF was relatively few. However, there were four Primary Health Care areas which have high percentage of residents who do not have WWDF, they are Bangetayu Primary Health Care, Srondol, Mijen, and Gunung Pati. There is one thing that ought to be concerned that Bangetayu Primary Health Care is one of Primary Health Care area which has the highest proportion of residents who do not have WWDF and household latrines. This condition should be assumed as the risk factors of gastroenteritis disease incidence and other infectious diseases. Besides, this housing condition can lead to the breeding of diseases vectors such as flies, cockroaches, and rats that act as mechanical vectors of some communicable diseases.

(4) Garbage Disposal.

Garbage disposal is one of family sanitation facilities which serve to prevent diseases risks to the occupants, because garbage has impact both vertically and horizontally. Vertically, garbage will cause odors that interfere the human comfort and cause interference of aesthetics (bad view). In addition, it can contaminate the residents' clean water. Horizontally, garbage provide the opportunity for vectors to breed such as flies and rats that can cause public health problems.

The survey results indicate that there are six Primary Health Care area which the percentage of residents do not have garbage disposal are more than 20%. Those Primary Health Care are Gunung Pati, Srondol, Karang Doro, Halmahera, Tlogosari Wetan, and Mijen.

The area of Gunung Pati Primary Health Care has high proportion of residents do not have special landfills, because this is a rural area and highland. There are a lot of vacant lands around the houses, so residents can easily dispose their garbage without the urge of having special landfills. Garbage disposal by making soil pit can be a composting place that can be used to fertilize the crops. This condition is also common to other regions with relatively large vacant land.

(5). Larvae Numbers.

The survey results indicate that there were a lot of Primary Health Care areas that have more than 5% of larvae numbers (House Index=HI). Primary Health Care areas which have relatively high number of larvae are Ngemplak Simongan Primary Health Care, Karang Malang, Candi Lama, Manyaran, and Ngesrep. There were few Primary Health Care with larvae number (HI) of less than 5%. It indicates that most of Primary Health Care areas in Semarang City have

great potential in the dissemination of DHF. This should be a concern of all parties. The dengue fever (DHF) is an acute communicable disease with a high mortality rate. Therefore, it needs more attention from the decision makers (especially Health Office as well as the technical implementation unit) and the optimal community participation to reduce the number of these larvae. The low number of larvae can reduce the speed of DHF deployment to other residents.

The Description of Clean and Healthy Behavior

The clean and healthy behavior is a macro indicator of community participation in improving their health. In addition, this indicator is good enough to look through the community participation in health area, in particular the promotion and prevention efforts. The survey results of clean and healthy behavior indicators obtained a description as shown below:
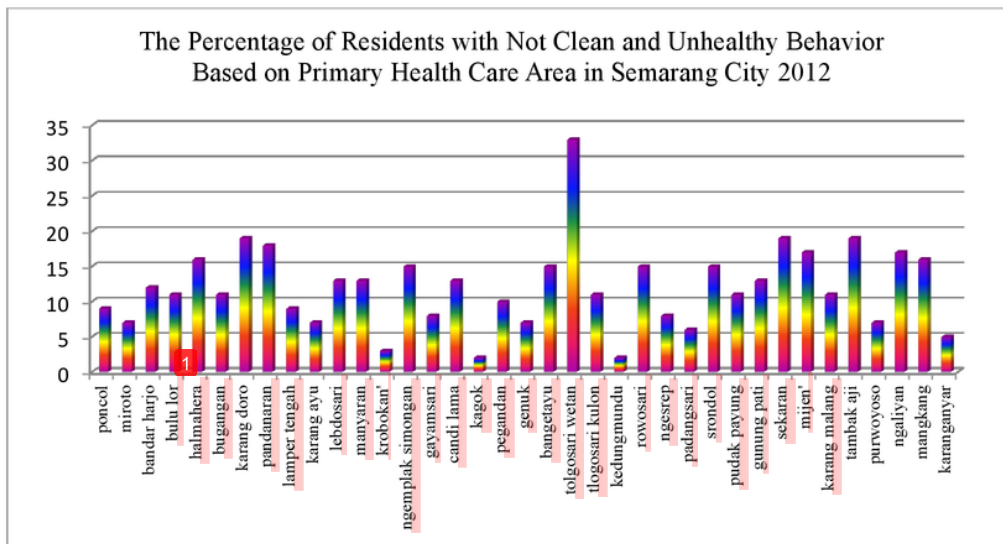

Figure 1. The Percentage (%) of residents with not clean and unhealthy behavior based on primary health care area in Semarang City 2012

Figure 1 shows that there are many people who do not implement clean and healthy behavior with the proportion of more than 10%. Tlogosari Wetan Primary Health Care was one of the highest area whose the residents do not have clean and healthy behavior (more than 30%). This should be a concern for improvement in the future. Eventhough clean and healthy behavior is a macro indicator, but it can be used to see the level of community participation in health development.

Clean and healthy behavior can also be used to see the level of public awareness of the importance of maintaining and improving their health to become their daily necessities. If the community is aware that health is a major need in life, then surely they will gain happiness in social life.

6

The Description of Environmental-Based Diseases

The level of community health status could be seen based on several indicators. The easiest indicator is by looking at diseases incidence in the community. The persistently high incidence of diseases (especially communicable diseases) is a marker for the low health status of public health in a region.

This study will find diseases incidence which linked to environmental condition (environmental-based diseases). There are eight diseases which explained in this study and analyzed by each environmental health condition in the area of Primary Health Care in Semarang City. The eight environmental-based diseases are: chicken pox, scabies, diarrhea, respiratory infections, pneumonia, pulmonary tuberculosis, DHF, and leptospirosis.

The survey result shows that only some of Primary Health Care areas have all eight environmental-based diseases. Three types of diseases that exist throughout the entire area of Primary Health Care are diarrhea, respiratory infections, and pneumonia. Therefore, those three diseases are endemic diseases in Semarang City.

Five other diseases which not endemic in the entire area of Semarang City's Primary Health Care are chicken pox, scabies, tuberculosis, DHF, and leptospirosis. Although those five diseases are not endemic in each Primary Health Care areas, but they remains a priority to be controlled for several reasons, such as: infecting vulnerable groups (infants and toddlers), spreading quickly, have a high mortality rate, involving vectors thus it requires a comprehensive effort to control.

Dengue Fever (DHF), for example, is a disease that often leads to Extraordinary Events due to the rapid spread and pose a high risk of death. In addition, DHF involves mosquito as vectors thus it requires various approaches to mitigate them. Likewise, leptospirosis, is a relatively new phenomenon developed in the community, the deployment of this disease is thought to be caused by poor condition of the environmental health as the ideal medium for the transmission. Rat suspected of having a major role in the spread of this disease. As we all know, rats really like places that are relatively dirty and close to human life. The disease condition is shown in table 1.

Table 1. Morbidity Rate of Several Environmental-Based Diseases Cases in Semarang City 2012.

No	Primary Health Care	Population	Chicken Pox		Scabies		Diarrhea		Resp. Infections		Pneumonia		Tuberculosis		DHF		Leptospirosis	
			Number of cases	IR/1000	Number of cases	IR/10000	Number of cases	IR/1000	Number of cases	IR/1000	Number of cases	IR/1000	Number of cases	PR/10000	Number of cases	IR/10000	Number of cases	IR/10000
1	Poncol	41095	74	1.800	0	0	227	5.523	934	22.727	85	2.068	8	1.946	20	4.866	1	0.243
2	Miroto	28229	223	7.899	3	1.062	457	16.189	4934	174.784	255	9.033	33	11.690	0	0	1	0.354
3	bandar harjo	75296	239	3.174	4	0.531	618	8.207	6308	83.776	166	2.204	58	7.702	36	4.781	0	0
4	bulu lor	52063	0	0	0	0	555	10.660	1254	24.086	55	1.056	0	0	0	0	0	0
5	halmahera	34390	145	4.216	9	2.617	487	14.161	3170	92.177	126	3.663	13	3.780	14	4.070	0	0
6	bugangan	24310	0	0	0	0	447	18.387	870	35.787	195	8.021	0	0	14	5.758	0	0
7	karang doro	26937	0	0	0	0	335	12.436	1240	46.033	269	9.986	0	0	6	2.227	0	0
8	pandanaran	49238	238	4.833	127	25.793	747	15.171	4492	91.230	13	0.264	36	7.311	40	8.123	6	1.218
9	lamper tengah	32940	26	0.789	21	6.375	885	26.867	880	26.715	452	13.721	329	99.878	38	11.53	40	12.143
10	karang ayu	28197	0	0	0	0	547	19.399	1120	39.720	60	2.127	23	8.156	21	7.447	0	0
11	lebdosari	36248	210	5.793	67	18.483	431	11.890	3226	88.998	2	0.055	40	11.035	35	9.655	0	0
12	manyaran	39140	0	0	0	0	869	22.202	1420	36.280	55	1.405	31	7.920	37	9.453	0	0
13	krobokan'	29678	41	1.381	15	5.054	480	16.173	2857	96.266	25	0.842	4	1.347	16	5.391	0	0
14	ngemplak simongan	27030	0	0	0	0	902	33.370	980	36.256	15	0.554	22	8.139	25	9.248	0	0
15	gayamsari	76711	0	0	0	0	254	3.3111	162	2.1118	46	0.599	11	1.433	53	6.909	0	0
16	candi lama	41397	0	0	0	0	340	8.2131	329	7.947	220	5.314	33	7.971	55	13.285	0	0
17	Kagok	37645	255	6.773	85	22.579	553	14.689	8348	221.755	17	0.451	0	0	46	12.219	2	0.531
18	pegandan	62052	0	0	0	0	988	15.922	621	10.007	25	0.402	0	0	111	17.888	0	0
19	Genuk	37290	0	0	0	0	1062	28.479	373	10.002	36	0.965	0	0	10	2.681	0	0
20	bangetayu	51105	0	0	0	0	523	10.233	458	8.961	60	1.174	36	7.044	38	7.435	7	1.369
21	tolgosari wetan	82155	0	0	0	0	1505	18.319	13774	167.658	506	6.159	23	2.799	76	9.250	4	0.486
22	tlogosari kulon	90382	0	0	0	0	620	6.8597	8916	98.647	40	0.442	53	5.863	39	4.315	0	0
23	kedungmundu	109871	0	0	23	2.093	1859	16.919	16706	152.051	311	2.830	62	5.642	153	13.925	4	0.364
24	rowosari	20540	0	0	0	0	605	29.454	908	44.206	4	0.194	27	13.145	56	27.263	0	0
25	ngesrep	33929	206	6.071	18	5.305	1251	36.871	11322	333.696	24	0.707	10	2.947	34	10.020	3	0.884
26	padangsari	25519	0	0	0	0	517	20.259	654	25.627	22	0.862	20	7.837	22	8.621	0	0
27	srondol	41416	0	0	5	1.207	879	21.223	4074	98.367	1	0.024	37	8.933	0	0	0	0
28	pudak payung	27335	86	3.146	57	20.852	276	10.096	3098	113.334	40	1.463	5	1.829	12	4.389	0	0
29	gunung pati	44137	0	0	0	0	1316	29.816	1450	32.852	14	0.317	35	7.929	15	3.398	0	0
30	sekaran	24411	0	0	0	0	396	16.222	625	25.603	42	1.720	20	8.193	14	5.735	0	0
31	mijen'	41372	29	0.700	288	69.612	831	20.086	1064	25.717	51	1.232	0	0	25	6.042	21	5.075
32	karang malang	9663	0	0	0	0	250	25.871	540	55.883	8	0.827	8	8.279	2	2.069	0	0
33	tambak aji	37045	0	0	0	0	309	8.3412	1340	36.172	320	8.638	0	0	41	11.067	0	0
34	purwoyoso	32214	0	0	0	0	542	16.824	322	9.995	60	1.862	0	0	9	2.793	0	0
35	ngaliyan	43462	0	0	0	0	294	6.7645	435	10.008	42	0.966	0	0	29	6.672	0	0
36	mangkang	13809	0	0	0	0	486	35.194	138	9.993	65	4.707	0	0	7	5.069	0	0
37	karanganyar	13789	0	0	0	0	392	28.428	138	10.007	40	2.900	0	0	12	8.702	0	0

The Determination of Environmental Health and Public Health Indicators

1) Initial Stage Analysis

The initial stage of SEM analysis was done to see which indicators that good enough to construct exogenous and endogenous variables. In this study, the exogenous variables are environmental health and clean and healthy behavior. The endogenous variable is public health. In the initial stage of analysis, indicators which analyzed by the variables are exogenous variable 1 (environmental health), using indicators of healthy housing, household latrines , WWDF, garbage disposal, number of larvae ; exogenous variable 2 using the indicators of clean and healthy behavior; and endogenous variable is health status using indicators of chicken pox, scabies, diarrhea, respiratory infections, pneumonia, tuberculosis, DHF, and leptospirosis.

The result of *structural equation modeling* (SEM) analysis with *visual partial least square* (VPLS) resulted in the following table:

Table 2. The Result of Initial Stage of SEM Analysis

No.	Variables	Indicators	Loading Value (validity)
1.	Environmental Health	Healthy Housing	0.5457
		Night Patrolling	0.4080
		WWDF	0.7986
		Garbage Disposal	0.7040
		Larvae	0.0099
2.	Clean and Healthy Behavior	Non-Clean and Healthy Behavior	1.0000
3.	Public Health	Chicken Pox	0.1416
		Scabies	0.5111
		Diarrhea	0.8447
		Respiratory Infections	0.4902
		Pneumonia	0.2469
		Tuberculosis	0.2663
		DHF	0.4970
		Leptospirosis	0.5182
4.	Environmental Health →Public Health Behavior → Public Health	Estimate = 0.567 T-value = 2.464 Estimate = 0.068 T-value = 0.314	R-square = 0.334

Based on the result of SEM analysis of the measurement model (outer model), it can be seen that the good indicator from environmental health indicator is WWDF and Garbage Disposal with validity value (loading factor) more than 0.7. The clean and healthy behavior as the sole indicator of behavior has loading value of 1.0. in public health variable, indicators that have a useful loading value are Scabies, Diarrhea, Respiratory Infections, and leptospirosis with loading factor values >0.4. This value is still usefull for multivariat analysis (Latan H, 2012).

The result of structural model analysis shows that the estimate value of the relationship between environmental health variable with public health was at 0.567. The value of the significance test obtained the T value for 2.464 (Ghozali I, 2011). This result shows that T value is bigger than 1.96, which means there is significant influence of environmental health variable to public health. Thus, it can be interpreted

9

that the greater the percentage of people who do not have WWDF and Garbage Disposal, the higher the incidence of environmental-based diseases (scabies, diarrhea, respiratory infections, DHF, and leptospirosis)

The structural model analysis of the relationship between the behavior with the public health obtained estimate value of 0.068. After this value was tested the significance, obtained T value for 0.314. This value is smaller than 1.96, which means that there is no positive effect of behavior variable to public health. Based on this SEM analysis, obtained the R-Square value for 0.334. This means that the environmental-based diseases (5 diseases) could be explained by the environmental health variable (with WWDF and garbage disposal indicators) as much as 33.4%. While the rest (66.6%) was influenced by other variables which were not examined in this study.

2) Final Stage Analysis

The final stage analysis was done without using the environmental health indicator which has loading value <0.7 and public health indicator with loading value of <0.5. The result of final SEM analysis as shown in the following table:

Table 3. The Result of Final SEM Analysis

No.	Variables	Indicators	Loading Values (validity)
1.	Environmental Health (EH)	WWDF	0.8236
		Garbage Disposal (GD)	0.9408
2.	Public Health (PH)	Diarrhea (D)	1.0000
3.	Environmental Health →Public Health	Estimate = 0.360 T-value = 2.530 R-square = 0.129	

A schematic model of the relationship between environmental health (EH) and public health (PH) is described as follows:
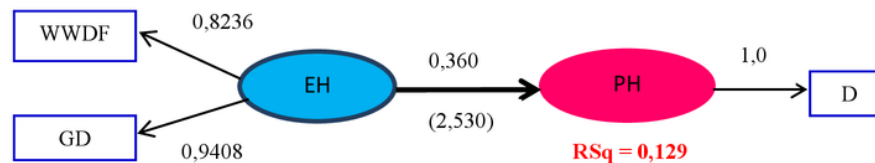

Figure 2. Final Model of the Relationship between Environmental Health with Public Health

Based on the analysis result as shown in the above figure, it appears that the WWDF and Garbage Disposal indicators are still a valid indicators in constructing environmental health indicators (loading factor value >0.7). Likewise, diarrhea is a good indicator from public heath variable (loading factor value >0.7). Those related factors is very important as the basic in integrated controling for diseases transmission in the frame of "Simpul theory", especially diarrhea (Achmadi UF, 2008). Diarrhea is communicable disease which can be prevented by water supply, WWDF, garbage disposal, and also fly control (Mukono J, 2000; Surudji D, 2010).

The analysis result of the relationship between environmental health variable with public health variable, obtained an estimate value of 0.36. After it was having the significance test, the T value was 2.530. This T-value is larger than 1.96, which means that there is a positive influence of environmental health toward public health. The R-Square value from this analysis was 0.129, which means that the high incidence of diarrhea could be explained that as much as 12.9% was caused by the high percentage of residents who do not have WWDF and Garbage Disposal. The rest (87.1%) was caused by other factors which are not examined in this study. WWDF and Garbage Disposal is a part or hygiene and sanitation which are the major causes for diarrheal diseases (Elimelech M, 2006)

Conclusion

The result of this study concluded that the valid indicators in constructing latent variables of environmental health are WWDF and Garbage Disposal. Meanwhile, the latent variable of public health, the best indicator is Diarrhea. The result of structural analysis shows that there is a positive influence of environmental health variable (using WWDF and Garbage Disposal as indicators) with public health (using diarrhea as indicator).

Recommendation

To suppress the incidence of environmental-based diseases (especially diarrhea) in Semarang City need environmental health improvement efforts. The improvements of environmental health implemented by emphasis in improving public access to safety Waste Water Disposal Facility (WWDF) and Garbage Disposal thus people would not pollute the environment, which in turn could affect to the decline of the incidence of Diarrhea in the community.

References:

1. Achmadi UF.2008. Manajemen Penyakit Berbasis Wilayah. Jakarta: UI Press.
2. Dinas Kesehatan Kota Semarang.2011. Profil Kesehatan Kota Semarang.
3. Elimelech M. 2006. Water, Sanitation, and Health in Developing Countries. Department of Chemical Engineering Environmental Engineering Program Yale University.
4. Ghozali, I. 2011. Structural Equation Modeling, Metode Alternatif Dengan Partial Least Square (PLS). Semarang: UNDIP Press.
5. Latan H, Ghozali I. 2012. Partial Least Squares menggunakan program WarpPLS 2.0 untuk penelitian empiris. Semarang:: Badan Penerbit Universitas Diponegoro.
6. Mukono, J. 2000. Prinsip Dasar Kesehatan Lingkungan. Surabaya: Airlangga University Press.
7. Surudji D. 2010. Kesehatan Lingkungan. Bandung: Karya Putra Daryati.

Determination of Environemntal Health Indicator Related to Environmental-Based Diseases

Pekalongan", 2012 International Conference on Information Management, Innovation Management and Industrial Engineering, 2012
Publication

9   Sri Handayani, Kismi Mubarokah. "PERAN SUAMI DALAM KESEHATAN IBU HAMIL DI KOTA SEMARANG", JKM (Jurnal Kesehatan Masyarakat) Cendekia Utama, 2018
Publication

<1%

10   Augustina Asih Rumanti, Trifenaus Prabu Hidayat, Rocky Reynaldo, Stephanie. "Organizational innovation based on intellectual capital and transfer tacit knowledge", 2016 IEEE International Conference on Management of Innovation and Technology (ICMIT), 2016
Publication

<1%

11   "Health Reforms in South East Europe", Springer Nature, 2012
Publication

<1%

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		