

Study of community's treatment of latrine for priority area intervention policy in Kolaka Regency 2021: Geographic Information System (GIS) Approach

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Abstract

Background: Since 1995 Ministry of Health has made efforts to realize a clean and healthy living behavior (PHBS) for Indonesian people to improve public health status. However, the achievement of PHBS in Kolaka District has not been optimal as expected. This study aimed to determine the community's treatment of latrines in Priority area intervention.

Method: A descriptive observational with Geographic Information System (GIS) Approach was conducted in this study. Data collection was carried out by household survey using questionnaires and observation checklists. This study used simple random sampling techniques and there were 5,400 households selected as samples.

Result: Based on the risk index calculation, the Sub-Districts of Iwomendaa, Wolo, Samaturu, Wundulako, and Pomalaa Sub-Districts are included in the very high-risk category. These 5 Sub Districts will be the basic of decision-making for the behavioral intervention priority program of latrines to avoid negative impacts due to unhealthy latrines.

Conclusion: For preparing the clean and healthy living behavior intervention policy that focused on the latrines community's treatment, the government needs to prioritize areas with very high-risk category.

Keywords: Policy; Latrine; Community's treatment; Geographic Information System

1. Introduction

Since 1995, the Ministry of Health (MoH) Indonesia has made efforts to realize clean and healthy living behavior (PHBS) for all Indonesian people. Clean and healthy living behavior is one of the supporting programs for improving the quality of public health status. However, the PHBS program has not been implemented optimally as expected ⁽¹⁾.

The habits of hand-washing and defecating properly are the indicators of clean and healthy living behavior. According to the Basic Health Survey (Riskesdas) 2018, 49,8% of people wash their hands properly, and 50,2% of people do not. Whereas, in defecation habits, 88,2% of people had good habits and the remaining 11,8% of people still practiced open defecation ⁽²⁾. In 2019, there were 7.065 diarrhea cases in all age groups and 4.414 diarrhea cases among children were found in Kolaka Regency ⁽³⁾. This indicates there are still many cases of diarrhea in that area. Rapid population growth will have an impact on increasing the environment pollutant materials ⁽⁴⁾.

Diarrhea is an infectious disease that closely related to clean and healthy living behavior, especially in the use and condition of latrine. The unclean treatment of latrines is very possible for transmission of diseases. Handwashing habit after defecating can prevent diarrhea. Sometimes people do not wash their hands after defecating because soap is not

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provided in the latrine. Consequently, E. coli bacteria will be carried in their hands which may cause diarrhea and other infectious diseases. This was exacerbated by unclean latrines because people rarely clean latrines after using them so the environment around the latrine was not clean. There were 9 million deaths every year caused by environmental pollution.

People who live in an environment with unsanitary condition around latrines are at high risk of experiencing diarrhea, especially children. The prevalence of diarrhea in children with unsafe defecation is high. Unsafe handling of children's stool can be a source of exposure to diarrhea in children and other family members ⁽⁵⁾.

The implementation of clean and healthy living behavior is an important thing that must be done by everyone. It would be better if this activity becomes a daily habit. However, there were many people did not aware that clean and healthy living behavior was needed when the covid-19 pandemic occurred. This experience should make us realize how important it is to prevent infectious diseases spreading. In addition, everyone can play a role in keeping the environment clean such as by throwing garbage in the trash. The success of clean and healthy behavior implementation should be supported by the provision of clean water. Clean and healthy behavior will bring many benefits to ourselves, family, and environment around us.

The condition of latrines can affect public health needs to be analyzed further to determine priority areas for intervention, especially in areas that have limitations as a preventive measure. A risk index calculation can be used to obtain the risk level for each area and with help of Geographic Information System (GIS) application can help Government in the decision-making process do determine priority areas of intervention ⁽⁶⁾.

This study aimed to determine of community's treatment of using latrines with the Geographic Information System approach by generating the risk index level. Its result will assist local governments in determining priority areas for intervention.

2. Material and methods

An observational descriptive with Geographic Information System (GIS) approach was conducted in this study ^(7,8). Data collection was carried out through household surveys by filling out questionnaires and observation checklist in Kolaka Regency in July 2021. There were 135 villages as the target, and 40 households were selected randomly per village. This study used simple random sampling technique with a total sample of 5.400 households. Data was analyzed by SPSS version 20.2 application. To determine the risk status for each area used the value of clean and healthy living behavior (PHBS) parameters. Then determined the level of behavior used *Quantum GIS* application Version 3.26.0. with mode *equal interval*. The risk status of each area was displayed on the maps with color gradation according to the risk level ⁽⁹⁾.

The parameters assessed were washing hands with soap in the five important times, the latrines' condition including: the floor and wall are free of stools, free from cockroaches and flies, the flusher works properly, soap provided in the latrine, the contamination on water storage and handling, as well as open defecation habits (BABS).

The determination of the risk level based on variables related to clean and healthy living behavior in the Environmental Health Risk Assessment (EHRA) study. The identified risk areas then entered into a GIS application which displayed maps with color degradation based on the risk status.

3. Results

Surveys dan observations were carried out in community houses that were selected as the research subject. The survey was conducted by filling out the questionnaires to obtain information about community's treatment of latrines. Meanwhile, the observation to observe directly the community behavior and latrines condition. The data collection was conducted to obtain data on the parameters that assessed in this study, namely hand washing with soap in the five important times, including before and after eating, after defecating, before breastfeeding, after cleaning the baby, and after contact with animals. Other parameters assessed were floor and wall conditions that free from stools, the presence of cockroaches and flies on the latrine, the flusher works properly, soap provided near the latrine, contamination in storage water and handling, and open defecation behavior. The following data were obtained through surveys and observations:

Table 1 Results of Surveys and Observational on Community's Treatment of Latrines Based on the Hand Washing with Soap in the Five Important Times, Floor and Wall Condition, the Presence of Cockroaches and Flies as well as the Flusher Works Properly

Sub- districts	Hand washing with soap in the 5 important times		Floor and wall free from stools		Free from cockroaches and flies		Flusher Works Properly	
	No	Yes	No	Yes	No	Yes	No	Yes
Watubangga	419	141	102	458	98	462	72	488
Tanggetada	66	494	14	546	14	546	14	546
Toari	343	57	34	366	65	335	64	736
Polinggona	203	77	60	220	49	231	157	123
Pomalaa	470	10	97	383	113	367	306	174
Wundulako	361	79	79	361	51	389	48	392
Baula	325	75	78	322	102	298	211	189
Kolaka	260	20	69	211	34	246	32	248
Latambaga	241	39	67	213	69	211	64	216
Wolo	525	35	258	302	258	302	246	314
Samaturu	631	129	125	635	92	668	339	421
Iwoimendaa	296	104	105	295	122	278	146	254
TOTAL	4,140	1,260	1,088	4,312	1,067	4,333	1,699	4,101

Table 2 The Result of Surveys and Observations of Community's Treatment of Latrines for Parameters: Soap Provided, Contamination in Water Storage and Handling and Defecation Behavior

Sub-Districts	Soap Providing in the Latrines		Contamination in Water Storage and Handling		Open Behavior Defecation	
	No	Yes	No	Yes	No	Yes
Watubangga	42	518	509	51	427	133
Tanggetada	15	545	544	16	514	46
Toari	128	672	778	22	364	36
Polinggona	37	243	245	35	234	46
Pomalaa	49	431	338	142	323	157
Wundulako	29	411	350	90	61	379
Baula	34	366	347	53	348	52
Kolaka	2	278	271	9	276	4
Latambaga	50	230	247	33	175	105
Wolo	159	401	409	151	401	159
Samaturu	54	706	655	105	66	694
Iwoimendaa	25	375	348	52	21	379
TOTAL	624	5,176	5,041	759	3,210	2,190

Table 1 showed that out of 5.400 respondents, 76,67% did not wash their hands in the five important times. Based on Table 2, most of the latrine's condition were good; 79,85% the floor and walls were clean, free from stools; 80,24% cockroaches and fly were not found; 70,71% the flusher worked properly; 89,24% of the soap provided in the toilet and 86,91% of water were not contaminated and most of the respondents did not have open defecation habits.

Furthermore, the data on table 2 was calculated to obtain the risk index value from each parameter. For calculating the risk index, the value reflected risk for each parameter was taken namely: did not washing hands in the 5 important times, floor and walls were not free from stools, the cockroaches and flies were found in the toilet, soap was not provided in the latrines and water storage and handling was contaminated and practiced open defecation. Each parameter was given the value based on the Environmental Health Risk Assessment (10). The result of the parameters calculation were presented in the following Table 3 :

Table 3 Risk Index Value

Sub-Districts	Did not washing hands in the five important times	Floor and wall were not free from stools	Cockroaches and flies were found in the toilet	The flusher did not work properly	Soap was not provided in the latrines	Water storage and handling were contaminated	Practiced Open defecation	Value of IRS
	Value (25%)	Value (6%)	Value (6%)	Value (6%)	Value (6%)	Value (25%)	Value (25%)	
Watubangga	74.82	18.21	17.50	12.86	7.50	9.11	23.75	30.28
Tanggetada	11.79	2.50	2.50	2.50	2.68	2.86	8.21	6.33
Toari	85.75	8.50	16.25	16.00	32.00	5.50	9.00	29.43
Polinggona	72.50	21.43	17.50	56.07	13.21	12.50	16.43	31.85
Pomalaa	97.92	20.21	23.54	63.75	10.21	29.58	32.71	47.11
Wundulako	82.05	17.95	11.59	10.91	6.59	20.45	86.14	49.98
Baula	81.25	19.50	25.50	52.75	8.50	13.25	13.00	33.25
Kolaka	92.86	24.64	12.14	11.43	0.71	3.21	1.43	27.31
Latambaga	86.07	23.93	24.64	22.86	17.86	11.79	37.50	39.20
Wolo	93.75	46.07	46.07	43.93	28.39	26.96	28.39	47.14
Samaturu	83.03	16.45	12.11	44.61	7.11	13.82	91.32	51.86
Iwoimendaa	74.00	26.25	30.50	36.50	6.25	13.00	94.75	51.41
Total	76.67	20.15	19.76	31.46	11.56	14.06	40.56	37.80

The risk level index was found in Table 4, then entered in Quantum GIS version 3.26.0 Application and produced the map of risk index level for each Sub-District in Kolaka Regency. Using equal interval mode in Figure 1. So can identify which priority areas are the basic of intervention policy.

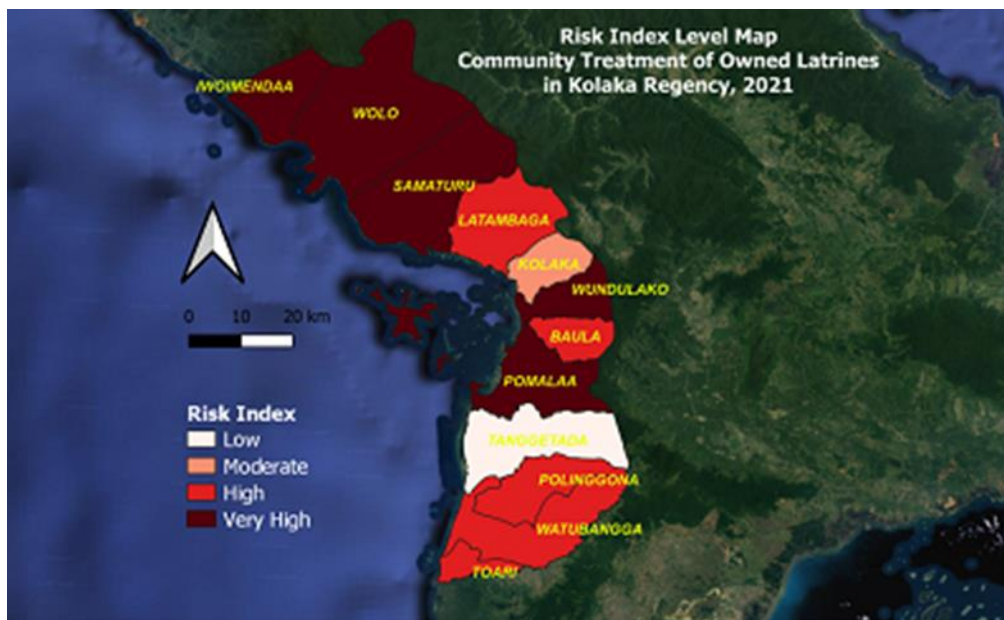


Figure 1 Map of Risk Index Level Related to the Community's Treatment of Latrines in Kolaka, 2021

In Figure 1 showed that there were 5 sub districts in the very high-risk level category namely Iwomendaa, Wolo, Samaturu, Wundulako dan Pomalaa Sub-Districts. This data can be basic for the decision making on intervention program related community's treatment of latrines.

4. Discussion

Clean and healthy living behavior is a set of behavior that carried out based on awareness as the result of learning which enable a person, family, group or community to independently can play a role to achieve the optimal public health status ⁽¹¹⁾. The treatment on latrines is one of the activities that should be done well by community. If the latrine not cared properly, will be very risky for spreading the infectious diseases such as diarrhea. People who do not clean the latrines after using them, can cause dirt around the latrines and become the breeding place for insects and even bacteria that cause of infectious diseases.

There are several things that need to be considered in healthy behavior including hand washing in the five important times namely hand washing with soap before and after eating, after defecating, before breastfeeding, before preparing food, after cleaning baby, and after contact with animals. Hand washing habit is the important way to prevent cross contamination of pathogens during preparing food. Many people think washing hands with water only and with soap is considered the same ⁽¹²⁾. Hand washing habit of community are not in the five important times. Most of them wash their hands only after defecating and before/after eating.

In addition, the condition of the latrines is also another important thing. The community must ensure that the walls of the latrine are clean and free of feces. The significant factors related to the latrines using are the number of family members (1-3 people), some of the family members are elementary school or junior high school students, the length of time the household has used the latrine (two years or more) and frequency of routine latrine cleaning ⁽¹³⁾. Parents need to set an example and teach their children how to keep the toilet clean because the children's habits are usually obtained from parents' habits. If a child has been taught good behavior since childhood, it will carry over into adulthood.

The community should set a side time to clean the latrines, not only the closed one but also latrines' wall and floor. Transformation changes in the community setting are necessary before the impacts occur because of the feces contamination ⁽¹⁴⁾. Behavioral intervention in latrine use is not expensive. It can increase safe defecation and the effect may be felt in the short term although are unlikely to reduce exposure of faecal pathogens to the levels needed in achieving the health improvement ⁽¹⁵⁾. The feces in the latrines which not cleaned will pose a risk or negative impact to the household. The latrine user can be contaminated and get infectious diseases such as diarrhea ⁽¹⁶⁾.

The cleaning latrines habit can reduce the insects like cockroaches and flies. There are still people let the cockroaches and flies around latrines without doing anything to eradicate them. Dirty toilets will allow insects to land, live and breed around the latrines which pose a serious risk to public health because these insects are vector of diseases to human ⁽¹⁷⁾.

Beside the clean latrines, the flusher should work properly. The flusher does not work causes the feces to remain in the flush. This is very risky because infest insects such as flies of cockroaches. Flushing greatly determines the cleanliness of latrine. If the flusher doesn't work, people don't want to use the latrine. A problem that can arise if the latrines still used although flushing does not work is the stool will contaminate latrines which can cause a disease among users and family members (17,18). The soap must be provided in the or near the latrines for cleaning purposes including in the hand washing activity after defecating. The habit of hand washing with soap after defecating can prevent the infectious diseases such as diarrhea ^(18,19) because the dirt hand can be carriers of disease ⁽²⁰⁾.

The water storage in the toilet needs to be cleaned at least once a week. This cleaning activity can prevent the accumulation of dirt and also reduce mosquito breeding site. All these parameters are the part of clean and healthy living behavior that are very important to be implemented by community especially in the toilet using.

The problems above need intervention to reduce and prevent bigger public health problems. In carrying out interventions, the local government through the district health office and primary health care (Puskesmas) need to prioritize areas with a very high-risk level index because these areas that most need to be handled. So that the intervention is right on target. After that the intervention can be continued in the medium, less and low risk level areas. The intervention activities need for collaboration between government and non-government organization to identify the risk factors of diarrhea transmission including the poor sanitation factor ⁽²¹⁾.

5. Conclusion

In planning clean and healthy living behavior intervention policy that focus on community's treatment of latrines, the Government needs to prioritize areas with very high-risk category namely Iwomendaa Sub District, Wolo, Samaturu, Wundulako and Pomalaa Sub Districts. This is so that the intervention will right on target and reduce the risk of health problems such as infectious diseases spreading.

Compliance with ethical standards

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Disclosure of conflict of interest

All authors in the making of this scientific article have no conflict of interest.

Statement of informed consent

All informants/respondents involved in this study have stated their consent as informants/respondents to be interviewed and provided information/information in accordance with research needs.

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