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# Patterns and Determinants of Open Defecation among Urban People

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## Abstract

At the present time, million people still defecate in the open, not in private. Indonesia is a densely populated country with a lot of open defecation (OD) both in urban and rural areas. Tanjung Karang Pusat District is an area in Bandar Lampung City with the highest percentage of OD practice. This study aimed to explore and explained the patterns and determinants of OD among urban people in the Tanjung Karang Pusat District involving 377 respondents for quantitative analysis. Quantitative data were analyzed using chi-square and regression analysis. After controlling the economic status and education level variables, the data revealed that urban communities were still practicing OD (23.3%) with land ownership, latrine ownership, conative attitude, and occupation as influential factors. Statistical test results showed that the most influential factor in the behavior of OD in the community was latrine ownership ( $p$ -value < 0.001, AOR = 58.2). These findings suggest that stakeholders must take action on landowners who do not allow sanitation facilities to be built on their land.

**Keywords:** open defecation, pattern, urban people

## Introduction

An estimated 673 million people in 2017 still defecated in the open, not in private. This practice is known as open defecation (OD).<sup>1,2</sup> There is always a high number of population (more than 58 million) in Indonesia still practicing open defecation both in urban areas and rural areas.<sup>3,4</sup> Open defecation has a severe impact on children's health and contributes to a large number of premature deaths.<sup>5-9</sup>

In this day and age, there are still many people who practice OD.<sup>10</sup> Technological developments and the easy exchange of information are no guarantees in changing peoples' behavior, even in urban areas with internet access.<sup>11-13</sup> Tanjung Karang Pusat District, as a mother district in Bandar Lampung, has the highest number of OD. It is estimated that around 45% of the population in this subdistrict still practices OD using a plastic bag to defecate and dump it outside the home ("flying plastic"). In the same subdistrict, there are latrines without a connected septic tank.<sup>14</sup>

The Ministry of Health of the Republic of Indonesia has come up with a regulation known as the Community-Based Total Sanitation (CBTS) since 2008.<sup>15</sup> Thirty-four out of 126 villages in the city of Bandar Lampung have

not done CBTS, and a further 90 out of 126 communities have not been declared Open Defecation Free (ODF).<sup>16</sup> The Public Work Service also has a program on sanitation in urban communities known as Community Sanitation (*Sanitasi Berbasis Masyarakat/SANIMAS*).<sup>17</sup> However, the complexity of OD problems in Bandar Lampung City continues to occur.

Several studies have determined the cause of OD, but this study will focus on rural areas; however, studies on urban areas are scarce.<sup>18-21</sup> There has been a scant study to explore OD at municipal levels.<sup>22</sup> The findings of the present study can be used to design or conduct follow up intervention of access sanitation and reduce OD in urban areas. Therefore, to answer this emerging gap in the background of this study, which aims to explore and explain the patterns and determinants of OD in urban areas, a cross-sectional survey was conducted to answer the questions in the jurisdiction of the Palapa Primary Health Care, Tanjung Karang Pusat District. The number of quantitative samples reached 377 respondents distributed across four subdistricts—Palapa, Kaliawi, Gotong Royong, and Durian Payung—in the Tanjung Karang Pusat District.

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**Method**

The community-based cross-sectional study design was utilized among the randomly selected households in the study area. The total population of this study was drawn from 7,707 entire families in the Tanjung Karang Pusat District located in the jurisdiction of the Palapa Primary Health Care. Quantitative sampling using the Lemeshow formula with p1 (0.62) and p2 (0.46) was utilized from the study conducted by Yulyani V, *et al.*<sup>19,23</sup>

The minimum sample is 179. However, based on the calculation, 377 households required to get a plausible result. Therefore, we took a sample of 377 to describe the population better. The samples were distributed across all four subdistricts among the working areas of the Palapa Primary Health Care using proportional random sampling (Table 1).

Subdistricts with higher population densities were sampled at proportionally higher rates. Purposive sampling was conducted after determining the number of samples required per subdistrict with inclusion criteria of households in the poverty pocket, and the respondents agreed to be involved in the study.

Two trained enumerators carried out this study in each subdistrict. The questionnaire was developed based on Precede Lawrence Green Model, the SaniFOAM framework, and previous studies.<sup>18,19,24</sup> Education, economic status, occupation, land ownership, latrine access, and attitude (cognitive, affective, and conative) were the primary factors influencing health-related behaviors according to those references.

The open defecation behavior category was divided into “OD” and “Non-Open Defecation (Non-OD)”. Level of education was divided into “None,” “Elementary School,” “Junior High School,” and “Higher or equal than Senior High School.” The respondents’ economic status category corresponded to “lower” if the total monthly household income was less than USD 175. Occupation is divided into “Unemployed” and “Employed”. The status of land ownership was divided into “Rent” and “Private Property”. Ownership of latrine was split into “None” and “Yes.” The attitude category (cognitive, affective, and conative) was divided into “positive” and “negative,” which identified a respondent having a positive attitude if the T-score is  $\geq 50$ .

Validity and reliability tests were undertaken on 30 households in the jurisdiction of Simpung Primary Health Care, Tanjung Karang Pusat District. The resulting questionnaire was found to be valid and reliable for use in this study. The results of the validity and reliability tests are used to test attitude questions with the following results:

a. Cognitive attitude: Initially, 10 question items became seven valid question items with corrected items total-

ing more than r table 0.361.

b. Affective attitude: The number of questions conducted by the validity test was 13 questions with nine valid questions resulting in corrected items totaling more than r table 0.361.

c. Conative attitude: From a total of nine questions tested for validity, the number of valid questions was as many as six items with corrected items totaling more than r table 0.361.

The chi-square test was used to describe cross-tabulation between variables OD and non-OD. The dependent variable is OD, while the independent variables are demographic, cognitive, affective, and conative attitudes. A binary logistic regression was used to determine the most dominant variable.

**Results**

Out of 377, an estimated 289 of the households used a latrine for defecation, and 88 families did not use a toilet. This section presents and discusses the relationships between the practice of OD and household socioeconomic, demographic and geographic factors in communities that are in the jurisdiction of the Palapa Primary Health Care. The factors that influence OD practice are presented in Table 2. The variables examined in this study include the level of education, economic status, occupation,

**Table 1. Sample Size per Subdistrict of Tanjung Karang Pusat District**

Subdistrict	N	n
Kaliawi	1,046	107
Palapa	2,342	63
Durian Payung	1,387	157
Gotong Royong	2,932	50
Total	7,707	377

**Table 2. Descriptive Statistic of Variables Influencing Open Defecation**

Variable	Category	Frequency	Percentage
Open Defecation (OD) behavior	OD	88	23.5
	Non-OD	289	76.7
Level of education	None	21	5.5
	Elementary school	108	28.1
	Junior high school	97	25.2
	$\geq$ Senior high school	159	41.2
Economic status	Lower	177	53.8
	Higher or equal	152	46.2
Occupation	Unemployed	243	64.4
	Employed	134	35.6
Land ownership	Rent	152	39.6
	Private property	232	60.4
Ownership of latrine	None	133	34.8
	Yes	249	65.2
Cognitive	Negative	191	49.6
	Positive	194	50.4
Affective	Negative	233	60.5
	Positive	152	39.5
Conative	Negative	160	41.6
	Positive	225	58.4

**Table 3. Influencing Factors of Open Defecation**

Variable	Category	Open Defecation		p-value
		Open Defecation (%)	Non Open Defecation (%)	
Education	No school	9 (10.2)	11 (3.8)	< 0.001
	Elementary school	47 (53.4)	59 (20.4)	0.957
	Junior high school	24 (27.5)	69 (23.9)	0.092
	≥ Senior high school	8 (9.1)	150 (51.9)	< 0.001
Economic status	< USD 171.5	54 (90)	121(45.3)	< 0.001
	≥ USD 171.5	6 (10)	146 (54.7)	
Occupation	Unemployed	64 (72.7)	179 (61.9)	0.064
	Employed	24 (27.3)	110 (38.1)	
Land ownership	Rent	82 (95.3)	47 (16.3)	< 0.001
	Private property	4 (4.5)	241 (85.7)	
Latrine ownership	No	82 (95.3)	47 (16.3)	< 0.001
	Yes	4 (4.7)	241 (85.7)	
Attitude: Cognitive	Negative	61 (69.3)	124 (42.9)	< 0.001
	Positive	27 (30.7)	165 (57.1)	
Attitude: Affective	Negative	55 (62.5)	174 (60.2)	0.794
	Positive	33 (37.5)	115 (39.8)	
Attitude: Conative	Negative	61 (69.3)	95 (32.2)	0.000
	Positive	27 (30.7)	196 (57.8)	

**Table 4. Patterns and Determinants of Open Defecation in Urban People**

Variable	Category	β	p-value	AOR	95% CI for OR	
					Lower Limit	Upper Limit
Land ownership	Rent	2.896	< 0.001	17.38	4.24	71.23
Latrine ownership	None	4.065	< 0.001	58.28	13.49	251.73
Attitude: Conative	Negative	1.473	0.013	4.37	1.36	14.03
Economic status	< USD 171.5	0.080	0.918	1.08	0.23	4.99
Occupation	Unemployed	1.201	0.048	3.32	1.01	10.90
Education	No School		0.012			
	Elementary school	0.483	0.685	1.62	0.15	16.80
	Junior high school	-2.332	0.006	0.09	0.01	0.51
	≥ Senior high school	-0.676	0.376	0.50	0.11	2.27

Notes: AOR = Adjusted Odds Ratio; CI = Confidence Interval; OR = Odds Ratio; USD = US Dollar

land ownership, latrine ownership, attitude (cognitive, affective, and conative). The majority of respondents (76.7%) did not practice OD, compared to the 23.3% who practiced OD. Most of the respondents (41.2%) had completed higher or equal than senior high school, followed by those who completed elementary school (28.1%), junior high school (25.2%), and none (5.5%). More than half of the respondents (53.8%) had lower than regional minimum wage (USD 171.5). Most of the respondents (64.4%) are unemployed, and the number of respondents who rent (or tenants) is 39.6%. There were 34.8% of respondents who did not have a toilet.

Data on Table 3 indicates statistical significance variables that influence OD, such as economic status, land ownership, lantrine ownership, cognitive attitude, and attitude, have p-value ≤ 0.001. Open defecation is not influenced by job status and affective attitude with a p value of more than α (0.05).

Tabel 4 shows that the most influence OD was latrine ownership (AOR = 58.28). People who do not own a toi-

let have 58 times more chance of doing OD than those who have a toilet. People whose lands are leased (AOR = 17.38) have 17 times more chance to do OD than those who own private land. Variables that are not included in the final model include cognitive and affective attitudes. The economic status (AOR = 1.08) and education level (AOR Elementary school = 1.62; Junior high school = 0.09; Senior high school = 0.50) variables were confounding variables in this study with p-value more than α (0.05).

**Discussion**

Based on the results, approximately 23.3% of respondents practice OD. Findings from this study showed that OD in urban areas is caused by access and ownership of latrines not allowed by landowners. Access and availability of restrooms represent a key external or environmental factor.<sup>18</sup> Allowing construction of sanitation facilities on leased land must be examined as a critical aspect in reducing OD in urban areas.<sup>25</sup> These results are in line

with a previous study conducted in Ghana where OD was reduced when there is access to the toilet.<sup>26</sup> Attitude and injunctive norm are the psychological predictors of latrine ownership, and consistent latrine use was associated with attitude, cleanliness of the latrine, and its privacy.<sup>27</sup>

Logistic regression analysis shows that the most influential factor in OD behavior is latrine ownership (p-value < 0.001, AOR = 58.28). These results are in line with a research conducted in India on urban communities where the leading cause of OD is access to water and sanitation facilities.<sup>28</sup> Social networks such as caste, education, and income influence the ownership of a toilet.<sup>29</sup> The results of this study are in line with the study that has been done where people who do not have latrines are indeed in the same area with similar social characteristics.

Building latrines at the household level is very important in eliminating OD.<sup>30</sup> The construction depends on education, soil conditions, social cohesion, the perception that many other community members have a restroom, and high confidence in personal abilities.<sup>31</sup> The interventions so far carried out by the Ministry of Health are always focused mostly on individual-level determinants such as attitudes and behavior, instead of considering all possible social determinants of latrine ownership.<sup>32</sup>

Public toilets built by stakeholders are often grossly inadequate and of low quality that shortly after commissioning, maintenance provision was not part of the contracts.<sup>12</sup> Providing communal toilets can reduce but not end the problem of OD in urban poverty pockets.<sup>33</sup> What is interesting in the latrine ownership data is that there are people who already have latrines but are still practicing OD (4.7%) because usually they live near the river, and OD has become a habit. Health authorities must continue to promote and raise awareness about the importance of using latrines.<sup>34-36</sup>

Toilet ownership is usually related to the respondent's land ownership status. The results of in-depth interviews show that most landowners do not allow septic tanks to be built because they are still leasing the land they live in. Furthermore, if the land is located in a mountainous area and the ground is perforated in building septic tanks, the landowner fears this could cause landslides and reduce the selling price of land. The study indicates that latrine ownership is a variable that needs to be considered in lowering OD in urban poverty areas. The result is identical to earlier literature, which found that dwelling space and household latrine ownership are important conditions that reduce OD.<sup>32</sup>

Intending to increase ODF areas, from the results of this study, it is necessary that the city government implement a firm policy that every house occupied should be equipped with sanitation facilities. This study also found

that people are concerned about the difficulty of siphoning a toilet. Mountainous areas with very dense houses will make it difficult for people to siphon septic tanks. Urban poor communities are more likely to be affected by these problems—siphoning and constructing the septic tank.<sup>28</sup> A modern technology that does not pollute the environment is needed so that this complex sanitation problem can be resolved.

The Public Works Department has a work program that focuses on sanitation installations in urban areas known as SANIMAS.<sup>17</sup> Meanwhile, the Ministry of Health's CBTS is a program that focuses on interventions to change values and people's beliefs about sanitation.<sup>37</sup> The integration of the two programs will result in new sanitation technologies that will improve sanitation access for the city's communities.

There is a need for a policy shift toward empowering households and communities, especially in collaboration with landowners, to help resolve OD together.<sup>38</sup> This study has some significant limitations. It is based on the bias in data collection resulting from a non-random sample. This sampling technique can illustrate the real reason respondents who are in poverty pockets in urban areas practice OD.

## Conclusion

People in urban communities still defecate in the open, and the main factor is the ownership of latrines, especially among immigrants whose ownership status is that of a tenant. City governments should promote policies ensuring that every house, owned or rented, must be equipped with sanitation facilities. This program can work well if it involves communities, local stakeholders, and landowners. Suggestions for further research should determine to what extent the city government is committed to improving access to sanitation, reducing the number of ODs.

## Abbreviations

OD: Open Defecation; CBTS: Community-Based Total Sanitation; ODF: Open Defecation Free; SANIMAS: *Sanitasi Berbasis Masyarakat* (Community Sanitation); Non-OD: Non-Open Defecation; AOR: Adjusted Odds Ratio.

## Ethics Approval and Consent to Participate

The study ethics was obtained from the Ethics Committee Politeknik Kesehatan Tanjungkarang with the study protocol code 147/EA/KEPK-TJK/V/2019.

## Competing Interest

The author declares that there is no significant competing financial, professional, or personal interest that might have affected the performance or presentation of the work described in this manuscript.

### Availability of Data and Materials

The data supporting the findings and the material of this study are available on request from the corresponding author. The data are not publicly available due to information that could compromise the research participant's privacy/consent.

### Authors' Contribution

VY has devised the project, the main conceptual ideas, the proof outline, also worked out the technical and quantitative study. CAF worked out technical details on qualitative research. SMS made corrections in English and improved the manuscripts. DH supervised the findings of his work. All authors discussed the results and contributed to the final manuscript.

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The District Health Office authorized the study in Tanjung Karang, the Head of the Palapa Primary Health Care, the Head of the Bandar Lampung National Unity and Politics Agency, and Malahayati University.

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