Household Latrine Utilization Behavioral Model as an Effort to Improve Open Defecation-Free Program

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ABSTRACT

***Background**: Healthy latrine-using behavior indicates healthy behavior. However, many people still practice open defecation, which can cause illness and increase death risk. Self-efficacy is a dominant predictor of health behavior change. **Aims**: The study aims to develop a household latrine utilization behavior model based on self-efficacy to improve an open defecation-free (ODF) program. **Method**: The study was a descriptive-analytic with a cross-sectional design. The sample size was 138 respondents with cluster random sampling. The study variables were endogenous (household latrine utilization), exogenous (predisposing, enabling, and reinforcing factors), and intervening variables (self-efficacy). Data were collected by questionnaire and analyzed using SEM-PLS. **Result**: The household latrine utilization behavior-based self-efficacy model is fit (SRMR=0.098; NFI= 0.910; Q^2=0.334). Valid and reliable indicators were education (predisposing), clean water availability and latrine maintenance (enabling), and health worker and family support (reinforcing). Path analysis showed exogenous factors, directly and indirectly, influence latrine utilization behavior through self-efficacy. Predisposing and reinforcing factors had a direct and significant effect (p = 0.025; p = 0.001) while enabling factors were insignificant (p = 0.438). Enabling and reinforcing factors indirectly and significantly affected latrine utilization behavior through self-efficacy (p = 0.033; p = 0.004), while predisposing factors were insignificant (p = 0.141). Self-efficacy significantly influenced latrine-using behavior (p = 0.023). **Conclusion**: The household latrine utilization behavior-based self-efficacy model is a fit model with good predictive relevance in predicting household latrine use behavior. Health workers can use the model to enhance household latrine utilization behavior and improve the ODF program and public health status.*

***Keywords**: defecation, latrines, model, self-efficacy*

INTRODUCTION

Defecating in the household latrine indicates clean and healthy living to prevent various infectious diseases (Kementerian Kesehatan RI, 2022; United Nations Children's Fund and World Health Organization, 2023). Exposure to fecal pathogens contributes to diarrhea and can also cause stunting in childhood, causing short-term and long-term impacts that are harmful to health (Ellis *et al*., 2020; Mara, 2017). Open defecation (OD) is a big problem that must be resolved immediately because its impact is very bad for health (United Nations Children's Fund and World Health Organization, 2023).

In 2021, only 86.1% of families in Indonesia had access to adequate sanitation facilities. East Java Province was ranked 6th, namely 94.5% (Kementerian Kesehatan RI, 2022), with Situbondo district as one of the districts with the lowest percentage of healthy latrine facilities, namely only 70.7% (Dinas Kesehatan Provinsi Jawa Timur, 2022). However, the presence of latrines is only effective in improving health if they are used properly. In 2022, in some countries, more than half of the population still practices OD, for example, Chad (63%), Niger (65%) and South Sudan (60%) (United Nations Children's Fund and World Health Organization, 2023). The percentage of villages that have successfully implemented the Stop OD program is only 48.7%. East Java Province is in 7th position as a province that has

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successfully implemented the Stop OD program, namely 74.6% (Kementerian Kesehatan RI, 2022), and specifically, Situbondo District only 61% (Dinas Kesehatan Provinsi Jawa Timur, 2022). It means that there are still many people who practice OD.

According to the PRECEDE-PROCEED model, health behavior is influenced by predisposing, enabling, and reinforcing factors (Green *et al*., 2022). Several previous studies stated predisposing factor that influences the behavior of using a healthy latrine is age (Lopez *et al*., 2019; Sinha *et al*., 2017); gender (Lopez *et al*., 2019; Tamene & Afework, 2021; Temesgen *et al*., 2021); education level (Leshargie *et al*., 2018; Tamene & Afework, 2021; Temesgen *et al*., 2021; Woyessa *et al*., 2022); income level (Abebe *et al*., 2020; Sclar *et al*., 2022; Yulyani *et al*., 2019); number of family members (Asnake & Adane, 2020; Sinha *et al*., 2017; Temesgen *et al*., 2021; Woyessa *et al*., 2022); habits (Sinha *et al*., 2017; Tamene & Afework, 2021); knowledge (Ellis *et al*., 2020; Kpoeh, 2020; Leshargie *et al*., 2018; Omer *et al*., 2022; Yulyani *et al*., 2019); and attitudes (Ellis *et al*., 2020; Lopez *et al*., 2019; Tamene & Afework, 2021; Yulyani *et al*., 2019). Enabling factors include the availability of clean water facilities (Yulyani *et al*., 2019), house-to-water source distance (Abebe *et al*., 2020; Omer *et al*., 2022; Woyessa *et al*., 2022; Yulyani *et al*., 2019), and maintenance of latrines (Asnake & Adane, 2020; Lopez *et al*., 2019; Omer *et al*., 2022; Temesgen *et al*., 2021; Woyessa *et al*., 2022). Reinforcing factors include family support (Asnake & Adane, 2020; Sclar *et al*., 2022; Temesgen *et al*., 2021; Woyessa *et al*., 2022), health workers support (Yulyani *et al*., 2019), and community leaders support (Tribbe *et al*., 2021).

Self-efficacy is the main factor influencing behavior change (Bandura, 2018). Previous study showed self-efficacy is the dominant predictor of latrine utilization behavior (Kpoeh, 2020; Sclar *et al*., 2022). With high self-efficacy, a person will experience success in making important decisions for specific actions and situations (Bandura, 2018). The existence of facilities in the form of latrines and clean water facilities is not a guarantee for eliminating the practice of defecating. Even the already available latrines are only sometimes consistently used by the community (Sinha *et al*., 2017; Temesgen *et al*., 2021). There are still problems with families who practice OD, not limited to the unavailability of infrastructure, namely toilets and clean water supplies, but also the behavioral aspect, namely community behavior. Based on the background above, it can be seen that there are three main factors behind the behavior of using toilets, namely predisposing, enabling and reinforcing factors. There is also a self-efficacy factor, an intervening variable in shaping latrine use behavior. Therefore, the study aims to develop a household latrine utilization behavior model by analyzing the influence of predisposing, enabling, and reinforcing factors through self-efficacy in the Situbondo district. The developed model can be used to develop appropriate intervention models for the community to improve household toilet use behavior, support the ODF program, and improve public health.

METHODS

The study was analytically observational with a cross-sectional design conducted in Situbondo District, East Java, Indonesia, in March - December 2022. The study population was families who received social assistance in the form of healthy latrines from the government through Situbondo Regency APBD funds in 2019 (500 families from five villages: Klatakan = 60, Dawuhan = 264, Patokan = 106, Patemon = 34, and Kertosari = 36). The sample size was 135 respondents calculated using G Power Software (f^2 = 0.15; α = 0.05; and ß power = 0.8) with the inclusion criteria being: (1) receiving household latrine program through 2019 Situbondo District APBD funds; (2) act as head of the family; (3) able to communicate well; (4) do not have physical or mental limitations that could interfere with the conduct of study (blindness, deafness, dementia, etc.). The sampling technique used cluster random sampling, namely Klatakan (n = 60/500 x 135 = 16); Dawuhan (n = 264/500 x 135 = 71); Patokan (n = 106/500 x 135 = 29); Patemon (n = 34/500 x 135 = 9); Kertosari (n = 36/500 x 135 = 10).

The study variables consist of (1)

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household latrine utilization behavior as an endogenous variable, (2) exogenous variables were predisposing factors (age, gender, education level, income level, number of family members, habits, knowledge and attitudes), enabling factors (availability of clean water, house-to-water source distance, and latrine maintenance), and reinforcing factors (family support, support from health workers, and support from community leaders), and (3) the intervening variable is self-efficacy. The instrument used is a questionnaire, which consists of:

(1) A sociodemographic questionnaire was used to collect sociodemographic data: age, gender, education, income and number of family members.
(2) The habits questionnaire was adapted from the concept of latrine usage habits (Peraturan Menteri Kesehatan Republik Indonesia Nomor 3 Tahun 2014 Tentang Sanitasi Total Berbasis Masyarakat, 2014), which consists of six items, namely the latrine utilization (4 items) and latrine maintenance (2 items) with a Likert scale of 1 – 3. The validity and reliability test results were r = 0.432 – 0.741; Cronbach's alpha = 0.673. The habit was categorized as poor (< 10), moderate (10 - < 14), and good (≥ 14).
(3) *The knowledge questionnaire was adapted from the concept of knowledge of latrine use* (Peraturan Menteri Kesehatan Republik Indonesia Nomor 3 Tahun 2014 Tentang Sanitasi Total Berbasis Masyarakat, 2014), which consists of eight items, namely understanding (2 items), the benefits of defecating in the latrine (4 items), and latrine maintenance (2 items) with a Guttman scale (0 = false; 1 = true). The validity and reliability test results were r = 0.444 – 0.696; Cronbach's alpha = 0.709. Knowledge was categorized into low (< 2.67), moderate (2.67 - < 5.33), and high (≥ 5.33).
(4) The attitude toward latrine use questionnaire was adapted from the concept of attitudes toward latrine use (Peraturan Mdenteri Kesehatan RI, 2014), which consists of seven items, namely latrine use (5 items) and latrine maintenance (2 items) with a Likert scale of 1 – 3. The validity and reliability test results were r = 0.267 – 0.676; Cronbach's alpha = 0.901. Attitude toward latrine use was categorized into poor (< 13.33), moderate (13.33 - < 18.67), and good (≥ 18.67).
(5) The availability of clean water facilities questionnaire adapted from the concept of clean water and its use (Kementerian Kesehatan RI, 2017), which consists of five items, namely types of clean water sources (2 items) and the use of clean water facilities (3 items) with a Likert scale of 1 – 3. The validity and reliability test results were r = 0.377 – 0.593; Cronbach's alpha = 0.674. The availability of clean water facilities was categorized into poor (< 11.67), moderate (11.67 - < 16.33), and good (≥ 16.33).
(6) The house-to-water sources distance questionnaire was obtained from the checklist form of the sanitation water source observation (Mukherjee, 2011). Answers are measured using an ordinal data scale (1 = < 100 m, 2 = 100-500 m, 3 = ≥ 500 m).
(7) The latrine maintenance questionnaire was adapted from the checklist form of the observation sheet regarding latrine maintenance procedures (Peraturan Mdenteri Kesehatan RI, 2014), which consists of eight items with the Guttman scale. The correct answer is given a score of 1, and the wrong answer is 0. Latrine maintenance was categorized into poor (< 2.67), moderate (2.67 - < 5.33), and good (≥ 5.33).
(8) The perceived family support questionnaire was adapted from the concept of social support (Friedman et al., 2003), which consists of 12 items, namely informational (3 items), assessment (3 items), emotional (3 items) and instrumental (3 items) with a Likert scale of 1 – 5. The validity and reliability test results were r = 0.365 – 0.664; Cronbach's alpha = 0.741. Family support was categorized into low (< 28), moderate (28 - < 44), and high (≥ 44).
(9) The perceived health worker support questionnaire was adapted from the

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concept of social support (Friedman *et al.*, 2003), which consists of 10 items, namely informational (3 items), assessment (2 items), emotional (2 items) and instrumental (3 items) with a Likert scale of 1 – 5. The validity and reliability test results were r = 0.477 – 0.792; Cronbach's alpha = 0.828. Health workers support was categorized into low (< 23.33), moderate (23.33 - < 36.67), and high (≥ 36.67).

(10) The perceived community leaders support questionnaire was adapted from the concept of social support (Friedman *et al.*, 2003), which consists of 11 items, namely informational (3 items), assessment (2 items), emotional (3 items) and instrumental (3 items) with a Likert scale of 1 – 5. The validity and reliability test results were r = 0.646 – 0.918; Cronbach's alpha = 0.962. Community leaders support was categorized into low (< 25.67), moderate (25.67 - < 40.33), and high (≥ 40.33).

(11) The latrine use self-efficacy questionnaire was adapted from self-efficacy theory (Bandura, 2018). This questionnaire consists of 10 items consisting of four indicators, namely cognitive (4 items), affection (3 items), motivational (1 item), and selection (2 items), with a Likert scale of 1 – 5. The results of the validity and reliability tests were r = 0.265 – 0.827; Cronbach's alpha = 0.774. Self-efficacy was categorized into low (< 23.33), moderate (23.33 - < 36.67), and high (≥ 36.67).

(12) The household latrine use behavior questionnaire was adapted from the concept of family health tasks *(Friedman et al., 2003),* which consists of 14 items, the domains of recognizing diseases caused by OD (2 items), making decisions about using a latrine (3 items), maintaining latrine cleanliness for health (3 items), modifying the environment (3 items), and using latrine facilities (3 items) with a Likert scale of 1 – 5. The validity and reliability test results were r = 0.353 – 0.685; Cronbach's alpha = 0.811. Household latrine utilization behavior was categorized into poor (< 32.67), moderate (32.67 - < 51.33), and good (≥ 51.33).

Data were collected by interviewing respondents directly at the respondent's home. Before data collection, the researcher explained the study's aims, benefits, procedures and possible risks to prospective respondents. After the prospective respondent understood and was willing to become a respondent, they were asked to sign a consent form. Data were analyzed using descriptive and inferential statistics. Descriptive analysis was used to describe the characteristics of study variables using SPSS V24 and SmartPLS V3 for structural equation modeling. The study has received approval from the Ethical Committee of Health Research of the Faculty of Dentistry, Universitas Jember, with protocol number 1665/UN25.8/KEPK/DL/2022.

RESULTS AND DISCUSSION

Based on sociodemographic characteristics, most respondents were aged 41 – 60 years (73.19%), female (57.25%), and had secondary education (55.80%) with family members ≤ 4 people (81.88%). All respondents have an income level less than the Regency Minimum Wage (RMW). Most respondents have good habits (78.30%), good knowledge (84.80%), and good attitudes toward using healthy latrines (46.40%). Most respondents have adequate clean water facilities (89.10%), and the distance between the house and the source of clean water is quite far (more than 500 meters) (74.60%), with the condition of latrine maintenance in the good category (84.10%). Most respondents have perceived family support and health workers in the high category (76.80%; 97.80%). Meanwhile, perceived community leaders support was low (54.30%). The study results also showed that most respondents have high self-efficacy (55.80%) and the behavior of using latrines for defection in the high category (76.80%) (Table 1).

Table 1. Respondents' Characteristics and Study Variables Distribution Frequency

No	Variable	n (%)	Mean±SD (CI 95%)
1.	Age (years)		47.79 ± 8.912 (46.30 – 49.30)

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No	Variable	n (%)	Mean±SD (CI 95%)
	18 – 40	29 (21.01)	
	41 – 60	101 (73.19)	
	≥ 61	8 (5.79)	
2.	Gender		
	Female	79 (57.25)	
	Male	59 (42.75)	
3.	Education Level		
	No Education	9 (6.52)	
	Basic Education	52 (37.68)	
	Middle Education	77 (55.80)	
	High Education	0 (0)	
4.	Income Level		
	Less than RMW	138 (100)	
	More than RMW	0 (0)	
5.	Number of Family Members		
	≤ 4 persons	113 (81.88)	
	> 4 persons	25 (18.12)	
6.	Latrine use habits		15.02 ± 1.916 (14.69 – 15.34)
	Poor	0 (0)	
	Moderate	30 (21.70)	
	Good	108 (78.30)	
7.	Knowledge about Healthy Latrines		6.80 ± 1.520 (6.54 – 7.05)
	Low	1 (0.70)	
	Moderate	20 (14.50)	
	High	117 (84.80)	
8.	Attitudes toward the Use of Healthy Latrines		16.25 ± 4.333 (15.52 – 16.98)
	Poor	33 (23.90)	
	Moderate	41 (29.70)	
	Good	64 (46.40)	
9.	Availability of Clean Water Facilities		14.11 ± 1.867 (13.79 – 14.42)
	Poor	15 (10.90)	
	Moderate	123 (89.10)	
	Good	0 (0)	
10.	House-to-Water Source Distance		
	< 100 m	19 (13.80)	
	100 – 500 m	16 (11.60)	
	> 500 m	103 (74.60)	
11.	Latrine Maintenance Conditions		6.99 ± 1.512 (6.74 – 7.25)
	Poor	4 (2.90)	
	Moderate	18 (13.00)	
	Good	116 (84.10)	
12.	Perceived Family Support		48.16 ± 5.660 (47.21 – 49.11)
	Low	1 (0.70)	
	Moderate	31 (22.50)	
	High	106 (76.80)	
13.	Perceived Health Workers Support		49.25 ± 4.419 (48.50 – 49.99)
	Low	0 (0)	
	Moderate	3 (2.20)	
	High	135 (97.80)	
14.	Perceived Community Leaders Support		27.67 ± 13.36 (25.42 – 29.92)
	Low	75 (54.30)	
	Moderate	27 (19.60)	
	High	36 (26.10)	
15.	Self-efficacy in using healthy latrine		36.99 ± 4.025 (36.31 – 37.66)
	Low	0 (0)	
	Moderate	61 (44.20)	
	High	77 (55.80)	
16.	Household latrine Utilization Behavior		56.38 ± 5.776 (55.41 – 57.36)
	Poor	0 (0)	
	Moderate	32 (23.20)	
	Good	106 (76.80)	

Table 2. The Results of Validity and Reliability Test (Outer Model or Measurement Model)

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Variable	Indicators		Modeling	Modeling II			
			Loading factor	Loading factor	AVE	Discriminant Validity	Cronbach Alpha	Composite Reliability
(X1) Predisposing Factors	X1.1	Age	-0.677	-	1.000	1.000	1.000	1.000
	X1.2	Gender	0.284	-				
	X1.3	Education level	0.827	1.000				
	X1.4	Income level	-0.127	-				
	X1.5	Family members	0.153	-				
	X1.6	Habits	0.501	-				
	X1.7	Knowledge	0.125	-				
	X1.8	Attitude	0.021	-				
(X2) Enabling Factors	X2.1	Availability of clean water facilities	0.848	0.898	0.704	0.839	0.721	0.826
	X2.2	House-water source distance	0.618	-				
	X2.3	Latrine maintenance	0.762	0.776				
(X3) Reinforcing Factors	X3.1	Perceived Family Support	0.837	0.865	0.760	0.872	0.782	0.863
	X3.2	Perceived Health Workers Support	0.859	0.878				
	X3.3	Perceived Community Leaders Support	0.276	-				
(I) Self-efficacy	I.1	Cognitive	0.640	0.875	0.647	0.804	0.721	0.784
	I.2	Affection	0.799	0.726				
	I.3	Motivational	0.624	-				
	I.4	Selection	-0.596	-				
(Y) Household Latrine Utilization Behavior	Y.1	Knowing diseases	0.713	-	0.672	0.820	0.756	0.860
	Y.2	Decide to use a healthy latrine	0.737	0.773				
	Y.3	Maintain the household latrine	0.806	0.847				
	Y.4	Modify the environment	0.676	-				
	Y.5	Using household-healthy latrine infrastructure	0.816	0.837				

Table 2 shows that several indicators had loading factors < 0.7 in the first model testing, then the researcher retested the model. The results of the second modeling show that the loading factor for all indicators for each variable is > 0.7, average variance extracted (AVE) > 0.5, with the discriminant validity value

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being more significant than the other variables. The composite reliability and Cronbach's alpha values are also > 0.7. So, it means the indicators are valid and reliable.

Table 3. Statistical Test Results for the Effect of Determination, Effect Size, Cross-validated Redundancy, and Model Fit (Inner Model or Structural Model)

Variable	Model fit		R^2	f^2		Q^2
	SRMR	NFI		Self-efficacy	Household latrine Utilization Behavior	
Predisposing Factors	0.098	0.910		0.001	0.047	
Enabling Factors				0.401	0.007	
Reinforcing Factors				0.051	0.287	
Self-efficacy			0.430		0.046	0.256
Household Latrine Utilization Behavior			0.527			0.334

Table 3 shows that the model is fit (SRMR = 0.098 < 0.10; NFI = 0.910 > 0.9). The value of Q^2 = 0.256 and 0.334 > 0, meaning the model has good predictive relevance. The values of R^2 = 0.430 and 0.527 indicate that predisposing, enabling, and reinforcing factors influenced self-efficacy of 43% and household latrine utilization behavior of 52.7%. Based on the effect size value, it can be concluded that the factors most significantly influencing household latrine utilization behavior were reinforcing factors (f^2 = 0.287), including the medium category. Meanwhile, predisposing and enabling factors and self-efficacy value f^2 = 0.047; 0.007; 0.046 < 0.15, so it is categorized as having a minor influence.

Table 4. Path Analysis and Significance Test Results

No	Variable	Coefficient	t	p	Note
1.	Predisposing Factors --> Household Latrine Utilization Behavior	0.180	2.248	0.025	Direct effects, significant
2.	Predisposing Factors --> Self-efficacy	0.021	0.288	0.774	Direct effects, not significant
3.	Predisposing Factors --> Self-efficacy --> Household Latrine Utilization Behavior	0.004	0.251	0.802	Indirect effect, not significant
4.	Enabling Factors --> Household Latrine Utilization Behavior	0.178	0.776	0.438	Direct effects, not significant
5.	Enabling Factors --> Self-efficacy	0.532	5.993	0.001	Direct effects, significant
6.	Enabling Factors --> Self-efficacy --> Household Latrine Utilization Behavior	0.104	2.142	0.033	Indirect effect, significant
7.	Reinforcing Factors --> Household Latrine Utilization Behavior	0.503	7.551	0.001	Direct effects, significant
8.	Reinforcing Factors --> Self-efficacy	0.208	2.913	0.004	Direct effects, significant
9.	Reinforcing Factors --> Self-efficacy --> Household Latrine Utilization Behavior	0.041	1.474	0.141	Indirect effect; not significant
10.	Self-efficacy --> Household Latrine Utilization Behavior	0.195	1.700	0.023	Direct effects, significant

Table 4 shows that only predisposing and reinforcing factors have a direct, positive and significant influence on household latrine utilization behavior of 18% and 50.30% (t = 2.248; p = 0.025 and t = 7.511; p = 0.001) while enabling factors do not have a direct and significant effect (t = 0.776; p = 0.438). The results of the further analysis show that predisposing and reinforcing factors do not have a significant influence on household latrine utilization behavior through self-efficacy (t = 0.251; p = 0.802 and t = 1.474; p = 0.141), but reinforcing factors have a direct influence significantly on self-efficacy by 20.80% (t=2.913; p = 0.004), while enabling factors have a significant effect in a positive direction on household latrine utilization behavior through self-efficacy by 10.40% (t=2.142; p= 0.033).

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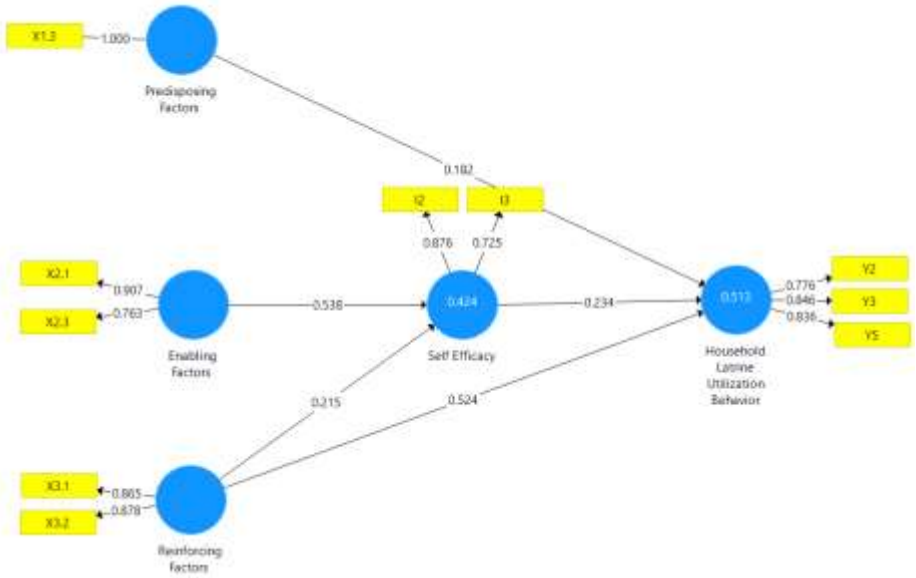

Figure 1. Result of Household Latrine Utilization Behavior Modelling

The results of this study follow several previous studies which stated that most family heads are in the middle adult age category, namely more than 40 years old (Kpoeh, 2020; Temesgen *et al.*, 2021), female (Woyessa *et al.*, 2022), the family type is a nuclear family with ≤ 4 (Abebe *et al.*, 2020), with low level of education and income (Abebe *et al.*, 2020; Temesgen *et al.*, 2021; Woyessa *et al.*, 2022). The results of this study showed that no one had latrine utilization behavior in the poor category. The findings follow several previous studies that stated that most people had good defecation practices in the latrine, namely 71.8 – 91.2% (Abebe *et al.*, 2020; Asnake & Adane, 2020; Lopez *et al.*, 2019). The results of this study do not agree with some previous studies, namely a study in Indonesia that stated that only 55.6% of people used the toilet to defecate (Yulyani *et al.*, 2019). A study's results in Ethiopia also showed that even if a family already had latrines, 27.8% of households still practiced OD (Temesgen *et al.*, 2021). Another study shows that only 41.9% of people use latrines to defecate (Omer *et al.*, 2022).

The influence of predisposing factors on household latrine utilization behavior

The study showed only one valid and reliable indicator explaining the predisposing factors for household latrine utilization behavior: education (Table 1). The study results also show that predisposing factors directly, positively and significantly influence family toilet use behavior. However, it does not significantly influence household toilet use behavior through self-efficacy (Table 4 and Figure 1). This study's results follow several previous studies stating that education is an essential component that shapes latrine use behavior. The higher the level of education, the better the behavior of using toilets as a means of defecation (Abebe *et al.*, 2020; Garn *et al.*, 2017; Leshargie *et al.*, 2018; Tamene & Afework, 2021; Temesgen *et al.*, 2021; Woyessa *et al.*, 2022; Zewdie *et al.*, 2021).

People with formal education are likelier to use healthy latrines (Leshargie *et al.*, 2018; Woyessa *et al.*, 2022). Someone who has never attended formal education will tend to engage in OD (Garn *et al.*, 2017; Temesgen *et al.*, 2021). A higher level of education enables a person to be increasingly able to know, understand or analyze clean and healthy living. On the other hand, the lower a person's level of education, the lower the person's understanding of using the household latrine (Abebe *et al.*, 2020; Leshargie *et al.*, 2018). In line with the

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increase in people's educational status, their knowledge about the causes of disease, transmission and the role of human waste in the occurrence of infectious diseases also increases. Therefore, to maintain health, they manage and dispose of all types of waste, including human waste (Tamene & Afework, 2021; Temesgen *et al*., 2021; Woyessa *et al*., 2022).

The study results showed that predisposing factors, in this case, the level of education, do not significantly influence behavior through self-efficacy. Sources of self-efficacy are mastery experiences, vicarious experiences, verbal or social persuasion, and physiological and emotional states (Bandura, 2018). The level of education may be an indicator that forms one source, namely mastery experiences. However, many other indicators still shape it, for example, sociodemographic conditions and other psychosocial factors (Kpoeh, 2020; Sclar *et al*., 2022). The research results show that age, gender, income level, number of family members, habits, knowledge and attitudes are unreliable indicators of predisposing factors (Table 2). So, there is also the possibility that predisposing factors do not significantly influence household latrine use behavior through self-efficacy.

The influence of enabling factors on household latrine utilization behavior

The study results showed that valid and reliable indicators explain the enabling factors: the availability of clean water facilities and latrine maintenance conditions (Table 1). The results of the study showed that enabling factors do not have a direct influence on household toilet use behavior. However, it indirectly, positively and significantly influences household toilet use behavior through self-efficacy (Table 4 and Figure 1). The results of this study follow several previous studies that stated the availability of clean water facilities and latrine maintenance conditions enable someone to carry out latrine utilization behavior (Asnake & Adane, 2020; Budhathoki *et al*., 2017; Garn *et al*., 2017; Woyessa *et al*., 2022). However, the results of this study do not agree with previous studies, which stated that distance from a clean water source is one of the factors that influence latrine use behavior (Abebe *et al*., 2020; Woyessa *et al*., 2022). House-to-water source distance is not a valid and reliable indicator, possibly because all respondents in this study were recipients of healthy toilet assistance from the government. Every latrine built for families is equipped with sanitation system facilities. In addition, most respondents are near their homes to clean water sources, namely more than 500 m, so the possibility of them defecating in rivers or water sources is relatively small.

The results of this study follow several previous studies which stated that latrine maintenance conditions had a positive effect on latrine utilization behavior (Asnake & Adane, 2020; Budhathoki *et al*., 2017; Garn *et al*., 2017; Woyessa *et al*., 2022). The better the latrine maintenance, the more likely someone is to use the latrine 2.19 times (Woyessa *et al*., 2022). Apart from that, the availability of clean water facilities can also increase the behavior of using toilets (Abebe *et al*., 2020; Garn *et al*., 2017; Zewdie *et al*., 2021). Latrine maintenance, accessibility, privacy, type of facility, and access to better hygiene are often associated with better latrine utilization, whereas poor sanitary conditions are associated with lower use (Garn *et al*., 2017). The absence of infrastructure makes it difficult for someone to carry out certain behaviors, which causes a decrease in motivation to change. Assistance from the government in providing healthy latrine facilities for families, especially low-income families, is expected to increase community access to clean and healthy sanitation. Having healthy and clean latrine facilities can reduce OD behavior (United Nations Children's Fund and World Health Organization, 2023). However, the results of this study do not agree with a previous study, which stated that adequate facilities only sometimes correlate positively with latrine utilization behavior (Sinha *et al*., 2017).

Adequate infrastructure will increase self-awareness, self-efficacy, and self-control (Bandura, 2018). The research results show that most

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respondents have self-efficacy in the high category, which is possibly the reason why the latrine utilization behavior of most respondents is also in the good category (Table 1). This study's results follow a previous study that stated that self-efficacy has a positive relationship with hygiene behavior (Kpoeh, 2020). High self-efficacy will lead to increased cognitive, affective, motivational and selective processes so that a person can choose the correct behavior (Bandura, 2018). The results of this study emphasize the importance of strengthening one's self-efficacy to further increase self-confidence in using the available household toilets. Self-efficacy increases awareness of disease risks to improve disease prevention behavior (Yoo & Song, 2021).

The influence of reinforcing factors on household latrine utilization behavior

The study results showed that only perceived family support and health workers' support are valid and reliable indicators of reinforcing factors (Table 1). The study results also showed that reinforcing factors directly, positively and significantly influence the behavior of household latrine use. However, it does not significantly influence household toilet use behavior through self-efficacy (Table 4 and Figure 3). This study's results follow a previous study stating that family support is essential to behavior change. Family support will increase latrine utilization behavior (Asnake & Adane, 2020; Sclar *et al.*, 2022; Temesgen *et al.*, 2021; Woyessa *et al.*, 2022). Support from health workers is also the main predictor in shaping latrine use behavior. The higher the support from health workers, the better the community's toilet behavior (Tamene & Afework, 2021; Yulyani *et al.*, 2019).

However, the results of this study do not agree with previous studies that stated that support from community leaders is essential in changing behavior in using toilets (Tribbe *et al.*, 2021). The lack of influence of perceived community leaders is probably because most respondents had perceptions of support from community leaders in the low category (Table 1). Community leaders only facilitate the construction of latrines, which is assistance from the government. After that, there needed to be follow-up in the form of activities that motivated the community. People feel that the health workers around them play a more critical role in reminding, encouraging and directing them not to defecate in the open area.

Family is the primary support system for an individual life. In the health context, based on Denham's (2003) Family Health Model theory, health routines and health outcomes are determined mainly by interactions between individuals and their families (Kaakinen *et al.*, 2015). Optimal family support in the form of informational, assessment, emotional and instrumental support will determine an individual's health routine (Friedman *et al.*, 2003). Apart from that, support from other people, in this case, optimal health workers, can also increase knowledge and understanding about the disease, its management, and disease prevention procedures (Kaakinen *et al.*, 2015). The study results showed that most respondents positively perceived family support and health workers in the high category (Table 1). Support from the external environment is a source of a person's self-efficacy, which can be categorized as part of verbal or social persuasion. Increasing verbal or social persuasion can increase perceived self-efficacy to improve cognitive function, motivation to change, controlled emotions, and selecting appropriate actions to increase positive behavioral changes (Bandura, 2018).

The study showed self-efficacy influenced household latrine use behavior (Table 4 and Figure 3). The study results follow previous studies, which stated that the family environment can increase self-efficacy by increasing perceptions of risk and vulnerability and reducing perceived barriers to taking action, which ultimately increases good behavior in waste or feces disposal (Kpoeh, 2020; Sclar *et al.*, 2022). The limitation of the study is that several other variables, such as ethnic differences or policies/regulations regarding the prohibition of open defecation from the

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government, have not been studied, which may influence behavior. Future studies may compare open defecation behavior based on culture. Technically, the limitation of this study is that, because it was conducted directly door to door, some respondents could not meet according to schedule, so they had to reschedule for data collection.

CONCLUSION

The study concludes that three factors influence household latrine utilization behavior: predisposing, enabling and reinforcing, and self-efficacy as an intervening variable. Predisposing factors, namely education and reinforcing factors, namely family support and support from health workers, directly influenced the formation of household latrine utilization behavior without going through self-efficacy. Meanwhile, the enabling factors, namely the availability of clean water facilities and latrine maintenance conditions, indirectly influence the household's latrine utilization behavior through self-efficacy. However, self-efficacy significantly influenced changes in household latrine utilization behavior. Health interventions aimed at increasing toilet use behavior as part of ODF interventions should not only be carried out by providing latrines equipped with clean water infrastructure. However, health workers must also develop educational interventions tailored to the community's level of education, which not only facilitate knowledge but also motivate them to increase self-efficacy in using the household toilet to reduce open defecation behavior and prevent diseases related to open defecation.

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