

Meta Analysis: Relationship Of Education And Income With The Utilization Of Latrine

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DOI: 10.29322/IJSRP.11.05.2021.p11364

<http://dx.doi.org/10.29322/IJSRP.11.05.2021.p11364>

Abstract- It is estimated that 1.1 billion people or 17% of the world's population still defecate in open areas. Utilization of toilets by the community according to the results of Riskesdas 2018 only reached 76.2%, while 12.9% still defecated. Several studies have shown that education and income are related to the use of latrines by the community. The research examines studies that explain the relationship between education and income with the utilization of latrine. This study used a retrospective observational study, in the sense that the researcher made a recapitulation of facts without doing experimental manipulation. Effect size. Sources of data using secondary data obtained from previous studies online. Data collection procedures using Google Scholar and Garuda Portal which were involved in the last 5 years. Data were analyzed using Comprehensive Meta Analysis Version 3 (CMA 3). Of the 116 studies obtained according to the inclusion and exclusion criteria, there were 12 studies which could be continued into the CMA 3 analysis. Whereas for the education variable, 9 studies were used and the income variable was 7 studies. The results of data analysis showed that there was a relationship between education and latrine use with a p value <0.05, namely p <0.000 and a pooled odds ratio value of 4,848 (95% CI 3,290-7,146). The results of data analysis showed a relationship between income and latrine use with a p value <0.05, namely p <0.000 and a pooled odds ratio of 5.080 (95% CI 1.203-22.950). There is a relationship between education and income and the use of latrines through a meta-analysis study

Index Terms- Education, income, utilization of latrine.

I. INTRODUCTION

Sustainable Development Goals (SDGs) are a refinement of the Millennium Development Goals (MDGs). One of the goals of the SDGs is to ensure the availability and management of water and sustainable sanitation for all. The target of this goal is to achieve adequate and equitable access to sanitation and hygiene for all people and end open defecation (Kemenkes RI, 2018).

It is estimated that 1.1 billion people or 17% of the world's population still defecate in open areas, from this data, 81% of

the population has open defecation in 10 countries, namely India (58%), Indonesia (12%), China (4.5%), Ethiopia (4.4%), Pakistan (4.3%), Nigeria (3%), Sudan (1.5%), Nepal (1.3%), Brazil (1, 2%), Niger (1.25%) and Indonesia as the second most common countries found defecating in open areas. There are still around 12% of Indonesia's population who do not have a latrine, of the 2.4 billion people in the world who do not have a latrine, with a ratio of seven out of ten people in the world still defecating in the open, where most of them are in rivers (WHO, 2014).

Nationally, the percentage of latrine access in 2018 reached 75.16%, this value has increased compared to 2017 which was only 68.08% and 2016 with a value of 63.86%. Of the 34 provinces in Indonesia, the highest access to latrines in 2018 was achieved by the Special Region of Yogyakarta, namely 100% (Kemenkes RI, 2018). Utilization of toilets by the community according to the results of Riskesdas 2018 only reached 76.2%, while 12.9% still defecated. If viewed by district, the highest defecation behavior occurred in West Lombok Regency in NTB at 37.43%. Even the BABS case still occurs in the pilot project area, namely in Muaro Jambi Regency in Jambi Province at 30.65% and Sumedang Regency in West Java Province at 17.26% (Ministry of Health RI; Balitbangkes. 2018).

The World Bank Water Sanitation Program (WBWSP) argues that Indonesia is in second place in the world as a country with poor sanitation. According to data published by the United Nations (UN), 63 million Indonesians do not have toilets and still defecate in the river, sea, or on the ground (Diela, 2013).

There are several theories related to the use of latrines. Green (1998) explains that there are three factors related to community behavior in using latrines as a place to defecate, namely, facilitating factors (knowledge, attitudes, and individual characteristics), enabling factors (facilities, facilities and infrastructure), and supporting factors (attitudes and behavior of health workers or other groups) (Anggoro et al., 2015). while Taylor (2003) explains that the factors related to latrine use are demographic factors, health behavior varies based on demographic factors such as age, gender, education, value, personal control, social influence, personal goals, perceived symptoms, access to health care delivery system.

Based on the description above, the researcher is interested in mapping the results of research related to latrine use through

meta-analysis. Meta analysis is a technique used to summarize the findings of two or more studies with the aim of combining, reviewing and summarizing previous studies. In addition, by using meta-analysis various questions can be investigated based on data that has been found from the results of previous studies that have been published and one of the requirements needed in conducting meta-analysis is an assessment of the results of similar research (Sriawan & Utami, 2015).

II. RESEARCH METHOD

This type of research is a systematic literature review or a quantitative synthesis with a meta-analysis study design. Meta analysis is a statistical technique to combine the results of two or more similar studies in order to obtain a combination of quantitative data. Meta analysis is intended to re-analyze the results of statistically processed research based on primary data.

The quality of the meta-analysis largely depends on the quality of the studies or the combined literature. Through the PRISMA procedure, the research sample is published articles related to the relationship between education and income with latrine use, through the Google Scholar and Pubmed databases for the duration of 2015-2020. The inclusion criterion is a cross-sectional design research that has a p value and Prevalence Ratio (PR). Two variables (education and income) as independent variables and latrine utilization as the dependent variable.

The search was carried out by entering the following keywords: education, income, latrine use. Articles that have

titles and abstracts that are potentially relevant are reviewed in full (full text) at the next stage, while articles that are not relevant are excluded. Furthermore, articles selected based on a full text review were included in a systematic review and were further reviewed for clarity of factor definitions, data completeness, results and other matters as conditions for inclusion in the meta analysis.

Data were analyzed using Comprehensive Meta Analysis Version 3 software. Data analysis was performed to obtain the value of the pooled odds ratio (pOR), which is the combined odds ratio value from research journals using a fixed effect model and a random effect model. The heterogeneity test was carried out in order to determine the incorporation model in the meta-analysis. The I2 statistical test was conducted to assess the heterogeneity among a number of study effect sizes expressed in percentage terms. The final result of the meta-analysis is a forest plot with a pooled odds ratio and an effect size in each study. The funnel plot results were also analyzed for publication bias assessment of the final meta-analysis. The final value used as an answer to the research objectives is the value of the pooled odds ratio which shows the combined OR value of several studies. This shows how much the likelihood of the relationship between each of the variables studied.

III. FINDINGS

There are 12 studies that are included in the meta-analysis where in one research journal there are two independent variables studied, each 9 studies for the education variable, 7 studies for the income variable.

Table 1. Characteristics of Research on the Relationship between Education and Latrine Utilization

No	Author	Publication Year	Sample Amount	P Value	P-OR	CI 95%
1	Lestari	2015	92	0,508	1,333	0,569-3,124
2	Novitry F	2017	213	0,000	7,317	3,961-13,552
3	Oktasari W	2017	93	0,025	3,846	1,189-12,446
4	Annisa	2018	100	0,721	1,800	0,071-45,327
5	Hannani, A	2018	54	0,014	4,821	1,370-16,972
6	Ulina, Yulia Irma	2019	71	0,223	1,848	0,689-4,958
7	Widyastutik	2019	64	0,122	0,371	0,106-1,303
8	Putra, Gandha S	2019	62	0,001	33,000	3,950-275,222
9	Masnariva, Yeffi	2020	97	0,002	3,789	1,632-8,799

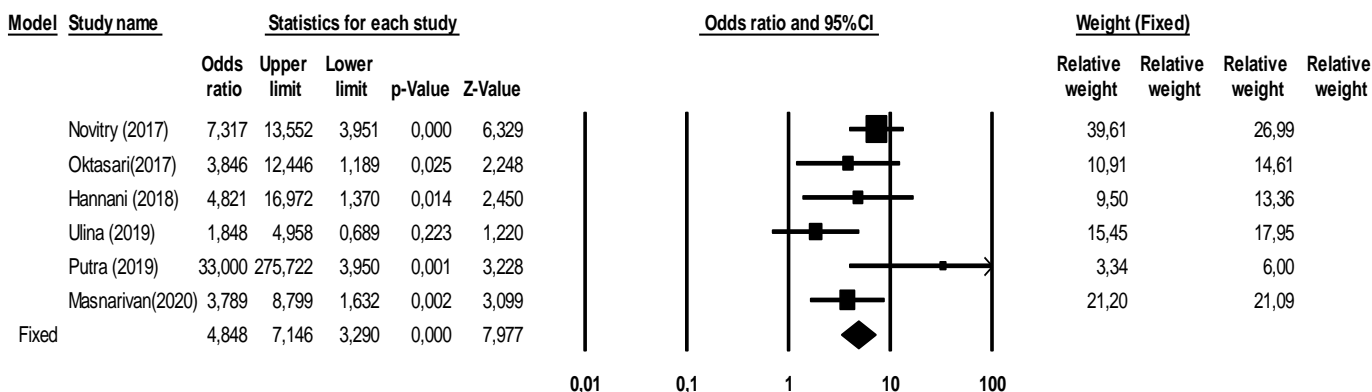
Table 2. Research Characteristics on the Relationship between Income and Latrine Use

No	Author	Publication Year	Sample Amount	P Value	OR	CI 95%
1	Lestari	2015	92	0,215	0,577	0,242-1,376
2	Fitri	2016	76	0,000	270,667	26,145-2802,036
3	Novitry	2017	213	0,001	2,683	1,500-4,797
4	Annisa	2018	100	0,000	8,533	2,937-24,790
5	Widyastutik	2019	64	0,022	3,667	1,203-11,174
6	Kirana	2019	177	0,477	3,211	0,129-79,885
7	Hayana	2020	74	0,005	6,491	1,734-24,291

Pendidikan

Table 3 Forest Plot Analysis of the Relationship between Education and Latrine Utilization

Meta Analysis



Total (95% CI) : 4.848 (3,290-7,146)

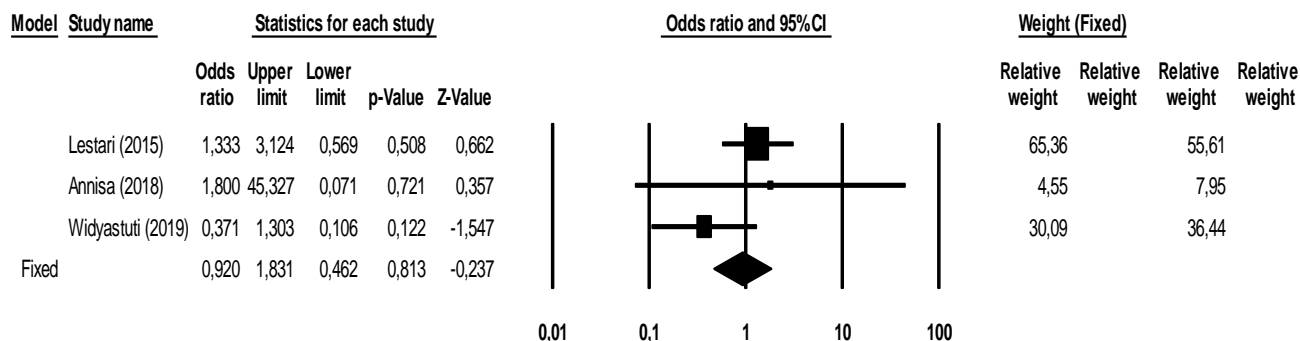
Heterogeneity : Tau² = 0,208, dfr = 5 (p = 0,109), I² = 44,4%

The results of the heterogeneity test showed that the variation in the study was moderate heterogeneous, with a p value = 0.109 and the variation value between studies (I²) of 44.4%. The results of data analysis displayed on the forest plot indicate that there is a relationship between education and latrine use with a p value <0.05, namely p <0.000 and a

pooled odds ratio value of 4,848 (95% CI 3,290-7,140), so it can be concluded that education is communities with low levels of education have an increased risk or tend to be 4,848 times less likely to use latrines compared to people with higher levels of education.

Table 4. Forest Plot Analysis There is no relationship between education and latrine utilization

Meta Analysis



Total (95% CI) : 0.920 (0,462-1,831)

Heterogeneity : Tau² = 0,232, df = 3 (p = 0,234), I² = 31,1%

The results of the heterogeneity test showed that the variation of the study was moderate heterogeneity, with a p value greater than 0.05 in the heterogeneity test, namely p = 0.234 and the variation value between studies (I²) of 31.1%. The results of data analysis displayed on the forest plot show that the results of the two studies show no relationship between education and latrine use, after a combined analysis,

the results show no relationship with p value > 0.05, namely p = 0.813 and the pooled odds ratio value. amounting to 0.920 (95% CI 0.462-1.831), so it can be concluded that education with a community with a low level of education increases the risk or tends to use the latrine 0.920 times compared to people with a high level of education.

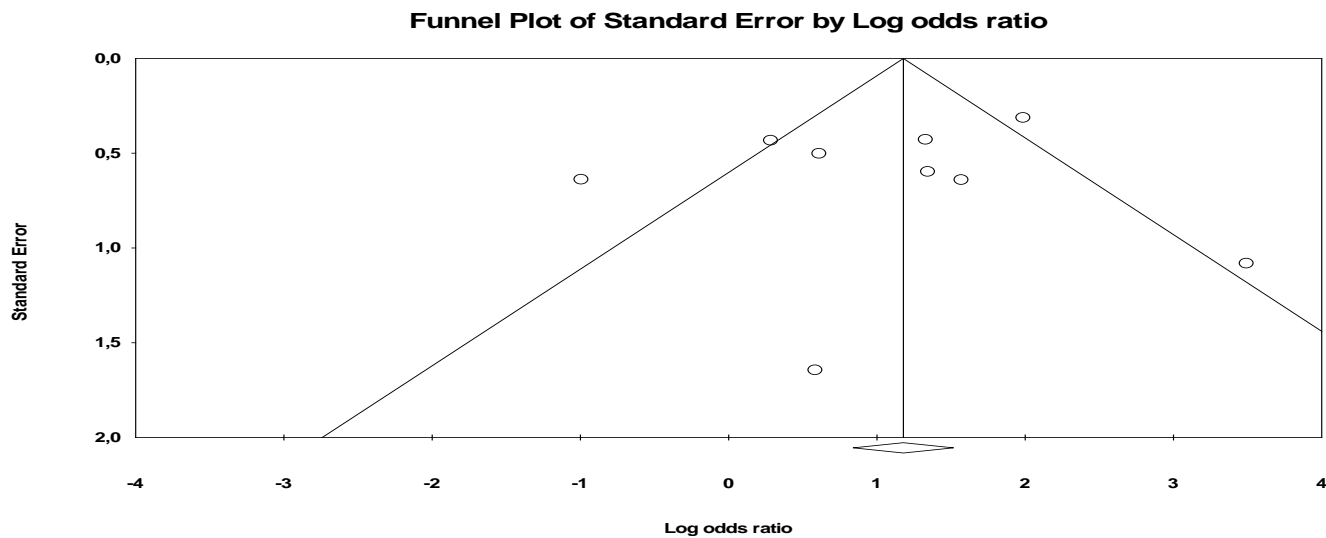


Figure 1. Funnel plot of the combined relationship between education and latrine utilization

the results of the funnel plot show that there is no publication bias indicated by the symmetrical plot on the right and left of the vertical line where the number of plots on the left is 4 and the right is 5 and there is no plot touching the vertical line. Plots that are above the curve indicate that the study has high

ES while studies with plots that are below the curve show that the study has low ES and plots that touch the vertical line indicate that the study biases the meta analysis.

Income

Table 5 Forest Plot Analysis of the Relationship between Income and Latrine Utilization

Meta Analysis

Model	Study name	Statistics for each study				Odds ratio and 95% CI		Weight (Fixed)				
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value	Relative weight	Relative weight	Relative weight	Relative weight		
	Fitri (2016)	270,667	26,145	2802,036	4,697	0,000			3,39	15,08		
	Nouvitry (2017)	2,683	1,500	4,797	3,327	0,001			54,80	22,84		
	Annisa (2018)	8,533	2,937	24,790	3,940	0,000			16,28	21,14		
	Widyastuti (2019)	0,273	0,089	0,831	-2,285	0,022			14,91	20,94		
	Hayana (2020)	6,491	1,734	24,291	2,778	0,005			10,63	20,01		
Fixed		2,958	1,924	4,549	4,941	0,000						

Total (95% CI) : 5.080 (1,124-22,950)
Heterogeneity : Tau² = 2,504, df = 4 (p = 0,000), I² = 89,243

The results of the heterogeneity test showed that the variation of the study was very high heterogeneous, with a value of p = 0.000 and a value of variation between studies (I²) of 89.243%.

The results of data analysis displayed on the forest plot indicate that there is a relationship between income and latrine use with p <

0.05, namely p < 0.035 and the pooled odds ratio value of 5.080 (95% CI 1.124-22.950), so it can be concluded that income, namely people with low income levels increases the risk or tends to be 5.080 times not using latrines compared to people who have a low income level. high income.

Table 6. Forest Plot Analysis of the Relationship between Income and Latrine Utilization

Meta Analysis

Model	Study name	Statistics for each study				Odds ratio and 95% CI	Weight (Fixed)			
		Odds ratio	Lower limit	Upper limit	Z-Value		p-Value	Relative weight	Relative weight	Relative weight
	Lestari (2015)	0,577	0,242	1,376	-1,240	0,215		93,18		92,30
	Kirana (2019)	3,211	0,129	79,885	0,711	0,477		6,82		7,70
Fixed		0,649	0,280	1,501	-1,011	0,312				

Total (95% CI) : 0.649 (0,280-1,501)
Heterogeneity : Tau² = 0,030, df = 1 (p = 0,312), I² =2,044%

The results of the heterogeneity test showed that the variation in the study was low heterogeneous, with a p value greater than 0.05 in the heterogeneity test, namely p = 0.312 and the variation value between studies (I²) of 2.044%.

The results of the data analysis displayed on the forest plot show that the results of the two studies show no relationship between income and latrine use, after a combined analysis, the

results show no relationship with p value > 0.05, namely p = 0.232 and the pooled odds ratio value. amounting to 0.649 (95% CI 0.280-1.501), so it can be concluded that income with low income level communities increases the risk or tends to use the latrine 0.649 times compared to people with high income levels.

Funnel Plot of Standard Error by Log odds ratio

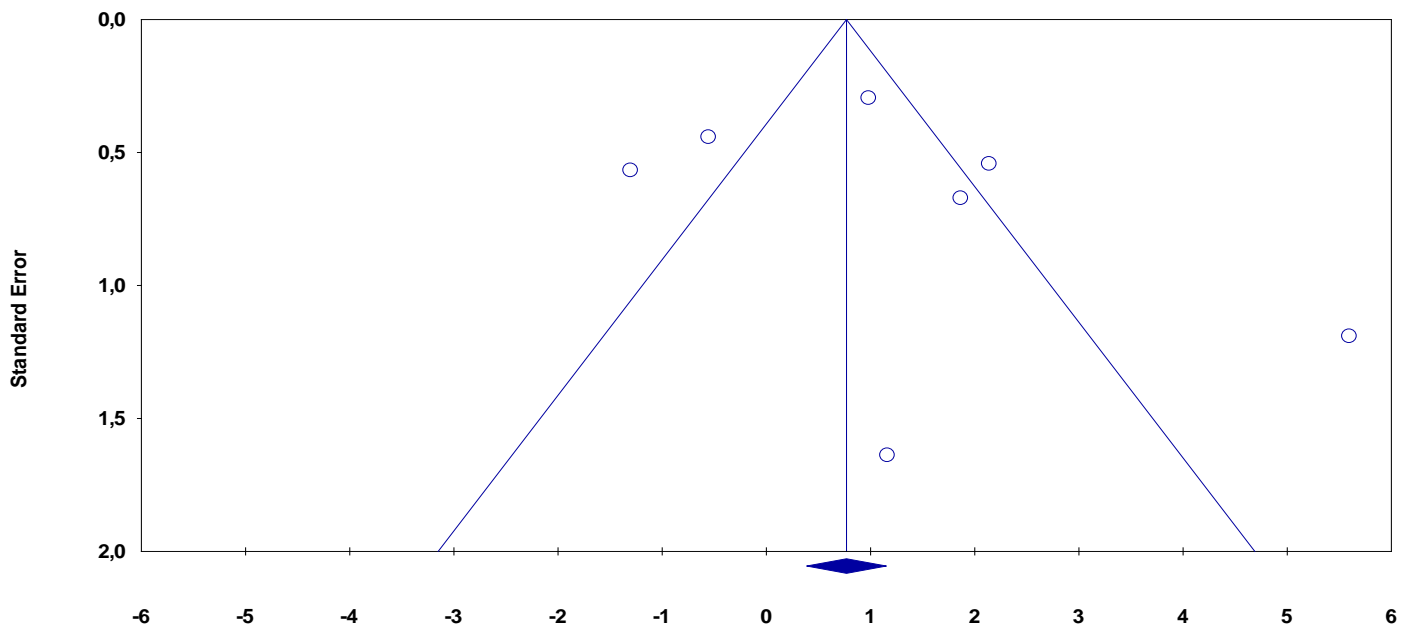


Figure 2. The combined funnel plot of the Income relationship with Latrine utilization

The results of the funnel plot show that there is a publication bias marked by the asymmetry of the plots on the right and left of the vertical line where the number of plots on the left is 2 and the right is 5 but there is no plot touching the vertical line. Plots that are above the curve indicate that the study has high ES while studies with plots that are below the curve show that the study has low ES and plots that touch the vertical line indicate that the study biases the meta analysis.

IV. DISCUSSION

Relationship between Education and Latrine Utilization

In six studies which stated that there was a relationship between education and the use of latrines, it was seen that the largest PR figure was owned by the research of Putra Gandha S (2019) with a value of 33,000, which means that respondents with low education have 33 times the chance of not using latrines, while the smallest PR value states that The relationship between education and the use of latrines is research by Ulina Yulia Irma (2019) with a score of 1,848 which means that low education has a 1.848 times greater opportunity compared to people with higher education to use latrines. After incorporating the meta-analysis test, research studies which stated that there was a relationship between education and latrine use, the results showed a value of $p < 0,000$ and a pooled odds ratio of 4,848 (95% CI 3,290-7,146), which indicates that there is a relationship between education and latrine use with the level of relationship is medium where people with low education have a 4,848 times greater chance of not using latrines than people with high education.

According to Hamzah (2012) the use of a latrine means the use or use of a latrine in the case of defecating by the community to obtain a healthy environment. Starting from how the community knows the definition of a latrine, the conditions for a healthy latrine, to how to maintain a latrine and the active participation of the community in using it. According to Tarigan (2008), the effort to use the latrine by the family will have a major impact on reducing disease, because every member of the family has defecated in the latrine. Several studies have shown that the use of latrines in some areas is still lacking, because there are still many people who defecate openly, such as in rivers or other places. And several studies show that this is due to the low level of public education.

Research conducted in rural areas such as Sukomulto Village, Gunung Pati District, Gempolklutuk Village, Bontonyeleng Village, Aek Kota Batu Village, the results of the research show that there are similarities in the characteristics of the community, namely people who live in villages with enlightenment eyes as farmers or fishermen who do not use latrines, where on average, people with low education, people with low education will have an impact on their income. The community prefers to fulfill their daily needs from limited abilities compared to having to build a latrine. People are accustomed to defecating in rivers or in the sea. The level of education determines the habits and patterns of life of the people.

Education is one of the important aspects in people's life which plays a very important role in improving the quality of life in pursuing optimal health development. In general, the higher the level of community education, the better the quality of its resources. People with higher education generally have broader insights so that they can more easily absorb and receive information. Thus, it is hoped that the information received by the community through education can answer health problems and actively participate in environmental health management. The higher the level of education of a person in general who also has a broad knowledge, the more productive it will be so that it will generate high income. The more people who have high incomes, the more prosperous they will be. So that the high level of community welfare will help the community to make good use of the latrine.

Novitry (2018) in his research explained that education will affect a person's awareness of using latrines. This is supported by the results of interviews because people with higher education who are knowledgeable will feel ashamed if they do not have a latrine and defecate in the open. People with low education consider open defecation to be a natural thing and have become a habit that has been passed down from generation to generation. This shows that the higher a person's education, the broader his knowledge and insight will be, so that the role of education greatly influences family behavior towards the use of latrines as a means of defecating. A person's education level is a predisposing factor for health behavior. The higher the level of education, the easier it is for a person to receive constructive new information (Pane, 2009). Siregar's research (2011) proves that education has a close relationship with family behavior towards using latrines. This research is also supported by research conducted by Masnarivan (2020) with a value of $p = 0.003$ OR = 3.789 (1.322-8.799), research by Safrudin (2018) with a value of $p = 0.001$, PR = 6.496, research by Hayana (2020) with a value of $p = 0.008$, the researcher explained that the level of education was related to the ability to receive health information from the mass media and health workers. The level of education can be related to the ability to absorb and receive health information and the ability to participate in health development. People who have a higher level of education generally have broad insights so that they are easier to absorb and receive information, and can take an active role in overcoming health problems for themselves and their families, including the use of latrines.

However, Annisa's research (2018) shows that educational outcomes are not related to latrine use with a value of $p = 0.721$. From the results of his research, although the majority of the community's education is low, they use latrines. Theoretically, low education will inhibit the development of a person's attitude so that it has an impact on health behavior. However, contrary to the reality on the ground, people who have low education mostly use latrines. This can occur because of the awareness of the community about the importance of latrines and the role of local health workers who have provided good counseling and motivated the community.

Education influences the use of latrines can be seen in the research of Oloruntoba et al (2019) with the title of research on the Status of Sanitation Facilities and Factors Affecting

Fecal Disposal Practices in Some Low-Income Communities in Ibadan Nigeria, in his research it shows that most of the people have a low level of education and lack of knowledge. regarding sanitation, this affects health behaviors such as open defecation.

Osumanu et al (2019) in their research Determinants of Open Defecation in the Municipality of Wa Ghana: Empirical Findings Highlighting Sociocultural and Economic Dynamics between Households. In his research, Osumanu et al (2019) explained that low education causes people's behavior to defecate in the open. Low education has an impact on low knowledge of knowledge.

Income Relationship with Latrine Utilization

In the five studies that stated that there was a relationship between income and latrine use, it was seen that the largest PR figure was owned by Fitri's research (2016) with a value of 227.667, which means that low-income respondents had 228 times the chance of not using latrines, while the smallest PR value indicated an income relationship. with the use of latrines is a research by Widyastutik (2019) with a value of 0.273 which means that low income has a 0.273 times greater opportunity compared to people with high incomes using latrines. After incorporating the meta-analysis test, the research study which stated that there was a relationship between education and latrine use, the results showed a value of $p < 0.000$ and a pooled odds ratio of 5.080 (95% CI 3,290-7,146), which indicates that there is a relationship between education and latrine use. the level of relationship is medium where people with low education have a 4,848 times greater chance of not using latrines than people with high education.

Research conducted by Hayana (2020) shows that the economic conditions of residents affect the use of latrines for latrine use, maintenance and maintenance. The high income allows family members to make good use of the latrine, such as building a latrine in accordance with the conditions for a healthy latrine. The requirements for healthy latrines are a closed latrine building, protected from heat and rain, insects and other animals. On the other hand, if the income is low, the community prefers to buy daily necessities rather than building a latrine. Income level is related to poverty which will affect the health status of the community. Other factors that influence include the type of work, formal education of the head of the family, the number of family members and others.

This can be seen more in Hayana's research (2020) which supports previous research, namely the research of Misna (2014) which concluded that there is a relationship between community income and latrine ownership with a value of $P = 0.020$ ($P < 0.05$) which was carried out in Amal Village, Sindue District. Donggala Regency in 2014, as well as research conducted by Aisyah (2016) with a value of $P = 0.001$ ($P < 0.05$) research conducted in Sukomulyo Village, Martapura District, East Oku Regency in 2016 and research conducted by Faisal et al. (2014) with a value of $P = 0.000$ ($P < 0.05$), a study conducted in the village of Sei Musam Kendit, Bahorok District, Langkat Regency in 2014, concluded that there was a relationship between community income and latrine ownership. The level of income is an income that

people receive in a period, the higher the income of the community can affect a person's health status in the community, for example in terms of toilet ownership (Faisal 2014).

The community's economic level is low and causes low family income so that people do not make healthy latrines. Income affects a person's desire and willingness to have something, a high income can have and get what he wants, but in this community life is still not enough for daily needs, especially for the purposes of building a latrine, which requires a lot of money to make it. the responses from respondents about what the researcher had asked, so this income greatly influenced a person's circumstances. This low level of income can affect latrine ownership so that open defecation is very risky for people who do not have latrines by contracting a disease.

Kirana's research (2019) states that due to low socio-economic levels, environmental sanitation that has not been paid attention to is still a major problem so that the emergence of various types of infectious diseases that cannot be avoided and will ultimately become a barrier to achieving social and economic progress. This condition generally occurs in rural communities and urban slum areas. Likewise, Novitry's statement (2017) in his research explains that income affects the use of latrines, this is because low income causes people to focus more on fulfilling their daily needs compared to having to provide latrines, this can also be seen in Hayana's research (2020) that there are still many people. local people do not have latrines due to the lack of economic income, which can cause people not to build latrines. Income affects a person's desire and willingness to have something, a high income can have and get what he wants, but in the life of this community, for daily needs it is still not enough, especially for the needs of toilet construction, which requires a lot of money to make it.

But the results of this study are not in accordance with the research conducted by Kirana (2019) where in a study conducted by Kampung Baru Village, Pekanbaru City, the results of this study indicate there is no relationship because in these areas people who have low or high incomes still do not use latrines because of the lack of public awareness about the use of jamabn and because of the community's habit of defecating water on the surface of the water without using a latrine. The habit of the community defecates in the river so that they don't need to build a latrine because it is more comfortable to defecate in the river.

Income is very influential on latrine use, which can be seen in a study by Oloruntoba et al (2019) with the title of the study of the Status of Sanitation Facilities and Factors Affecting Fecal Disposal Practices in Some Low-Income Communities in Ibadan Nigeria, showing that low-income communities do not have sanitation and fecal disposal facilities. that is feasible, this is because they do not have the ability to make a healthy latrine and make latrines whose disposal is directed to the river.

Osumanu et al (2019) in their research Determinants of Open Defecation in the Municipality of Wa Ghana: Empirical Findings Highlighting Sociocultural and Economic Dynamics between Households. In his research, Osumanu et al (2019) explained that income is related to defecation behavior. People

with low income cannot afford to have a latrine so they defecate openly, this is also supported by the socio-culture of the community.

V. CONCLUSION

1. There is a significant relationship between education and latrine use through the analysis of 6 eligible journals with a relationship between education and latrine use with a value of $p < 0.05$, namely $p < 0.000$ and a pooled odds ratio of 4,848 (95% CI 3,290-7,146), so it can be concluded that people with low levels of education are at risk of not using latrines 4,848 times compared to people with high education.
2. There is a significant relationship between income and latrine use through analysis of 5 eligible journals with a relationship between income and latrine use with a value of

$p < 0.05$, namely $p < 0.000$ and a pooled odds ratio of 5.080 (95% CI 1.124- 22,950), so it can be concluded that people with low and low income have a risk of 5.080 times not to use the latrine compared to people with high income. on the research, it was concluded that in socialization on disinfectant and plastic waste management, the media that are booklets or pocket books and leaflets were used. From the results based on the results of the pre and post test questionnaires that were filled in by the respondents, it can be seen that the media has an effect on increasing the respondents' knowledge. After there is an increase in knowledge by the respondents, it is hoped that this can affect the attitude of the respondents in managing disinfectant waste and plastic waste during the Covid-19 Pandemic.

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