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## The Effectiveness of Dokterkit Application-Based Coronary Heart Risk Monitoring and Education

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### ABSTRACT

**Background:** In 2019, primary diagnoses in coronary heart disease outpatients increased by 1.4% and secondary diagnoses by 6% of patients. **Aims:** To determine the effectiveness of Edmon (Education & Monitoring) based on the medical kit application on coronary heart disease risk control at Soewandhi Hospital Surabaya. **Method:** This study is a quantitative study with quasi-experimental non-equivalent group design. This study involved 30 people consisting of 2 groups (the treatment group that received CHD health education through a dokterkit application and through leaflets). This research was conducted at Soewandi Hospital in Surabaya in August-November 2022. Univariate data analysis techniques were performed on each variable from the research results, then an independent test was carried out to find out the differences between the two groups. **Results:** The results showed that android-based education and monitoring were effective because they contributed to a 26.7% reduction in the number of patients with severe CHD risk and a 40% increase in the number of patients with normal uric acid levels in the treatment group. **Conclusion:** Dokterkit-based education & monitoring is effective in controlling the risk of coronary heart disease and uric acid levels in Soewandhie Hospital Surabaya, but not effective in reducing cholesterol levels, systolic blood pressure, blood sugar levels and not effective in changing smoking behavior.

**Keyword:** Coronary Heart Disease, Doctorkit Application, Education, Effectiveness, Monitoring.

### INTRODUCTION

One of the global and national concerns is non-communicable diseases. This is because PTM has an increasing tendency to cause morbidity and mortality. According to information from the World Health Organization (WHO), non-communicable diseases are the main cause of death worldwide. By the age of 70, more than 40% of people die prematurely. Deaths caused by non-communicable diseases will increase from 38 million in 2012 to 52 million by the end of 2030 (World Health Organization, 2014). The socio-cultural epidemiological shift is a significant factor contributing to the rise of NCDs. The way people live and eat has drastically changed as a result of economic development. These modifications have an effect on rising obesity and diabetes rates, which eventually result in non-communicable diseases (Low, Lee and Samy, 2015). CHD events reported by the

CDC in 2010 were grouped by age, education, and gender, and were aged 18-44 years (1.2%). The incidence of CHD by level of education is known, and the incidence of CHD is lower in those with higher education (4.6%) compared to those with low education or no schooling (9.2%).

The increase in NCDs in Indonesia compared to infectious diseases is influenced by, among others, environmental imbalances, people's lifestyles, smoking habits, exercise, fast food consumption, stress, and sleep deprivation (Wartiningih, 2019). Non-communicable disease incidence is rising, and this burden is being felt by the government as well as the general public. This is a result of rising healthcare costs and the sophisticated technology needed for surgery to treat non-communicable diseases. As many as 10.801,787 persons, or 5.7% of NHS users, got care for catastrophic diseases. Services for disorders like heart disease account for

21.8% of the cost of health services, or roughly IDR 14.6 trillion, or IDR 7.4 trillion (P2ptm.kemendes, 2019).

All parties must be involved in ongoing efforts to prevent and control non-communicable diseases, and everyone must work together to reduce risk factors that are major contributors to morbidity. It is very challenging to teach individuals as equals from a young age in Indonesia, where economic status, academic level and social level all vary. As a result, a comprehensive education system that covers all levels of society from an early age is needed so that people can detect and adopt a healthy lifestyle, thereby reducing the risk of non-communicable diseases.

According to the 2013 Indonesian Research and Health Centers data it was 0.5%, while around 1.5% was found based on the diagnosis (Badan Penelitian dan Pengembangan Kesehatan RI, 2013). The nine non-communicable disease targets are included in WHO regulations as a global policy, one of which is cardiovascular disease control. These goals include drug technology and accessibility, preventive medicine, reducing diabetes and obesity rates, limiting alcohol consumption, reducing mortality, increasing physical activity, limiting smoking, and lowering blood pressure. Six international initiatives to combat non-communicable diseases are anticipated to help achieve the nine non-communicable disease targets by 2025. The six steps include prioritizing disease prevention and control, enhancing national capabilities, reducing risk category, powering health systems, implementing for high-quality health programmes, research, and keeping an eye on disease trends (World Health Organization, 2013).

According to the catastrophic data of the KCU Surabaya heart clinic, in 2019 there was an increase in primary diagnoses compared to 2018, an increase in primary diagnoses of 1.4% from 1,396 to 3,387, while secondary diagnoses were 6% from 52,543 to 55,896 CHD patients undergoing outpatient care. Meanwhile, CHD who were admitted to advanced hospitalization at the hospital in 2019 experienced a decrease of 19.46%, primary diagnoses 695 compared to 2018 of 863, while secondary diagnoses experienced an increase of 0.2% from 1,229 to 1,490 sufferers (BPJS Kesehatan, 2020).

However, during the Covid-19 pandemic, health services were disrupted. In addition, patient access to cardiac rehabilitation is decreasing. So that technology-based low- and middle-income countries for health system services are needed (Taylor, Dalal and McDonagh, 2022).

One of the technology-based health services is the dokterkit application. This application provides health education features. CHD health education is very significant to increase the knowledge and awareness of CHD patients so that they can take preventive measures independently and early on (Mohamad et al., 2018). In addition, the dokterkit application also functions to store the results of the dokterkit's examination of the patient and the prescriptions given. So that through this application one can find complete patient information and data.

Based on the explanation above regarding the high incidence of CHD, especially in Surabaya, the researchers made this problem the basis for research on the Effectiveness of Edmon (Education & Monitoring) medical-based applications on controlling the risk of coronary heart disease at Soewandhi Hospital, Surabaya.

## METHODS

This study is quantitative, employs an ex-ante control group study methodology, and utilizes a quasi-experimental design. This study aims to reveal the effectiveness of Edmon (Education & Monitoring) based on the kit-based application on coronary heart disease risk control at Soewandhi Hospital, Surabaya. The group selection used was the non-equivalent group design which consisted of the experimental and control groups. This is because the determination of the results of the hypothesis is based on the results of observations in the two groups. The determination of the experimental and control groups is not random because the experimental group has to understand how android works and while the control group wants to be directly educated through posters. These two groups will later be tested using the same instrument and analyze which treatment is more optimal; whether the experiment is better or the control.

In this study, CHD risk was determined using the Framingham risk

score for the control and experimental groups, which consisted of two groups, namely: the treatment group which received CHD health education through a dokterkit application and through leaflets. This research was from August 2022 to November 2022. The population for this study were patients at Soewandhie Hospital Surabaya in August-November 2022. The process of selecting a representative population used a simple random representative sample by means of probability types and levels of research significance  $\alpha = 0.05$ . The sample size of each group was 30 people, so that there was a total of 60 patients as research subjects.

In this study, the summary criteria for research subjects were patients aged 25-55 years old, having the ability to operate an android-based mobile phone, being able to fill out Google Forms questionnaires, having the ability to read and write well, at risk of CHD with presence or absence of a history of hypertension, at risk of CHD. with or without a history of diabetes, and with or without a history of smoking. While the exclusion criteria were patients in a state of impaired consciousness and CHD patients who were being treated for complications. After calculating the sample size, a sample of 30 patients was obtained based on the number of groups studied.

The data collected in this study were demographic data on age, gender, BMI (Body Mass Index), occupation) and manual CHD monitoring through the Framingham risk score. The initial data collection process was carried out in front of the heart polyclinic at Soewandhi Hospital, Surabaya. During this phase, participants have fresh capillary blood samples taken to check HDL, cholesterol, and blood pressure values. This initial data were grouped according to the distribution of participants in the treatment and control groups.

Participants in the control group, measured by the Framingham Risk Score, were placed in the mild, moderate or severe risk category, then were given CHD health education. Meanwhile, participants in the treatment group were taught how to use the dokterkit application to download, as well as an introduction to its functions. Participants were then asked to measure the risk of CHD independently, and also

had access to health education included in the functionality of the dokterkit application. Within two weeks, participants could do another examination.

After two weeks, the participants in the control and treatment groups were collected again and examined, as well as measuring blood pressure, then CHD risk was measured using the Framingham risk score. Researchers monitored the decrease or increase in the risk of CHD, uric acid, cholesterol values, systolic blood pressure, smoking behavior, and blood sugar levels.

Univariate data analysis techniques were carried out on each variable from the research results. Then the processed data were analyzed for statistical test values before and after treatment with the independent t test to determine the differences between the two unpaired groups, namely the control group and the treatment group.

This research has passed the ethical test at the Health Research Ethics Commission, Faculty of Medicine, Universitas Ciputra Surabaya with an ethical number no. 004/EC/KEPK-FKUC/VII/2022.

## RESULTS AND DISCUSSION

### Patient Characteristics

The following is the distribution of the characteristics of the respondents.

**Table 1.** Frequency Distribution of Patient Characteristics

Characteristic s	Control		Treatment t		Total l
	N	%	n	%	
<b>Gender</b>					
Men	2	13.3	4	26.7	6
Women	1	86.7	11	73.3	24
Total	3	100	15	100	30
<b>Age</b>					
30-35 old	0	0.0	1	6.7	1
36-40 old	1	6.7	0	0.0	1
41-45 old	4	26.7	1	6.7	5
46-50 old	4	26.7	6	40.0	10
>50 years old	6	40.0	7	46.7	13
Total	15	100	15	100	30

According to Table 1, the majority of CHD patients in both the control and treatment groups were women, with 13 patients (86.7%) in the control group and 11 patients (73.3%) in the latter. Table 1 above also shows that in terms of age, the distribution of patients in both groups was dominated by patients over 50 years of age. The similarity of the control and treatment groups is that they have coronary heart disease and go to a doctor at Soewandhie Hospital.

**Effectiveness of Edmon Dokterkit on Reducing CHD Risk**

CHD is the main cause of death in the world. The risk factors for this disease are lifestyle, environmental factors and genetic factors (Malakar et al., 2019). The following presents the distribution of CHD risk in each control and treatment group.

**Table 2.** CHD Risk Frequency Distribution.

CHD Risk	Control				Treatment			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Light	9	60.0	8	53.3	5	33.3	7	46.7
Mild	4	26.7	7	46.7	3	20.0	5	33.3
Severe	2	13.3	0	0.0	7	46.7	3	20.0
Total	15	100	15	100	15	100	15	100

Based on Table 2, it can be seen that in the control group, there was a decrease in the number of patients with mild and severe CHD risk categories. The risk of mild CHD decreased by 6.7%, while the reduction in the risk of severe CHD was shown by the percentage from 13.3% to zero percent or decreased by 13.3%. This shows that education using leaflets in the control group relatively contributes to reducing the risk of mild and severe CHD. In the treatment group there was a decrease in the number of patients at risk for severe CHD, by 26.7%. This shows that android-based education and monitoring in the treatment group contributes to a reduction in the number of patients at risk of severe CHD. Based on the results of previous studies, CHD patients who were provided with health education had better

knowledge or awareness and better medical care outcomes than CHD patients who were not provided with health education (Melamed et al., 2014).

Overall, CHD patients in both the control and treatment groups were dominated by female patients, namely 13 people (86.7%) in the control group, and 11 people (73.3%) in the treatment group. Based on previous research, women are more at risk of suffering from coronary heart disease (Ghani, Susilawati and Novriani, 2020).

Meanwhile, in terms of age, the distribution of patients in both groups was dominated by patients over 50 years old, namely six people (40%) in the control group, and seven people (46.7%) in the treatment group. This is in line with previous studies, that those over 45 years of age have a greater risk of suffering from coronary heart disease (Johanis, Hinga and Sir, 2020). Meanwhile, the next highest number were patients aged 41-45 years and 46-50 years.

**Table 3.** Results of CHD Risk Analysis (Pre-post Test) for Edmon Dokterkit in the Control and Treatment Groups.

	Mean ± SD of CHD Risk		P-value
	Pre-test	Post-test	
	Control	8.54 ± 7.06	8.75 ± 4.42
Treatment	15.48 ± 8.46	10.95 ± 7.97	0.042
<i>P-value</i>	0.021	0.358	

Based on the pre-post test it can be seen that in the control group the mean post-test value is greater when compared to the pre-test mean. The p-value generated in the control group was 0.442 which was greater than 0.05, meaning that there was no significant difference in CHD risk between the pre-test and post-test. This shows that education through leaflets is not effective in reducing CHD risk.

In the treatment group, the mean post-test was smaller than the mean pre-test. The p-value generated in the treatment group is 0.042, which is less than 0.05, meaning that there is a significant difference in CHD risk between the pre-test and post-test. This shows that android-based education and monitoring dokterkit effectively contributes to reducing the risk of CHD.

Based on previous research, health education through online health applications is more in demand by the public. In addition, health applications can complement existing health services (Kusumadewi et al., 2021).

In the independent test between the control and treatment groups, a p-value of 0.021 was obtained for the pre-test data and 0.358 for the post-test data. These results indicate that the risk of CHD from patients before the test is done

tends to be different, with a mean risk of 8.54 for the control group and 15.48 for the treatment group. Meanwhile, after the test was carried out, the risk of CHD between the control and treatment groups was not significantly different.

**Effectiveness of Dokterkit's Edmon on Reducing Uric Acid Levels**

The following below is the frequency distribution of uric acid levels in each control and treatment group.

**Table 4.** Frequency Distribution of Category of Uric Acid Levels.

Category of uric acid levels	Control				Treatment			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Normal	10	66.7	6	40.0	5	33.3	11	73.3
More than normal	5	33.3	9	60.0	10	66.7	4	26.7
Total	15	100	15	100	15	100	15	100

Based on Table 4, in the control group there was a decrease in the number of patients with normal uric acid category by 26.7% after the test was carried out. This shows that education using leaflets in the control group does not contribute to an increase in the number of patients with normal uric acid levels. Meanwhile in the treatment group there was an increase in the number of patients with normal uric acid levels, by 40%. This shows that android-based education and monitoring in the treatment group contributed to an increase in the number of patients with normal uric acid levels.

group the mean post-test was smaller when compared to the mean pre-test.

The p-value produced in the treatment group was 0.007, or less than 0.05, meaning that there was a significant difference in uric acid levels between the pre-test and post-test. This shows that android-based education and monitoring of dokterkit is effective in reducing uric acid levels in patients.

**Table 5.** Results of Analysis of Uric Acid Levels (Pre-post Test) on Edmon Dokterkit in the Control and Treatment Groups.

	Mean ± SD uric acid levels		P-value
	Pre-test	Post-test	
Control	5.,66 ± 1.77	6.61 ± 2.02	0.069
Treatment	7.28 ± 1.83	5.62 ± 1.58	0.007
<i>P-value</i>	0.010	0.144	

The results of this study are in line with previous research that health education has an effect on reducing uric acid levels (Wetik et al., 2022). However, this also needs to be supported by patient compliance in adopting a healthy lifestyle to reduce uric acid levels.

Based on Table 5, the p-value produced in the control group was 0.069 or greater than 0.05, meaning that there was no significant difference in the uric acid levels of the patients before and after the test was carried out. This shows that education through leaflets is not effective in reducing uric acid levels from patients. Meanwhile in the treatment

In the independent test between the control and treatment groups, a p-value of 0.010 was obtained for the pre-test data and 0.144 for the post-test data. These results indicate that the uric acid levels of the patients before the test tended to be different, with a mean of 5.66 mg/dl for the control group and 7.28 mg/dl for the treatment group. Meanwhile, after the test was carried out, the uric acid levels between the control and treatment groups did not differ significantly.

**Effectiveness of Edmon Dokterkit on Reducing Total Cholesterol Levels**

The following shows the frequency distribution of total cholesterol levels in the control and treatment groups.

**Table 6.** Frequency Distribution of Total Cholesterol Levels.

Total Cholesterol Levels	Control				Treatment			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
<189	2	13.3	0	0.0	7	46.7	6	40.0
190-227	5	33.3	8	53.3	2	13.3	6	40.0
228-265	4	26.7	5	33.3	5	33.3	2	13.3
266-303	3	20.0	2	13.3	1	6.7	1	6.7
≥304	1	6.7	0	0.0	0	0.0	0	0.0
Total	15	100	15	100	15	100	15	100

Cholesterol has important functions for the body, namely building and maintaining membranes, regulating membrane fluidity over physiological temperature ranges and intracellular transport, cell signaling and nerve conduction (Bare and Smeltzer, 2015). In Table 6, the majority of patients have cholesterol levels of more than 200 mg/dl. This cholesterol level can increase if the patient consumes foods high in cholesterol then causes hyperlipidemia so that the body cannot metabolize this cholesterol properly (Sharma and Gulati, 2013). Based on Table 6, in the control group the biggest change in the control group between the pre-test and post-test was in the increase in the number of patients with total cholesterol levels of 190-227 mg/dl, which increased by 20% after the test was carried out. Meanwhile, changes in the number of patients in the other classes of total cholesterol were only around 6.6% to 13.3%. This shows that education using leaflets in the control group is sufficient to contribute to an increase in the number of patients who have total cholesterol levels of 190-227mg/dl.

A similar situation also occurred in the treatment group, where the biggest change between the pre-test and post-test was in the increase in the number of patients with total cholesterol levels of 190-227 mg/dl, which increased by 26.7% after the test was carried out. This shows that android-based education and monitoring in the treatment group contributed to an increase in the number of patients who had total cholesterol levels of 190-227 mg/dl. In general, it can be said that android-based education is better at increasing the number of patients who have total cholesterol levels of 190-

227 mg/dl when compared to education through leaflets.

**Table 7.** Results of Analysis of Cholesterol Levels (Pre-post Test) on Edmon Dokterkit in the Control and Treatment Groups.

	Mean ± SD of Cholesterol Levels		P-value
	Pre-test	Post-test	
Control	238.00 ± 54.08	230.33 ± 25.95	0.512
Treatment	194.53 ± 57.19	203.87 ± 39.26	0.599
P-value	0.041	0.038	

Based on Table 7, the p-value produced in the control group was 0.512 or greater than 0.05, meaning that there was no significant difference in the total cholesterol levels of the patients before and after the test was carried out. This shows that education through leaflets is not effective in reducing the total cholesterol level of patients.

The p-value generated in the treatment group was 0.599. which was greater than 0.05, meaning that there was no significant difference in total cholesterol levels between pre-test and post-test. This shows that education and monitoring based on android dokterkit is not effective in reducing total cholesterol levels from patients.

The unpaired test between the control and treatment groups showed that the total cholesterol levels of the patients before the test tended to be different, with a mean of 238 mg/dl for the control group and 194.53 mg/dl for the treatment group. After the test was carried out, the total cholesterol levels between the control and treatment groups differed significantly, with an average of 230.33 mg/dl for the control group and 203.87 mg/dl for the treatment group.

**Effectiveness of Edmon Dokterkit on Reducing Systolic Blood Pressure**

**Table 8.** Frequency Distribution of Systolic Blood Pressure Categories.

Systolic Blood Pressure	Control				Treatment			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
<120	2	13.3	0	0.0	0	0.0	0	0.0
120-129	4	26.7	2	13.3	2	13.3	4	26.7
130-139	2	13.3	3	20.0	0	0.0	3	20.0
140-149	4	26.7	3	20.0	9	60.0	4	26.7
150-159	1	6.7	4	26.7	4	26.7	2	13.3
≥160	2	13.3	3	20.0	0	0.0	2	13.3
Total	15	100	15	100	15	100	15	100

Based on Table 8, in the control group there were more than 10% of patients who had systolic blood pressure ≥ 150 mmHg. Based on previous research, hypertension is a risk factor for several diseases such as stroke, chronic kidney disease, retinopathy and coronary heart disease (Falase, Stewart and Sliwa, 2012).

In addition, it can be seen that the biggest change in the control group between the pre-test and post-test was in the increase in the number of patients with systolic blood pressure of 150-159 mmHg, which increased by 20% after the test was carried out. The treatment group showed better results, where after medical education there was a decrease in the number of patients with systolic blood pressure of 140-149 mmHg and 150-159 mmHg, with a decrease of 33.3% and 13.4%, respectively. In general, it can be said that android-based education is better at reducing the number of patients who have abnormal systolic blood pressure when compared to education through leaflets.

**Table 9.** Results of Systolic Blood Pressure Analysis (Pre-post Test) for Edmon Dokterkit in the Control and Treatment Groups.

	Mean ± SD of Systolic Blood Pressure Analysis		P-value
	Pre-test	Post-test	
	Control	138.47 ± 26.61	
Treatment	149.13 ± 14.54	148.60 ± 25.46	0.936
<i>P-value</i>	0.184	0.424	

The p-value generated in the control group was 0.034, or less than 0.05, meaning that there was a significant difference in the systolic blood pressure of the patient before and after the test was carried out. This shows that the existence of education through leaflets actually has an impact on a significant increase in the systolic blood pressure of patients. In the treatment group it is known that, even though the mean post-test is smaller when compared to the mean pre-test, the resulting p-value is 0.936, or greater than 0.05, meaning that there is no significant difference in systolic blood pressure from patients before and after dokterkit education is carried out.

In the unpaired test between the control and treatment groups, a p-value of 0.184 was obtained for the pre-test data and 0.424 for the post-test data. These results indicated that the systolic blood pressure of the patients before the test tended to be the same, with a mean of 138.37 mmHg for the control group and 149.13 mmHg for the treatment group. Likewise, after the test was carried out, the systolic blood pressure between the control and treatment groups did not differ significantly, with an average of 156 mmHg for the control group and 148.6 mmHg for the treatment group.

**Effectiveness of Edmon Dokterkit on Smoking Behavior**

Smoking behavior is a habit that can cause health problems. Below is the distribution of the frequency of smoking behavior in the control and treatment groups.



**Table 10.** Frequency Distribution of Smoking Behavior.

Smoking Behavior	Control				Treatment			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
No	15	100.0	15	100.0	14	93.3	14	93.3
Yes	0	0.0	0	0.0	1	6.7	1	6.7
Total	15	100	15	100	15	100	15	100

Based on Table 10, it shows that in both the control and treatment groups the number of patients smoking between before the test and after the test did not change. While in the treatment group there were 14 people (93.3%) who did not smoke and one person (6.7%) who smoked. In general, this shows that the educational method, either by using leaflets or android-based education on dokterkit, does not contribute to changes in smoking behavior of patients. Based on previous research, smoking behavior will increase the risk of coronary heart disease in a person (Lehmann et al., 2014). In addition, previous research also stated that smoking behavior causes many adverse changes in the body so that quitting smoking can reduce the reduction in morbidity and mortality of coronary heart disease (Keto et al., 2016).

Based on Table 11, the control group could not be tested regarding the relationship between smoking behavior between the pre-test and post-test. This is because the patients tested were all non-smokers. The test results in the treatment group showed a p-value

greater than 0.05. This shows that there is no relationship between smoking behavior before and after the test is carried out. Below are the results of the analysis of smoking behavior on Edmon dokterkit.

**Table 11.** Results of the Analysis of Smoking Behavior on Edmon Dokterkit.

Smoking Behavior	P-Value Uji Exact Fisher
Control	-
Treatment	0.067

#### Effectiveness of Edmon Dokterkit on Reducing Blood Sugar Levels

High blood sugar levels accompanied by disturbances in the metabolism of carbohydrates, proteins and lipids in the body are symptoms of diabetes mellitus (P2PTM Kemenkes RI, 2016). Microvascular and macrovascular complications can occur in someone with diabetes accompanied by poor metabolism (Saldanha et al., 2013). Below is the frequency distribution of blood sugar levels.

**Table 12.** Frequency Distribution of Blood Sugar Level Categories.

Blood Sugar Level	Control				Treatment			
	Pre-test		Post-test		Pre-test		Post-test	
	n	%	n	%	n	%	n	%
Normal	13	86.7	14	93.3	13	86.7	15	100.0
More than Normal	2	13.3	1	6.7	2	13.3	0	0.0
Total	15	100	15	100	15	100	15	100

Based on Table 12, blood sugar levels above normal still occur in one to two respondents. Based on previous research, the main determinant of the possibility of the emergence of disease in patients with diabetes mellitus is coronary heart disease (Aronson and Edelman, 2015).

In the control group there was an increase in the number of patients with normal blood sugar levels after the test was carried out. This shows that education using leaflets in the control group has contributed to increasing the number of patients with normal blood sugar levels. Meanwhile in the treatment group there was an increase in the number of patients

with normal blood sugar levels. This shows that android-based education and monitoring in the treatment group contributed to an increase in the number of patients with normal blood sugar levels.

**Table 13.** Results of Analysis of Blood Sugar Levels (Pre-Post Test) for Edmon Dokterkit in the Control and Treatment Groups.

	Mean ± SD of Blood Sugar Levels		P-value
	Pre-test	Post-test	
Control	136.33 ± 95.45	133.07 ± 109.04	1.000
Treatment	141.27 ± 92.05	99.80 ± 28.66	0.065
<i>P-value</i>	0.683	0.305	

According to Table 13, the control group's p-value was higher than 0.05, indicating that there was no significant difference between the patients' blood sugar levels before and after the test. This demonstrates that patient blood sugar levels cannot be changed by education provided through leaflets. The treatment group's p-value was higher than 0.05 and there was no discernible variation in blood sugar levels between the pre- and post-test. This demonstrates that android dokterkit -based education and monitoring are ineffective for lowering blood sugar levels.

In the independent test between the control and treatment groups, a p-value of 0.683 was obtained for the pre-test data and 0.305 for the post-test data. These results indicate that the blood sugar levels of the patients before the test tended to be the same, with a mean of 136.33 mg/dl for the control group and 141.27 mg/dl for the treatment group. The same thing also happened in the comparison of post-test blood sugar levels, where there was no significant difference between blood sugar levels before and after the test was carried out, with a mean of 133.07 mg/dl for the control group and 99.80 mm/dl for the treatment group.

The concept of using applications in health promotion is to increase public access to health information and promote healthy living behaviors. The use of the application accelerates the achievement of educational and monitoring objectives quickly and on target thereby saving time,

effort and costs in health promotion efforts (Levac et al., 2023). On the other hand, patient decision-making in healthcare services is also influenced by the information that the patient previously had (Supriyanto et al., 2023).

Concept and the effectiveness of monitoring and education using the dokterkit application is to reduce the risk of coronary heart disease using the Framingham risk score assessment. Dokterkit provides health education features, patient barcodes, records, medical history and Swayanaka with the SOCS program. The purpose of this application is to create a community that has the same vision and mission, lives a healthy life with a positive impact on oneself, has identity data and previous health checks that are neatly arranged, provides nutrition guidelines and plays a role in providing nutrition education. The scope of the program is the data entry feature. This feature serves as a place to store the results of the doctor's examination of the patient and the prescriptions given by the doctor to the patient, to be entered into the patient's history. This feature serves to find out in full about patient information and data. The limitation of this application program is that this application uses a database, so that the program arrangement system requires a database storage engine or called storage media / Database Storage.

## CONCLUSION

Education and monitoring based on medical applications is effective in controlling the risk of coronary heart disease and uric acid levels in Soewandhi Hospital Surabaya, but not effective in reducing cholesterol levels, systolic blood pressure, blood sugar levels and not effective in changing smoking behavior.

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## Factors Influencing Birth in Adolescents in the Province of West Nusa Tenggara

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### ABSTRACT

**Background:** Adolescent childbirth is a global problem, especially in developing countries. Based on data from the 2017 Indonesian Demographic and Health Survey (SDKI), the ASFR 15-19 at the national level is 36 per 1000 women while the NTB Province is 42 per 1000 women, so it is still in a position above the national level. **Objective:** To know the factors that influence teenage births. **Methods:** This research is an analytical study using secondary data from the results of the 2017 Indonesian Demographic and Health Survey (IDHS) by using a cross-sectional approach. The population in this study was 1368 respondents. sampling technique using purposive sampling obtained as many as 806 respondents. Data analysis was using univariate, bivariate analysis with chi-square, and multivariate with logistic regression analysis. **Results:** Based on the results of bivariate analysis, it was found that there was a significant relationship between the factors of education (CI 95% 2.996-16.366), age of first sex (CI 95% 2.271-11.853), use of contraception (CI 95% 0.292-0.846), number of children born (CI 95% 0.378-0.880) to teenagers. Factors of employment status (CI 95% 0.667-1.482) and living area (CI 95% 0.635-1.406) did not have a significant relationship with teenage births, while the results of multivariate analysis showed that the R<sup>2</sup> value was 0.603 which means that education, age of first sex, use of contraceptives, and number of children contributed to teenage births of 60.3%, the remaining 39.7% is caused by other variables. **Conclusion:** Factors of education, age of first sex, use of contraceptives, and the number of children have a significant relationship with teenage births. It is hoped that the BKKBN of West Nusa Tenggara Province will evaluate the programs that have been established to determine the effectiveness of these programs in overcoming the problem of teenage births.

**Keywords:** Adolescence, Birth, Determinant Factors.

### INTRODUCTION

Childbirth in adolescents is still a major public health problem, especially in low- and middle-income countries. Approximately 1 out of 8 within 140 million births each year is experienced by adolescent girls in low- and middle-income countries with 95% (WHO, 2020a). Adolescent childbirth can have a negative impact on the health, social and economic sectors, both in the short and long term (Pinto e Silva and Surita, 2017; Maravilla, Betts and Alati, 2019). Childbirth in adolescents is a global problem of concern, especially in low- and middle-income countries. The

number of teenage births is around 16 million women aged 15-19 years and 2.5 million women under the age of 16 (WHO, 2020b). According to UNICEF, Indonesia ranks in the middle for countries with available data on marriage before the age of 18 in the East Asia and Pacific region, with Laos and the Solomon Islands ranking highest at 37% and 28.3%, respectively, and Mongolia and Vietnam ranked the lowest at 6.2% and 12.3%, respectively (UNICEF, 2014). However, due to its large population, Indonesia is one of the countries with high teenage births. This is due to the highest burden of child marriage in the region and a major

contribution to the overall burden of child brides globally (UNICEF, 2014; BPS, 2020).

Population problems such as high fertility rates are one of the problems faced by almost all developing countries, including Indonesia. High population growth has an impact on various aspects of life. Furthermore, population growth control is carried out through efforts by controlling birth rates, infant and child mortality rates. Birth (fertility) is the result of real reproduction (live birth) of a woman or a group of women (Heri and Cich, 2019).

Indonesian Demographic and Health Survey 2017, ASFR 15-19 at the national level indicated that there was 36 per 1000 women, while the Province with the highest ASFR was Central Kalimantan at 83 per 1000 women, then the lowest one was DI Yogyakarta at 15 per 1000 women and in West Nusa Tenggara Province at 42 per 1000 women consecutively, which means that West Nusa Tenggara Province is still in a position above the national level (BKKBN., 2018)

There are several factors that affect adolescent births such as age, age at first marriage, number of marriages, women's employment status, use of contraceptives, income/wealth, and education level (Mahendra, 2017) In addition to the factors, other research also reports that adolescent births are influenced by age, area of residence, wealth quintile, and level of education (Neal et al., 2012). Adolescent marital status is a determinant in childbearing. Adolescents who are not married are less likely to have children than those who are married (Eyasu, 2016).

This research is in line with research conducted by Zhang and Lu (2014) that shows the factors affecting the expectancy of childbirth including age, socioeconomic status, ethnicity, culture, family income, pregnancy planning, and knowledge about childbirth. Age at first sex, current age, and marital status are key factors associated with adolescent childbirth (Monari, Orwa and Agwanda, 2022). Adolescents who have sex for the first time in their late teens are less likely to give birth. These findings are in accordance with research by Kassa et al. (2019) who revealed that fertility is higher in adolescents who initiate sexual intercourse before their 18th birthday

compared to those who do not have sexual intercourse

Childbirth increases risks for both mother and baby, and can also have negative social and economic effects on children, families and communities (Korenčan et al., 2017). Childbirth in adolescents will have an impact on the mother both physically and psychologically. Physical effects include premature birth, chorioamnionitis, endometritis, severe preeclampsia, eclampsia, postpartum hemorrhage, fetal growth restriction, fetal distress, and even death (Socolov et al., 2017).

The impact of teen births is that children are more likely to be born prematurely, have a lower birth weight and higher neonatal mortality, while mothers experience greater rates of postnatal depression and are less likely to start breastfeeding, less likely to complete secondary school, more likely to live in poverty, and have children who often experience health and developmental problems (Wall-Wieler, Roos and Nickel, 2016). In addition, adolescent fertility also has an impact on the incidence of stunting. Fertility at adolescence has a 3.86 times chance of stunting (Larasati, Nindya and Arief, 2018). Adolescent fertility can also have an impact on breastfeeding practices, where mothers who experience adolescent fertility are less likely to exclusively breastfeed their babies (Cinar and Menekse, 2017).

Adolescent fertility is one of the health problems that must be overcome because adolescent fertility has many negative impacts both on the mother and the baby, so it is necessary to investigate what factors influence it. Based on this background, this study aims to analyze the factors that cause adolescent births.

## METHODS

This research is a quantitative study using secondary data from the results of 2017 Indonesian Demographic and Health Survey (IDHS) carried out by the Central Statistics Agency (BPS) in collaboration with the National Population and Family Planning Agency. Indonesian Demographic and Health Survey (IDHS) results provide nationally representative data which are conducted every five years in low and middle-income countries (LMICs) to monitor population health and

demographics. Further information is available on the Demographic and Health Surveys (DHS) program website.

(<http://dhsprogram.com/>).

The research design is analytic observational, where the research was conducted without interfering with research subjects (society), directed at explaining a situation or situation with a cross-sectional approach. The population in this study were 1368 respondents. The total sample is 806 respondents with a sampling technique using purposive sampling based on inclusion and exclusion criteria. The inclusion criteria were adolescents who gave birth at the age of 15-19 years and had complete data, while the exclusion criteria were respondents who gave birth aged > 19 years and did not have complete data. The independent variables in this study were education level, age at first sex, employment status, use of contraception, and area of residence, while the dependent variable was teenage births.

This study uses univariate analysis, bivariate analysis, and multivariate analysis. The frequency of the distribution procedure for each variable is explained by univariate analysis. Cross-tabulation is also applied to observe the relationship between variables based on the categories using chi square analysis.

Logistic regression analysis was employed to determine the effect of education, age at first sex, and use of contraception on teenage births. This research was conducted by utilizing secondary data from reports published on official platforms that are easily accessible by anyone; therefore, ethical permission is not required to conduct this research.

## RESULTS AND DISCUSSION

This research was carried out by analyzing secondary data obtained from the 2019 IDHS results in West Nusa Tenggara Province, consisting of 806 people. Data analysis used variables that were predicted as factors related to the incidence of teenage births such as education level, age at first sex, employment status, use of contraceptives, and area of residence. Complete data analysis can be described as follows:

### 1. Univariate Analysis

Univariate analysis was carried out for each research variable, namely the independent variables (education level, age at first sex, employment status, use of contraceptives, and area of residence) to the dependent variable (adolescent births).

**Table 1.** Frequency Distribution of Univariate Analysis.

Variables	Category	n	%
Education	No education	32	4
	Elementary (Elementary School)	282	35
	Intermediate (junior high school, high school)	388	48.1
	High (Diploma, Bachelor)	104	12.9
Age of first sex	<15 years	71	8.8
	15-19 years	384	47.6
	>19 years	351	43.5
Employment status	Employed	448	55.6
	Unemployed	358	44.4
Use of contraceptives	Use	700	86.8
	Do not use	106	1.2
Area of residence	Urban	405	50.2
	Rural	401	49.8
Teenage childbearing	Childbirth $\leq$ 19 years	310	38.5
	Childbirth > 19 years	496	65.1
Total		806	100

Table 1 shows that most of the respondents had the last education, namely secondary education, as many as 388 people (48.1%). Most of the respondents had sexual intercourse for the first time at the age of 15-19 years as many as 384 people (47.6%).

The majority of respondents work with as many as 448 people (55.6%). Respondents who used contraception were 700 people (86.8%) The majority of respondents work with as many as 448 people (55.6%). Respondents who used contraception were 700 people (86.8%) and most of the respondents lived in urban areas, namely 405 people (50.2%). The number of respondents who gave birth in their teens was 310 people (38.5%).

The factors that influence the birth of adolescents are area of residence, age of first sex, age of first birth, and poverty (Amongin et al., 2020). Poverty causes young girls to lose the power to make decisions about the next birth, as well as the lack of use of family planning (Aslam et al., 2017). In accordance with other studies, it is stated that age at first sex, current age, marital status, wealth index, employment status, marital status, infertility, miscarriage postpartum infectivity, parental income, religion, media exposure, number of dead children, cohabitation status and practice of sexual intercourse, contact with family planning officials, husband's opinion on family planning, and

contraceptive use are the main determinants of childbearing in adolescents (Neal, Chandra-Mouli and Chou, 2015; Raharjo et al., 2019; MonarOrwa and Agwanda, 2022;). Contraceptive use plays an important role in changes in fertility (Laelago, Habtu and Yohannes, 2014).

According to research conducted by Mathenge Mutwiri (2019), it shows that age, education level of women, marital status, and age at first marriage affect the number of children born to adolescents. Adolescent marital status is an important determinant in giving birth to adolescents. Unmarried adolescents are less likely to have children than those who are married. The results showed that the percentage of married youth who had children was 70.7%, while the percentage of unmarried youth who had children was 8.1% (Monari, Orwa and Agwanda, 2022).

The low quality of adolescent sexual and reproductive health services, inadequate infrastructure, incompetence of health workers, and low utilization of services among adolescents are the main challenges in adolescent births (FDRE-MOH, 2016).

2. Bivariate Analysis

Bivariate analysis is an analysis used to see the relationship between the variables age, education, age of first sex, employment status, use of contraception, and area of residence with teenage births.

**Table 2.** Frequency Distribution of Bivariate Analysis.

Variable	Teenage childbearing				Total	P Value	PR	CI 95%	
	Childbirth ≤ 19 years		Childbirth > 19 years						
	n	%	n	%					
<b>Education</b>									
No education	14	5.2	16	3.2	32	4	0.00	4.0	2.996-16.366
Elementary (Elementary School)	144	46.5	138	27.8	282	35			
Intermediate (junior high school, high school)	144	46.5	244	49.2	388	48.1			
High (Diploma, Bachelor)	6	1.9	98	19.8	104	12.9			
<b>Age of first sex</b>									
<15 years	64	20.6	7	1.4	71	8.8	0.00	5.1	2.271-11.853
15-19 years	239	77.1	143	29.2	384	47.6			
>19 years	7	2.3	344	69.4	351	43.5			
<b>Employment status</b>									

Employed	167	46.1	281	56.7	310	38.5	0.43	0.9	0.667-1.482
Unemployed	143	53.9	215	43.3	496	61.5			
Use of contraceptives									
Use	279	90	421	84.9	700	86.8	0.03	0.6	0.292-0.846
Do not use	31	10	75	15.1	106	13.2			
Area of residence									
Urban	162	53.3	243	49	405	50.2	0.36	0.9	0.635-1.406
Rural	148	47.7	253	51	401	49.8			

Respondents who gave birth  $\leq 19$  years were 144 people (46.5%) in the category of having primary and secondary education. The results of the bivariate analysis showed that there was a significant relationship between the education level of the respondents and the birth of adolescents with a p-value =  $<0.01$  ( $\alpha < 0.05$ ).

The level of education is a factor that affects the level of fertility, where the level of education is one of the drivers of the level of social welfare and it has an impact on high economic growth. Besides that the age of first marriage is the age when someone gets married (first marriage), women who marry at the age of young people have a longer time at risk of getting pregnant and the birth rate is also higher (Sinaga and Prihanto, 2017).

Education was identified as a strong determinant of adolescent births where women with primary or secondary education were less likely to become pregnant than those with no education. Recurrent pregnancies during adolescence are more common in women with lower education (Burke et al., 2018).

Studies from both developing and developed countries show that higher education can protect against early pregnancy or unwanted pregnancies (Yakubu and Salisu, 2018). Educated women are more likely to delay marriage, have smaller family sizes, and use contraceptives than uneducated women (Ndahindwa et al., 2014). The education level of the woman as well as the educational level of the husband/partner, marital status, age at first living together and age affect the birth of adolescents (Dana, 2018).

Respondents who had sexual intercourse for the first time at the age of 15-20 years experienced teenage births (age  $\leq 19$  years) as many as 239 people (77.1%). The results of the bivariate analysis showed that p-value =  $<0.01$  ( $\alpha = 0.05$ ) so that the age of first sex has a significant relationship with teenage births. Adolescents who have sex for the first time when they are  $> 18$  years old are 84% less likely to give birth in their teens compared to women who have their first sexual intercourse when they are under 18 years old. Premarital sexual behavior in adolescents can lead to early marriage. One of the reasons is the association with peers. The interactions that occur between young men and women cause attraction between the opposite sex. This attraction is part of the process of adolescent sexual development. One study explained that girls are more vulnerable than boys because girls in some cases perceive sex as a way of showing care, affection and love, with the possibility of marrying in the future. They see sex as a sign of commitment in a relationship (Musa Abdullahi, 2013). This is supported by research conducted by Oljira, Berhane and Worku, (2012) and Khahlenya, Akoya and Ndiguitha (2018) who stated that age at first sex was an important factor significantly associated with birth. So early sexual activity may be associated with the increasing adolescent births rate because early sexual activity can prolong the period of exposure to pregnancy risks over the reproductive span, thus leading to early childbirth.

Research conducted by Amongin et al. (2020) showed that age at first sex and age at first birth was associated with an increased likelihood of recurrent teenage births (PR 0.84, 95%



CI = 0.81-0.88 and 0.76, 95% CI = 0.74-0, 79). This is in line with other studies which say that age at first sex is significantly associated with teenage pregnancy (Wado, Sully and Mumah, 2019).

Respondents who gave birth at age  $\leq 19$  years were 143 people (53.9%) with the category of mothers who did not work. If seen from the p-value = 0.43 ( $\alpha = 0.05$ ) then there is no significant relationship between employment status and teenage birth. Work is one part of social factors that are dynamic. A certain social environment does not just give the same effect to everyone, but social habits will have an influence on health. Therefore work has an indirect influence on adolescents so that between working youth and non-working youth there is no difference in the influence to do young marriages. This is supported by research which states that the employment status of young women is not related to the incidence of young marriage (Yunita, 2014). This is different from the research conducted by Mahendra (2017) which states that the employment status of women has a significant relationship with teenage births. Other similar studies explain that education level, employment status, and marital status are the main predictors of teenage births (Chung, Kim and Lee, 2018).

Another study revealed that adolescent fertility is significantly influenced by several factors, namely the level of education of young women and their partners, employment status of young women, wealth status, and media exposure. The chance of adolescent fertility is 3.98 times higher for unemployed female adolescents than for working female adolescents. As a result, girls who are not working are more likely to give birth than those who are working (Nyarko, 2012).

In this study, the majority of respondents had used contraception as many as 279 people (90%) and experienced teenage births. It is different from previous studies which said that many teenage births occurred in respondents who did not use contraception. However, based on the results of statistical tests, it shows

that there is a significant relationship between the use of contraceptives and teenage births with a p-value = 0.03 ( $\alpha = 0.05$ ). Counseling about postpartum family planning helps adolescents determine which contraceptive method to use (Smith, 2014).

In addition, effective interventions to increase access to and use of contraception include policies requiring the provision of sexuality education and contraceptive services for adolescents, building community support for the provision of contraception for adolescents, providing sexuality education within and outside the school environment, and increasing access and use. Contraception by creating youth-friendly health services, integrating contraceptive services with other health services, and providing contraception through various outlets because the use of cell phones and social media are promising means of increasing contraceptive use among adolescents (Chandra-Mouli et al., 2014).

Most of the respondents gave birth at the age of  $> 19$  years as many as 359 people (72.4%) in respondents with several children  $> 2$  children while the number of respondents who gave birth  $\leq 19$  years was 155 people (50%). The statistical test shows that the p-value was 0.00 ( $\alpha = 0.05$ ) so there is a significant relationship between the number of children and the birth of adolescents.

Research conducted by Morell and Martín (2018) confirms that fertility is influenced by two factors, namely demographic factors including age, age at first marriage, length of marriage, parity or number of births experienced and the proportion of marriages, and non-demographic factors, namely education level, improvement in women's status, urbanization and industrialization.

## 3. Multivariate analysis

**Table 3.** Results of Multivariate Analysis.

Variable	Model 1 PR (CI 95%)	Model 2 PR (CI 95%)	Model 3 PR (CI 95%)
Education			
No education	5.3	1.7	5.2
Elementary School	(2.351-20.868)	(1.834-3.566)	(2.344-20.804)
Intermediate			
High			
Age of first sex			
<15 years	5.1		5.3
15-19 years	(2.279-11.680)		(2.334-12.051)
>19 years			
Use of contraceptives			
Use		1.7	1.9
Do not use		(1.089-2.731)	(1.085-03.482)
R <sup>2</sup>	0.592	0.139	0.597
N	806	806	806

Research conducted by Morell and Martin (2018) confirms that fertility is influenced by two factors, namely demographic factors including age, age at first marriage, length of marriage, parity or number of births experienced and the proportion of marriages, and non-demographic factors, namely education level, improvement in women's status, urbanization and industrialization.

Based on Table 3 it can be seen that the results of statistical analysis using logistic regression obtained three models. Model 1 was made to predict the relationship between the variables of education and age at first sex with teenage births. The R<sup>2</sup> value is 0.592, which means that the education level and age of the respondent's first sex contributed 59.2% to teenage births, while the remaining 40.8% was caused by variables other than age and education level.

Logistic regression analysis carried out in model 2 is an analysis that predicts the relationship between education and use of contraceptives with teenage births with an R<sup>2</sup> value of 0.139. This indicates that education and use of contraceptives contribute 13.9% to teenage births, and the remaining 86.1% is caused by other variables.

Logistic regression analysis performed on model 3 was used to analyze the relationship between education, age at first sex, use of contraception, and the number of children with teenage births to obtain

an R<sup>2</sup> value of 0.597. These results indicate that age, education, age at first sex, and use of contraceptives contribute to teenage births by 59.7%, while the remaining 40.3% is caused by other variables.

Early and unwanted pregnancy among adolescents is associated with several aspects, namely in the health, education, social and economic sectors. Early childbirth is risky for girls and research shows that early pregnancy is the second leading cause of death among girls in developing countries. Teenage pregnancy also disrupts girls' schooling, jeopardizing their future economic opportunities, including reducing labor market opportunities. The effects of teenage childbearing also impact the health of their babies with evidence of higher perinatal mortality and lower birth weight among babies born to mothers under the age of 20 (Ganchimeg et al., 2014).

A large number of adolescents are sexually active and this continues to increase from mid to late adolescence. Adolescents who are sexually active, both married and unmarried, need contraception. All adolescents in developing countries - especially those who are not married, face a number of obstacles in obtaining contraception and using it correctly and consistently. Effective interventions to increase access to and use of contraception are policies that require the provision of sexuality education and contraceptive services for adolescents; building

community support for the provision of contraception for adolescents, providing sexuality education inside and outside the school environment, and increasing access to and use of contraception by making health services youth-friendly, integrating contraception services with other health services, and providing contraception through various outlets (Chandra-Mouli et al., 2014).

Another study identified that the birth of adolescents is influenced by several factors, namely socio-cultural, environmental and economic factors (peer influence, coercive sexual relations, gender inequality, poverty, religion, early marriage, lack of parental guidance, lack of comprehensive sexuality education, lack of using contraception). Individual factors (excessive alcohol use, substance abuse, educational status, low self-esteem, and inability to resist sexual temptation, curiosity, and cell phone use). Factors related to health services include cost of contraceptives, inadequate and unskilled health workers, long waiting times and lack of privacy in clinics, misunderstandings about contraception, and unfriendly adolescent reproductive services (Yakubu and Salisu, 2018).

## CONCLUSION

The results showed that there was a significant relationship between, education, age at first sex, contraception, and the number of children born to teenagers ( $p < 0.01$ ). Meanwhile, the variables of employment status and area of residence did not have a significant relationship with teenage births ( $p > 0.05$ ). Based on logistic regression analysis, an R2 value of 0.608 was obtained, which means that age, education, age at first sex, use of contraception, and the number of children contributed 60.2% to teenage births, and the remaining 39.8% was caused by other variables.

From a policy perspective, the government needs to work with various non-governmental organizations to develop a sexual education program that will educate adolescents about responsible and healthy attitudes toward sexuality especially about necessity, delaying the age at first having sex, preventing youth

marriage, and increasing secondary school enrollment among adolescent girls is a recommended strategy for controlling adolescent fertility as a means of addressing factors associated with adolescent birth.

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## Pictorial Health Warning and Intention to Quit Smoking in Smokers in an Urban Campus Jakarta

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### ABSTRACT

**Background:** Research on eye-tracking among active smokers shows they avoid the health warnings on cigarette packages, which still occur even without prominent imaging information. **Aims:** To evaluate the reactions and perceptions to pictorial health warning (PHW) labels by measuring eye-tracking devices and knowing their relationship to smoking cessation intention. **Methods:** The study used a cross-sectional design with measurements of PHW on cigarette packs by eye-tracker tools of type Tobii-data collection. With a non-random sampling technique, 50 respondents were from civitas academics on Campus-A UHAMKA. Samples were selected based on inclusion criteria: men, active smokers, not colorblind, and who didn't intend to stop smoking three months before the study. **Results:** The number also shows that most respondents already have strong intentions. The majority of respondents (64%) want to improve their health. However, 20% of those surveyed have no reason to quit smoking. That might represent the respondent's low intention to quit smoking. A bivariate test showed no significant association between respondents' attitudes toward smoking cessation intention ( $p$ -value: 0.706) and subjective norms for smoking cessation intention ( $p$ -value: 0.706). The eye-tracking results found that the different gaze plots and heatmap results on cigarette packets showing smoking-related diseases were more directed to the PHW area of interest. However, on smoking behavior images, the gaze plot and heatmap showed scattered results for PHW and cigarette brands. **Conclusion:** Although it has not been proven significantly related to smoking cessation intention, PHW has been the respondents' focus. We need further research on the shape and size of PHW.

**Keywords:** Eye tracker study, Pictorial health warning (PHW), UHAMKA.

### INTRODUCTION

Tobacco kills more than five million people per year and is a project to kill 10 million by 2020, of which 70% of victims come from developing countries dominated by men, with 700 million, mainly in Asia. WHO estimates 1.1 billion world smokers aged 15 years and over, one-third of the world population. Indonesia ranks 5th in cigarette consumption worldwide after China, the United States, Japan, and Russia (Backinger *et al.*, 2011).

Cigarette packaging is an essential communication tool in advertising to create and strengthen brand image. It is a link between other cigarette advertising and the absorption of the addictive nicotine drug from a cigarette. The cigarette packaging design specifically uses striking colors, different font types, and carefully crafted material

and the cigarette packaging is designed to be very attractive, especially for young people.

The obligation to include health warnings in the form of pictorial warnings on cigarette packaging in Indonesia has been compulsory as of June 24, 2014, after granting a grace period for cigarette manufacturers for 18 months since PP No. 109 of 2012 concerning securing addictive substances containing tobacco products (President RI, 2012). However, there are still few studies on pictorial warning policies in Indonesia. One study in Jember showed that only a few smokers feared the pictorial warning (Sandra, 2016).

One way to prevent the cigarette industry from promoting dangerous products is by plain packaging, as stated in Article 11 of the Framework Convention on Tobacco Control (FCTC) document (World Health Organization, 2015). Plain packaging will require all cigarettes to be

sold in packages with standard packaging forms, colors, and opening methods. That way, all branding will be deleted, leaving only the brand name and variants in the type of letter and standard location, health warnings, and other related information, such as paid stamps and composition information.

Based on the AIDA model, advertising has to be designed to increase the attention, interest, desire, and interest of consumers, which are necessary for taking action to buy (Kotler et al., 2009). To influence smokers' behavior, such as the intent to quit smoking, pictorial health warnings (PHW) must comply to AIDA rules.

Eye-tracking is widely used to measure the target audience's attention in viewing media. This tool is also widely used to measure how effective pictorial packaging policy is on cigarette packaging. A previous study found that smokers and non-smokers have very different attention when looking at cigarette packs, whereas non-smokers will focus on smoking-related diseases. In contrast, smokers will focus on cigarette logos (Edison, Anisa and Fauzy, 2021). This study aims to evaluate the reactions and perceptions of adults to pictorial warning labels by measuring eye-tracking devices and knowing their relationship to smoking cessation.

## METHODS

We recruited 50 participants from Campus A University Muhammadiyah Prof Dr. HAMKA. The sample was selected based on the inclusion criteria: 1) male, 2) smoker, 3) can read, 4) not color blind, 5) does not have the intention to stop smoking three months before the study.

The color blindness test to detect red-green color deficiencies used several Ishihara plates. Each plate depicts a solid circle of colored dots that appear randomly in color and size. The test takes place using a computer screen before the eye tracer test.

However, some criteria, such as different physiological, neurological, and psychological conditions of the eye and a different ability to follow instructions, the use of glasses, contact lenses, or mascara, or having long eyelashes or drooping eyelids, are not used by us. Because it might interfere with the eye image, this is a limitation of this study.

After obtaining informed consent, we led them into the Center of Neuroscience laboratory equipped with eye-tracking stations using Tobii Pro X2-30 to assess visual attention. The monitor screen size is 27-inch color with a resolution level of 1280X720 pixels. Calibration was carried out at every change of participants to ensure the precision of the eye position on the object seen on the monitor screen. A laboratory assistant read all instructions aloud to participants, which were also displayed on the monitor.

Data visualizations such as heat maps and gaze plots can convey significant features of visual activity. Gaze plots indicate the location, sequence, and time spent looking at different parts of the PHW in cigarette packs. The areas of interest in cigarette packets are divided into image, brand, and message.

Participants then completed a self-report survey. For this study, we focused only on measuring their intention to quit smoking, the reason to quit smoking, smoking behavior, attitude, and subjective norms. The questions were adapted from the Global Youth Tobacco Survey (GYTS) instrument. Ethical permission for the research was obtained from the UHAMKA Research Ethics Committee with ethical approval number: 03/19.04/024.

## RESULTS AND DISCUSSION

**Table 1.** Descriptive Analysis of Smoking Behavior.

Item	n	%
<b>Intention to Quit Smoking</b>		
Low	18	36%
High	32	64%
<b>Reasons to Quit Smoking</b>		
Improved Health	32	64
Saving	4	8
My family	3	6
My friends	1	2
No reason	10	20
<b>Smoking Behavior</b>		
High	30	60%
Low	20	40%
<b>Attitude to Smoking</b>		
Negative	23	46%
Positive	27	54%
<b>Subjective Norm</b>		
Negative	26	52%
Positive	24	48%

Table 1 shows respondents' intention to quit smoking is relatively high. There were 32 (65%) respondents who had high levels of it. The number also indicates that most respondents already have a strong intention to quit smoking. The highest reason for quitting smoking is to improve their health (64%). Other reasons given by respondents were for saving (4%), family (6%), and friends (2%). However, ten respondents (20%) have no reason to quit smoking. That might represent the respondent with a low intention to quit smoking.

**Table 2.** Bivariate Analysis of Smoking Behavior.

Item	Intention to quit smoking		P-value
	Low n (%)	Strong n (%)	
<b>Smoking Behavior</b>			0.904
Daily smokers	11(36.7%)	19(63.3%)	
Non-daily smokers	7(35%)	13(65%)	
Total	18(36%)	32(64%)	
<b>Attitude</b>			0.706
Negative	7(30.4%)	16(69.6%)	
Positive	11(40.7%)	16(59.3%)	
Total	18(36%)	32(64%)	
<b>Subjective norms</b>			0.706
Negative	10 (38.5%)	16(61.5%)	
Positive	8 (33.3%)	16 (66.7%)	
Total	18(26.7%)	32(64%)	

The bivariate analysis (Table 2) showed there was no significant association between smoking rate factors and intention to quit smoking with a p-value of 0.904 (> 0.05). In other words, the respondent's smoking level is unrelated. Further results show a strong intention to quit smoking found in daily smokers respondents (19 respondents) compared to respondents with non-daily smokers (13 respondents). Bivariate test results showed no relationship between respondents' attitude factors to quit smoking with a p-value of 0.706 (> 0.05). In other words, the attitude toward smoking is unrelated to the intention to stop smoking. Further results show that the intention to quit smoking is the same as those with a positive or negative attitude (16 respondents).

Bivariate test results showed no relationship between subjective norms

factors with the desire to stop smoking, with a p-value of 0.706 (> 0.05). In other words, the subjective norm is not associated with stopping smoking. Further results show that the intention to quit smoking is the same among respondents with positive subjective norms or negative attitudes (16 respondents).

The majority of the respondent, 30 (60%), were categorized as daily smokers, and 40% as a non-daily smoker. Most respondents, 27 (54%), have positive smoking attitudes, and 26 (52%) have positive subjective norms.

The study's results using the eye tracker showed the following results below. There were four packs of cigarettes that we offered to the respondents. We chose two categories of pictures, two about diseases caused by smoking, one about cancer in the mouth, and one about cancer in the throat. The second category was about smoking behavior, firstly a picture of a father smoking while holding a child and secondly a picture of an adult man smoking.

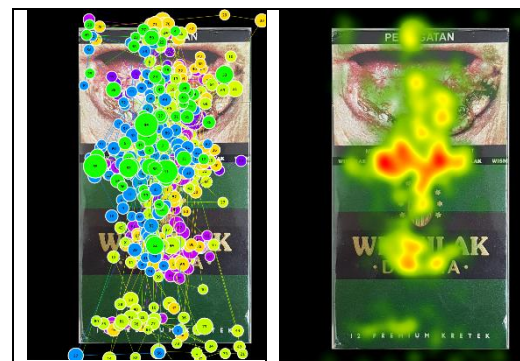


Figure 1. Gaze plot and heat map effect of smoking (disease 1)

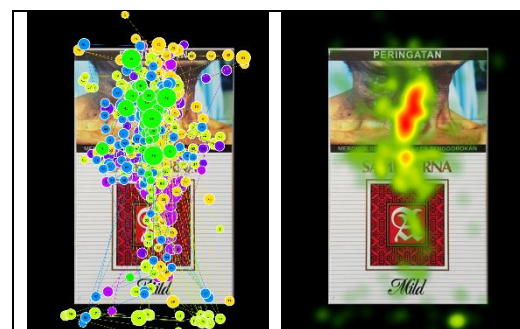


Figure 2. Gaze plot and heat map effect of smoking (disease 2)

Figure 1, a group of diseases caused by smoking, shows that the attention of the



human eye is more focused on the image area of interest than on the brand and message on the cigarette packet. However, the gaze plot results show that there is still much attention looking at the cigarette brand. Figure 2 shows almost the same effect, but in this image, the brand and message on the cigarette packet are even in their area of interest with little attention.

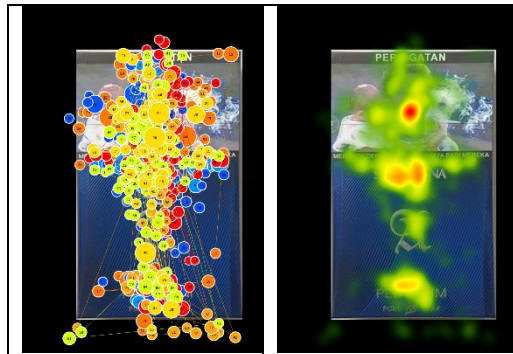


Figure 3. Gaze plot and heat map smoking in front of the baby.

Figure 3 shows almost the same results as Figure 1. Respondents' attention is more focused on the image area of interest compared to the brand and message. Figure 4 shows almost the same results as Figure 1. Respondents' attention is more focused on the area of interest of cigarette images and logos.

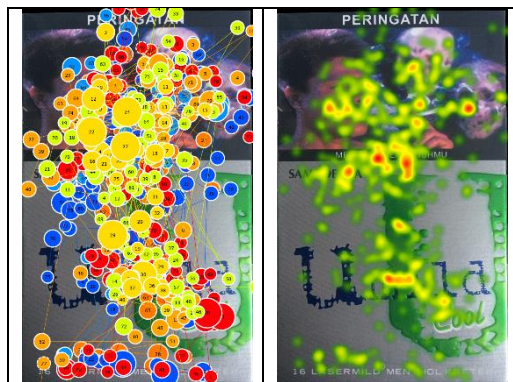


Figure 4. Gaze plot and heat map smoking.

The eye-tracking results in this study found that the different gaze plots and heat map results on cigarette packets showing smoking-related diseases were more directed to the PHW area of interest. However, on smoking behavior images, the gaze plot and heat map showed scattered results for PHW and cigarette brands.

Based on a previous study conducted by Baiquni et al. (2016), some aspects of the image influenced the overall

threat after seeing warning images on cigarette packaging. Therefore, clarity of content, the appearance of danger, and the appearance of severity due to smoking. What influences the emergence of threats and threat beliefs is the informant's experience, smoking status, cigarette price, and thoughts about the source of disease.

Warning with the highest threat from the study conducted by (Baiquni, Dewi and Widyatama, 2016) shows that the images considered the most frightening according to informants were pictures of oral and lung cancer. These images caused an uncomfortable feeling in most informants because they showed the vulnerability and severity of the effects of smoking. They were perceived as the highest hazard images showing the most severe results of tobacco. The lowest hazard warnings showed pictures that informants perceived to be the most ordinary (least scary) were images of people smoking with children nearby and images of people smoking with smoke forming a skull. Pictures of people smoking are considered the most ordinary because they are not disgusting. In addition, according to informants, cigarettes are not too dangerous for passive smokers because they are not always exposed to cigarette smoke.

The warning images of people smoking with smoke forming a skull and people smoking with children nearby were not strong enough to pose a threat, as most informants did not feel scared looking at the two images. This is because the two pictorial warnings do not show the body parts affected by the disease. These results align with what was conveyed by Russell et al. (2013), i.e., alerts that display pictures of limbs affected by the disease will be more effective in raising the threat.

Experience, images, and writing are stimuli that will influence the emergence of perceptions after seeing pictorial warnings. If experience, images, and writing provide a dangerous stimulant, individuals who see pictorial warnings will perceive that the sign indicates danger (Baiquni, Dewi and Widyatama, 2016).

Another case is when looking at the effectiveness of warning images on the intention to quit smoking among students. Although the influence can be produced by pictures of smoking-related diseases on cigarette packs, it turns out that the most significant source of the desire to quit smoking comes from within oneself in the

form of perceived behavioral control. Other exciting data state that when health warning images are shown to active smokers, almost half of the active smokers expressed no fear of the diseases that can arise from smoking (Edison, Anisa and Fauzy, 2021).

The study found that GWL (Graphic Warning Label) covering 30% of the front of a cigarette packet is better than no GWL. Increasing the size to 50% can increase visual attention to the label and its image. The study showed that a 50% GWL could promote quit intentions among adult smokers from socioeconomically disadvantaged groups but did not negatively impact risk beliefs or smoking-related intentions. The results imply that GWL may improve public health if it covers enough of the front of the cigarette packet (Skurka *et al.*, 2017).

(Pechey *et al.*, 2020) found that images of bowel cancer on alcohol bottles elicited the highest negative emotional arousal among health consequences. Labels with pictures of bowel cancer were rated as having the lowest desire to consume the product and were considered the least acceptable overall.

The study found that pictorial warnings on cigarette packets significantly impacted teenage smokers in the US. The warnings elicited adverse emotional reactions in adolescents and increased their concerns about their parents' smoking habits. The signs also encouraged conversations about smoking cessation and were perceived as effective by most teens (Brodar *et al.*, 2018).

The results showed that smoking is a common problem among US teenage smoking children. The study found a strong relationship between family SES and smoking practices or intentions, with more students from lower SES families trying to or intending to smoke shortly. In addition, it was found that more males than females had pro-smoking attitudes and perceived smoking as beneficial for social interaction, relaxing, and making them look more mature or masculine (Mao *et al.*, 2009).

A study by Romer Daniel *et al.* (2013) showed strong support for the Extended Decision Model (EDM) predictions about smoking cessation. The results suggest that the effectiveness of pictorial warnings in helping smokers quit depends on their smoking levels and their efficacy in finishing.

Alley *et al.* (2014) found video-tailored advice was more effective at gaining participants' visual attention than text-tailored advice in a web-based physical activity intervention. Presenting health advice in video form may be an effective strategy to increase participant engagement and exposure to web-based health interventions.

Experience supports that cigarettes are harmful and that clear pictures and text promote the perception that pictorial cigarette warnings are dangerous (Bond and Nolan, 2011). Witt and Riley state that perception is sensing information derived from stimuli received. Experience, images, and writing are stimuli that will affect the emergence of perceptions after seeing pictorial warnings. If experience, pictures, and writing provide a threat stimulant, individuals who know the warning show fear.

Threats for smokers and non-smokers when seeing warning pictures in cigarette packets appear in fear, disgust, pity, worry, and concern, by what is conveyed by Gore and Bracken that a threatening warning message will bring up anxiety in people who see or read it. Meanwhile, warning messages with no threat will not bring up anything in people who see or read them (Durkin *et al.*, 2013).

## CONCLUSION

In the heat maps of PHW, the fixation numbers on the images were typically high. Mostly the respondents were reading the PHW rather than the text. Although there is no significant association between attitude and subjective norm, eye-tracker analysis found that pictures and text should be deterrents for effective prevention. Although it has not been proven to be significantly related to the desire to stop smoking, PHW has been the respondents' focus. The pictures and text should be bigger and add threatening messages. Further research is needed on the shape and size of PHW.

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## Multilevel Intervention Program Goes to School Camba' Rokok for School Based Smoking Prevention

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### ABSTRACT

**Background:** The earlier age people start smoking will have the potential to become long-term smokers. One way that can be done to overcome this problem is through program intervention such as promotive preventive program that is focused on addressing the problem of smoking is urgently needed. In the City of Palopo in 2017 smokers of elementary school children reached 15.27%, people who broke the rules by smoking in schools reached 44.27% and 36.64% of students had been exposed to outdoor cigarette advertisements. **Purpose:** This study aims to assess the program goes to school camba' rokok in multilevel interventions at the student and school level to increase self-efficacy and skills in school-based smoking prevention. **Methods:** The population in this study was state junior high school and senior high school in Palopo city. This research is a quasi-experimental study, with a Solomon four group design. The samples in this study were 131 students who were randomly determined at SMAN 2 Palopo, SMAN 4 Palopo, SMPN 5 Palopo and SMPN 8 Palopo using simple cluster random sampling tests. Data analysis using STATA for statistical analysis using statistical tests with Wilcoxon, Mann-Whitney and Kruskal-Wallis at the significance level  $p$  value  $<0.05$ . **Results:** Posttest scores in the four groups, there was a significant difference in the effect of program interventions going to school camba' rokok on self-efficacy with a  $p$  value of 0.0001, skills with a  $p$  value of 0.0012. **Conclusion:** There is an increase in students' self-efficacy and skills through a multilevel intervention program going to school camba' rokok in Palopo City.

**Keywords:** multilevel interventions, Camba' rokok, self efficacy, skills, school based prevention

### INTRODUCTION

Smoking behavior is a serious problem in society and risks causing various kinds of diseases in humans. The negative impact caused by smoking behavior kills approximately 6 million people every year. More than 600,000 of the victims are passive smokers who are around smokers and inhale cigarette smoke indirectly (WHO, 2011). In the last 10 years, the proportion of smokers in Indonesia has increased in number and decreased the age increase. According to FCTC data (2015), Indonesia ranks the highest with the most smokers in ASEAN (Indonesia 62.3 million people, Philippines 17.3 million people, and Vietnam 15.3 million people). Still from FCTC data (2015) (FCTC, 2015), Indonesia is the country with the most youth smokers aged 13-15 years (Indonesia 41%, Malaysia 30.9%, Thailand 20.1%), and Indonesia is

the country with the most children exposed to smoking, Indonesia 78.1%, Vietnam 71, 2%, and Thailand 67.6%. GYTS 2014 data shows there are 20.3% of school-aged children have consumed cigarettes (GYTS, 2014).

The number of passive smokers in Indonesia is 96 million, consist of 54% women and 56% toddlers aged 0-4 years (FCTC, 2015). In fact, it was found that more than 30% of children in Indonesia had started smoking before the age of 10 years (GYTS, 2014). Likewise, the results of a survey conducted by KPA in 2012, showed that 99.6% of children had been exposed to cigarette advertising via television, 92 % exposed to cigarette advertisements outside the building, and 76.2% exposed to cigarette advertisements in newspapers or magazines (FCTC, 2015).

Based on the results of research conducted by Cahyo, it is known that the

starting age for smoking is 7-15 years. This shows that in general they have been exposed to smoking since elementary school. Students who start smoking at a younger age are more likely to become heavy smokers and smoke regularly than students who start smoking at an older age. This thing can make the risk of suffering from disease (Cahyo, Wigati and Shaluhiyah, 2012). According to the Ministry of Health (Ministry of Health, 2013), in South Sulawesi Province there are 22.8% of smokers every day and occasional smokers were 4.2%. Smokers aged 10-14 years who smoked every day were 0.5% and occasional smokers were 0.9%, while smokers aged 15-19 years who smoked every day were 11.2% and occasional smokers were 7.1%. According to Health Riskesdas data, (2018) the number of smoking behavior among teenagers has increased by 1.9%. Based on research conducted by Amanah 2017, it shows that there are male elementary school students in Palopo City who smoke or reach 15.27%, people who break the rules by smoking at school reach 44.27% and 36.64% of students have been exposed to outdoor cigarette advertising (Amanah and Prabandari).

According to Iva's research, it shows that knowledge and attitudes greatly influence the smoking behavior of junior high school students in Palopo City, so an intervention program is needed to overcome this problem (Mukrimah et al., 2017). Apart from that, in Palopo Town in 2017 elementary school children smokers reached 15.27%, people who broke the rules by smoking at school reached 44.27% and 36.64% of students had been exposed to outdoor cigarette advertising (Amanah and Prabandari, no date) Tobacco control programs use approaches that combine education, clinical, regulatory, economic and social strategies to achieve high levels of impact in society (NACCHO, 2015). Besides that, the results of Dobbins' research (Dobbins et al., 2008) show that school-based tobacco use prevention program interventions are effective in reducing smoking prevalence, reducing smoking initiation and smoking intentions, at least in the short term. The results of Crone's research (Crone et al., 2011) show that school prevention programs are effective in preventing smoking.

## METHODS

This research is a quasi-experimental research, with a Solomon four group design.

**Tabel 1.** Solomon four group design

Group	Pretest	Treatment	Posttest
Experiment Group A	O1	x	O2
Control Group B	O3	-	O4
Experiment Group C	-	x	O5
Experiment Group D	-	-	O6

(Campbell and Stanley, 1967; Creswell, 2016)

The sample in this research was 131 students at SMAN 2 Palopo as the control group, SMAN 4 Palopo as the experiment group, SMPN 5 Palopo as the control group and SMPN 8 Palopo as the experiment group at the Junior High School level. Data analysis used STATA for statistical analysis with Wilcoxon to test groups A and B, Mann-Whitney to test groups C and D and Kruskal-Wallis for posttest groups A, B, C, D.

### The Program of Goes to School Camba' Rokok

The program of Goes to School Camba' Rokok is a preventive promotional program to provide education and skills to students about the dangers and impacts of smoking on health as well as how to refuse to smoke when offered or invited to smoke. The word "camba" was adopted from the local term of Palopo children and teenagers in expressing hatred and friendly rejection. This program also provides recommendations for appropriate regulations for handling school-based smoking problems based on the results of assessments at each school.

#### a. Preventive methods for students:

In the implementation of Goes to School Camba' Rokok, it is divided into 5 sessions in 1 day and using several methods in conveying information including:

1. Session 1 (counseling with question and answer lectures), the facilitator delivers material about the dangers and impacts of smoking on health, giving students the opportunity to ask questions related to the material that has been presented.

2. Session 2 (video screening), the facilitator shows a video related to the impact of cigarette smoke on the human body.
  3. Session 3 (honest and dare quiz), the facilitator gives students the opportunity as volunteer and come forward, then the facilitator asks questions that must be answered honestly by the students concerned, such as: Have you ever smoked or not? and the reasons, how do they feel when someone smokes, and how to refuse the invitation to smoke, give an explanation of what should be done and then give directions or solutions. In this session too, students are voluntarily asked to do a role play on how to refuse offer/offer smoking according to what was taught in the previous session.
  4. Session 4, in the final session, students are invited to *camba'* (hate or reject) cigarettes and voice enthusiastically "*Kami Camba' Rokok*".
- b. Intervention methods for the school:
1. Carrying out an assessment of the regulatory conditions that have been implemented by the school
  2. Carry out assessments and observations of students and school residents
  3. Develop and formulate recommendations for effective school-based regulations
  4. Giving recommendation the results of the formulation to the school for implementation.
  5. Carrying out evaluations of the results that was implemented by the school

independently as a determining factor for other factors, including self-efficacy and skills. It focuses on people's ability to change and build environments that suit their own goals. Social cognitive theory emphasizes observational learning as an educational process. The intervention carried out by the school is through the Deputy Principal and Teacher by providing an analysis of the impact and urgency of early smoking prevention as well as providing recommendations for implementing the program of *Goes to School Camba' Rokok* independently in each of their schools in accordance with the distributed program modules. This is manifested by the school starting to prioritize the marketing of smoking prevention information in schools.

**Multilevel Intervention of the Goes to School Camba' Rokok Program to Increase Self-Efficacy for School-Based Smoking Prevention**

Comparison of the mean values of the self-efficacy variable and the complete statistical analysis results are presented in tables 2 and 3.

**Table 2.** Comparison of means and results of respondents' self-efficacy tests in pretest and posttest groups A and B

	Eksp. A (N = 31)		Kon. B (N = 24)	
	Mean	P	Mean	p
Pretest	24,29	0,000*	21,70	0,785
Posttest	31,93		22,62	

Description: \*) meaningful

Table 2 shows that the mean pretest score in control group B was 21.70 and in the posttest was 22.62. Based on the results of analysis using the Wilcoxon statistical test, the p value obtained was 0.785 which was greater than 0.05. This shows that there was no significant increase in self-efficacy, whereas in experiment group A, the posttest self-efficacy score after receiving the program increased with the difference in mean score between pretest and posttest, namely 37.64. The average posttest score was 31.93 and the pretest average was 24.29. Based on the results of the analysis using the Wilcoxon statistical test, the p value was 0.000 or smaller than 0.05. This shows that there is a statistically significant increase in student self-efficacy.

**RESULTS AND DISCUSSION**

According to Bandura (2005), social cognitive theory describes human behavior as an interaction between personal factors, behavioral factors and environmental factors which mutually influence each other and each operates

**Table 3.** Comparison of means and results of respondents' self-efficacy tests in group C and D posttests

	Group	N	Mean	p
Posttest	Exp. C	49	29,55	0,019*
	Kon. D	27	28,48	

Description: \*) meaningful

Table 3 shows that the research results in the group without a pretest, namely experiment group C and control group D, obtained a difference in the mean posttest self-efficacy score with a difference of 1.07. The mean self-efficacy score in experiment group C was 29.55, while in the control group D the mean self-efficacy score was 28.48. The results of the analysis using the Mann-Whitney statistical test showed that there was a statistically significant difference in self-efficacy between experiment group C and control group D with a p value of 0.019 which was smaller than 0.05. In the

research results, the two experiment groups showed that there were differences between the control and experiment groups, this shows that those who received the intervention had higher posttest scores than the group who did not receive the intervention and statistically this had a significant meaning.

In the research results, the posttest score increased in the experimental group with a pretest, while in the control group with a pretest, namely control group B, also experienced an increase in the posttest score. This shows that apart from the experimental group, giving a pretest to respondents can also influence the results of the posttest scores. Furthermore, the Kruskal-Wallis statistical test was carried out showing a comparison of the influence of the four research groups as in table 4.

**Table 4.** Comparison of differences in the influence of program provision on respondents' self-efficacy scores in the posttest of the four groups

	Exp. A (N = 31)		Kon. B (N = 24)		Exp. C (N = 49)		Kon. D (N = 27)		p
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Posttest	31,93	0,24	22,62	5,96	29,55	3,92	28,48	2,94	0.0001*

Description: \*) meaningful

Table 4 shows that experiment group A, which was given the program before the posttest, and experiment group C, which received the program before the posttest, obtained higher self-efficacy scores compared to the control group. The mean posttest score in experiment group A was 31.93, in control group B was 22.62, in experiment group C was 29.55 and in control group D was 28.48. Based on the results of the analysis of posttest self-efficacy scores using the Kruskal-Wallis statistical test, it was found that there were significant differences in the effect of providing the program on the four groups at all different levels with a p value of 0.001 less than 0.05. This research is in line with research conducted by Flay (2009), which states that school-based smoking prevention programs can reduce the incidence of smoking through self-efficacy. In line with research by Dobbins et al. (2008), which shows strong evidence that school-based tobacco use prevention program interventions are effective in reducing smoking prevalence, reducing smoking initiation and smoking

intentions, at least in the short term. Increasing self-efficacy is also an effort to prevent smoking in children (Lepore, Collins and Sosnowski, 2019), as well as the role of self-efficacy in changing behavior (Strecher et al., 1986). Other research also explains that if a person's self-efficacy is high they will refuse to smoke, while people who have low self-efficacy will be more interested in smoking (Haryati et al., 2016).

#### Multilevel Intervention of the Goes to School Camba' Rokok Program to Improve Skills for School-Based Smoking Prevention

Comparison of the mean values of the skill variables and the complete statistical analysis results are presented in Tables 5 and 6.

**Table 5.** Comparison of the means and skills test results of respondents in the pretest and posttest for groups A and B

	Eksp. A (N = 31)		Kon. B (N = 24)	
	Mean	P	Mean	p
Pretest	29,13	0,000*	29,75	0,383
Posttest	34,93		30,25	

Description: \*) meaningful

Table 5 shows that the mean score of pretest in control group B is 29.75 and the posttest score is 30.25. Based on the results of the analysis using the Wilcoxon statistical test, the p value obtained was 0.383 which was greater than 0.05. This means that there was no significant increase in skills, whereas in experimental group A the posttest skills score after being given the program increased with the difference in mean score between pretest and posttest, namely 5.8. The average posttest score is 34.93 and the pretest average is 29.13. Based on the results of the analysis using the Wilcoxon statistical test, it was found that the p value was 0.000, which was smaller than 0.05. This means that there is a statistically significant increase in students' skills in refusing cigarettes before receiving the program compared to students' skills in refusing cigarettes after receiving the program.

**Comparison of the mean and skills test results of respondents in posttest groups C and D**

The results of the skills test show that the research results in the group without a pretest, namely the experiment group C and the control group D, obtained a difference in the mean posttest skills score with a difference of 1.54. The mean skill score in the experiment group C was 34.28, while in the control group D the mean skill score was 32.74. The results of the analysis using the Mann-Whitney statistical test showed that there was no statistically significant difference in cigarette refusal skills between experiment group C and control group D with a p value of 0.060 greater than 0.05. The results of the research in the experimental group with a pretest showed a high posttest value for their refusal skills, whereas in the experimental group without a pretest, it showed a low posttest value for their cigarette refusal skills, this could also caused by their perception which affected their skills (Bektas et al., 2014).

**Table 6.** Comparison of differences in the influence of program provision on respondents' skill scores in the posttest of the four groups

	Eksp. A (N = 31)		Kon. B (N = 24)		Eksp. C (N = 49)		Kon. D (N = 27)		p
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Posttest	34,93	0,24	30,25	6,80	34,28	1,36	32,74	3,13	0.0012*

Description: \*) meaningful

An increase in posttest scores occurred in the experiment group, both with and without a pretest, while in the control group with a pretest, namely control group B, also experienced an increase in posttest scores. This shows that apart from the experiment group, giving a pretest to respondents can also influence the results of the research group's posttest scores. Furthermore, the Kruskal-Wallis statistical test was carried out showing a comparison of the influence of the four research groups as in table 6. This also applies to the program implemented which has an impact on skills (Brown et al. al., 2007).

Based on table 6, it is known that experiment group A which was given the program before the posttest and experimental group C who received the program before the posttest showed higher student refusal skill scores compared to the control group. The

average posttest score in experiment group A was 34.93, in control group B was 30.25, in experiment group C was 34.28 and control group D was 32.74. From the results of the analysis of posttest skills scores at all levels using the Kruskal-Wallis statistical test, it was found that there was a significant difference in the effect of providing the program on the four groups with a p value of 0.0012 less than 0.05, this is in line with the research of Brown et al. (2007) which states that learning can improve refusal skills not to smoke, as well as research conducted by Widiarti & Pratiwi (2013) which shows that training applied to students can increase the ability to refuse friends' invitations to smoke. Torre et al. (2005) which states that in general school-based smoking prevention program interventions are effective, as implemented in the program in this research, students who received the smoking program went to



school had higher self-efficacy and smoking refusal skills compared to students who did not receive the program (control). This was indicated by the result of interview with students and deputy principals who said that there were still teachers and male staff who still smoked in the office and school environment. This really influences students because they become examples for students at school. Apart from that, schools are still lacking in implementing written appeals in the form of information media about the prohibition of smoking and the dangers of smoking to health.

## CONCLUSION

Based on the result of this research conducted in Palopo Town, it can be concluded that there is an increase in student self-efficacy and skills through the multilevel intervention of Goes to School Camba' Rokok program for school-based smoking prevention in Palopo Town. The Goes to School Camba' Rokok program can be applied to the school setting. However, it still needs to be improved in the aspect of school regulation.

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## The Influence of Child Caregivers' Personal Hygiene and Family Smoking Behavior on Stunting

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### ABSTRACT

**Background:** Stunting is a problem that still occurs in Indonesia. It is a chronic nutritional problem associated with insufficient food intake so that nutritional needs are not fulfilled over a long period of time. Stunting also can be caused by indirect factors such as environmental and behavioral. **Objective:** the aim of this study was to analyze the correlation of child caregivers' personal hygiene implementation and family smoking behavior on the occurrence of stunting. **Methods:** This type of research is an analytic survey with a case control study approach. The number of respondents was 25 cases and 25 controls so that the total respondents were 50 respondents. **Results:** The results of the examination found that personal hygiene of caregivers and smoking habits in the families of stunted toddlers were mostly inadequate and there was a smoking habit in the families of stunted toddlers. There is a significant relationship between defecation behaviors and the incidence of stunting with a p value of 0.02 (<0.05). Based on multivariate analysis, it was found that unqualified defecation behaviors had a 63.3% probability of stunting. **Conclusion:** There is a significant correlation between defecation behaviours and the occurrence of stunting with a p-value of 0.02 (<0.05). According to multivariate analysis, respondents with defecation behaviors that did not meet the standards had a 4.03 times greater risk of having a child with stunting.

**Keywords:** caregivers, family smoking, personal hygiene, stunting

### INTRODUCTION

Stunting is a chronic nutritional condition caused by insufficient food intake, resulting in long-term nutritional demands not being met. This causes abnormal growth and disruptions in the process of brain development, resulting in diminished intelligence, and makes children under the age of five prone to sickness. Stunting is defined as a Z-score of less than -2 SD to -3 SD (short/stunted) and less than -3 SD (very short/severely stunted) based on the body length index for age (PB/U) or height for age (TB/U) based on anthropometric examination for measuring children's nutritional status (Rahmadhita, 2020; Yuniar et al., 2020).

According to global data, the United Nations Children's Fund (UNICEF) discovered that the global frequency of stunting has dropped from 33.1% to 22% between 2000 and 2020.<sup>3</sup> West and Central Africa, East Africa, and Africa are the three regions with the greatest rates of stunting. South and South Asia had

prevalence rates of roughly 32.5%, 32.3%, and 31.8%, respectively, whereas Southeast Asia has the world's fifth-highest incidence of stunting at 13.5% (UNICEF-WHO-World Bank: Joint Child Malnutrition Estimates - 2021 edition interactive dashboard - UNICEF DATA, n.d.).

According to the 2021 Indonesian Nutritional Status Survey (SSGI), the prevalence of stunting in Indonesia is around 24.4%, a 6.4% drop from 30.8% in 2018. Although the prevalence of stunting in Indonesia has decreased, the rate remains far below the government's aim ("Tahun 2022 Angka Prevalensi Stunting Harus Turun Setidaknya 3%" - Stunting, n.d.).

According to Minister of PPN/Head of Bappenas Decree Number Kep 42/M.PPN/HK/04/2020, Pekanbaru will become the focal point for integrated interventions to reduce stunting in 2021. According to Pekanbaru City Health Service data for 2019, there were 2,714 toddlers with poor nutritional status, or

17.67%, 587 undernourished toddlers, or 0.8%, and 469 underweight toddlers, or 0.6%. According to the results of the summary of nutritional status through e-PGMBM aged 0-59 months in 2019 at the Pekanbaru City Health Office, the percentage of stunted children, i.e. children with very short nutritional status, includes 10 centres, namely Rumbai Bukit Health Center 39.4%, Limapuluh Health Center 29.3 %, Rejosari Health Center 27.8%, Sidomulyo RI Health Center 27%, Muara Fajar Health Center 25.5%, Melur Health Center 22%, Payung Sekaki Health Center 18.1%, Sail Health Center 15.8%, Tenayan Raya Health Center 14.1%, Harapan Raya Health Center 13.5% of the 21 work areas of the Health Center in Pekanbaru city.

Stunting is caused not only by unbalanced food intake and infectious diseases, but also by indirect factors such as the amount of knowledge of the mother, parenting style, family income, lack of hygiene/sanitation, and clean and healthy living behavior (PHBS) (Apriani, 2018). The habit of defecating, the habit of washing hands with soap (hand wash), the management of drinking water and household food, the smoking habits of parents in the house, and the safeguarding of household waste and liquid waste are all PHBS attitudes related to the occurrence of stunting 1).

Personal hygiene is an important aspect of living a clean and healthy lifestyle. PHBS is essentially a health habit carried out by both individuals and families on the awareness that is effective for illness prevention. Clean and healthy living behavior in the household is beneficial so that family members can practice as well as understand how to maintain, maintain, and improve. If PHBS is not implemented in a family or individual, toddlers who live in these household situations are more likely to catch diseases caused by an unclean lifestyle, making toddlers more prone to experiencing poor nutritional status (Lynawati, 2020; Rahmawati, 2018). This is related to poor cleanliness, which promotes digestive system issues, resulting in less energy spent on growth and more energy spent on fighting infection. The role of PHBS patterns can influence the likelihood of stunting in toddlers (Fildzah et al., 2020).

Several research studies have

discovered an association between stunting and PHBS. According to research conducted in the Work Area of the Pucang Sawit Community Health Center in Surakarta City, there was an effect of implementing PHBS on the incidence of stunting, with a 51.4% higher risk in non-PHBS families compared to PHBS families. The influence of the practice of washing hands with soap, the availability of latrines, the use of clean water, and not smoking within the house on the prevalence of stunting is particularly influential in the implementation of PHBS (Apriani, 2018).

Furthermore, research conducted in the Matan Hilir Selatan sub-district, Ketapang Regency, West Kalimantan province revealed that mothers or carers with stunted children who do not practice PHBS have a 71.3% risk when compared to mothers or carers who practice PHBS well in the household setting ((Aprizah, 2021). Bacteria can arise as a result of poor personal hygiene habits. Bacteria will enter the child's body as a result of exposure to the mother or carer and will have an impact on the child's health, causing failure to thrive in children if not balanced with proper nutrition. Children that are malnourished have low body resistance to disease, making them susceptible to disease (Aisah et al., 2019). This will result in stunting in children.

According to an initial study of researchers at the Puskesmas' two working regions, namely the Limapuluh Health Center and the Rumbai Bukit Health Center, the people living in these areas are still lacking in implementing PHBS. People are less concerned about their health, both inside and outside the house. Aside from that, economic concerns influence the community's ability to meet the nutritional needs of each family, such that nutrition and environmental issues adapt the community to a life of hardship and limits. This is also related to the community's difficulty in implementing the PHBS pattern. Therefore, the topic of this study is the effect of applying personal hygiene for caregivers on stunting. Because of the high incidence of stunting in the Rumbai Bukit and Limapuluh health centers and the lack of public knowledge related to hygiene in the area. The purpose of this study was to find out child caregivers' personal hygiene

implementation and family smoking behavior on the occurrence of stunting.

## METHODS

The type of this research was an analytic survey with a case-control study approach. The research was conducted in two Community Health Center work areas that have the highest data on stunting cases in Pekanbaru City, namely the Rumbai Bukit Health Center Work Area and the Limapuluh Health Center Work Area. The research was conducted from October 2021 to December 2022. The research sample included 50 respondents, with 25 cases and 25 controls. The population in this study consisted of all carers who were dominant in caring for toddlers and were familiar with the conditions in families with stunted and non-stunted toddlers in the Rumbai Bukit Health Center work area and the Limapuluh Health Center work region. The stunting population was derived from Puskesmas e-PPGBM statistics. Subjects were determined using the consecutive sampling method, in which all attached subjects who met the selection criteria were included in the study until the required number of subjects was met.

This study has six independent variables, including nail cleanliness, hand wash, bath habit and change clothes, defecation behavior and smoking habit.

This study divided nail cleanliness, hand wash, bath habit and change clothes and defecation behavior into two categories: Not fulfilling the requirement and fulfilling the requirement. Smoking habit was categorized into smoking and no smoking. All of the variables were measured by questionnaire.

### Data Analysis

Univariate analysis was conducted to describe the risk factors using frequency and percentage. In bivariate analysis we used Chi square test with  $\alpha$  0.05, 95% CI and  $p < 0.05$  was determined as significant result. We also used the odds ratio to determine whether the independent variable was a risk factor or protective factor. The variables which had  $OR < 1$  was a protective factor,  $OR = 1$  was not risk factor, and  $OR > 1$  was a risk factor. Multivariate analysis used the multiple logistic regression test. The likelihood of stunting happening can be determined using the multiple logistic regression equation, which is as follows:

$$P = \frac{1}{1 + e^{-y}}$$

### Ethical Approval

This research has passed the ethical review by the Medical and Health Research Ethics Unit of the Faculty of Medicine, Riau University with number B / 080 / UNI19.5.1.1.8 / UEPKK / 2021.

## RESULTS AND DISCUSSION

**Table 1.** Description of Respondents

Variable	Stunting Occurrence			
	Stunting		Not Stunting	
	N	%	n	%
Toddlers' Age				
• 6-23 months	9	81.8	2	18.2
• 24-59 months	16	41	23	59
Gender				
• Male	14	51.9	13	48.1
• Female	11	47.8	12	52.2
Toddlers' Caregiver				
• The Mother	20	51.3	19	48.7
• Sister/Brother	1	50	1	50
• Grandmother	4	44.4	5	55.6

Based on Table 4.1, it is known that the majority of toddlers are between the ages of 24 and 59 months, both in the case group, which included 16 respondents (41%), and the control group, which included a total of 23 respondents (59%). It is also known that the majority

of toddlers are male, with 14 respondents in the case group (51.9%) and 13 respondents in the control group (48.1%). Furthermore, the caregivers for toddlers were mothers, with 20 respondents (51.3%) in cases and 19 respondents (48.7%) in the control group.

**Table 2.** Description of the Application of Personal Hygiene in Families with Stunted and Non-Stunted Toddlers

Personal hygiene	Stunting Occurrence			
	Stunting		Not Stunting	
	n	%	n	%
Nail cleanliness				
• Not fulfilling the requirement	16	61.5	10	38.5
• Fulfilling the requirement	9	37.5	15	62.5
HAND WASH				
• Not fulfilling the requirement	18	51.4	17	48.6
• Fulfilling the requirement	7	46.7	8	53.3
Bathe habit and change clothes				
• Not fulfilling the requirement	7	50	7	50
• Fulfilling the requirement	18	50	18	50
Defecation behavior				
• Fulfilling the requirement	19	63.3	11	36.7
• Not fulfilling the requirement	6	30	14	70
Smoking habit				
• There is smoking habit	18	54.5	15	45.5
• There is no smoking habit	7	41.2	10	58.5

Table 2 shows that the majority of caregivers' nail hygiene practices fall under the category of not meeting the standards with the number of case respondents, which is 16 respondents (61.5%); the majority of HAND WASH habits do not meet the standards with the number in the case group, which is up to 18 respondents (51.4%); habits for

bathing and changing clothes mostly met the standards with the number of case respondents, which is 18 respondents (50%); with a total of 19 case respondents (63.3%), defecation behaviours mostly did not meet the standards; and smoking habits in households with stunted toddlers mostly exhibited smoking habits with a total of 18 respondents (54.5%).

**Table 3.** The Effects of Personal Hygiene Implementation on Stunting Cases

Personal hygiene	Stunting Occurrence				OR	p-value
	Stunting		Not Stunting			
	n	%	n	%		
Nail cleanliness						
• Not fulfilling the requirement	16	61.5	10	38.5	2.66	0.08
• Fulfilling the requirement	9	37.5	15	62.5		
HAND WASH						
• Not fulfilling the requirement	18	51.4	17	48.6	1.21	0.75
• Fulfilling the requirement	7	46.7	8	53.3		
Bathing habit and change clothes						
• Not fulfilling the requirement	7	50	7	50	1	1
• Fulfilling the requirement	18	50	18	50		
Defecation behavior						
• Not fulfilling the requirement	19	63.3	11	36.7	4.03	0.02
• Fulfilling the requirement	6	30	14	70		
Smoking habit						
• There is smoking habit	18	54.5	15	45.5	1.71	0.37
• There is no smoking habit	7	41.2	10	58.5		

According to Table 3, there is no significant correlation between nail hygiene and stunting (p-value = 0.08). When we look at the odds ratio, we obtain an OR of 2.66, which is greater than one. This demonstrates that nail hygiene which does not satisfy the standards has a risk of stunting 2,667 times more than those who do meet the standards. The hand wash habit has no

significant correlation with the incidence of stunting (p-value = 0.75) with an odds ratio (OR) of 1.21 or (OR > 1), so the risk of hand wash habit that does not meet the standards and fulfils the standards is nearly the same. There is no significant correlation between the practice of bathing and changing clothing and the incidence of stunting (p-value = 1), with odds ratios (OR) of 1 or (OR = 1),

demonstrating that the habit of bathing and changing clothes is not associated to the occurrence of stunting. Furthermore, there is a significant correlation between defecation behaviors and the incidence of stunting (p-value = 0.021), with an odds ratio (OR) value of 4.03 or (OR> 1), indicating that defecation behaviors that do not meet the risk standards are 4.03

times more likely to be in the stunting group than those who met the standards. There is no significant correlation between smoking habits and the incidence of stunting (p-value = 0.37), with an odds ratio (OR) of 1.71 or (OR> 1), this indicates that smoking has a risk of 1.71 in the stunting group compared to those who have no habit of smoking.

**Table 4.** The Effect of Simultaneous Application of Personal Hygiene on Stunting

Variable	B	p-value	OR	95% CI
Defecation behavior	1.394	0.024	4.03	1.201-13.526
Constant	-0.847	0.082	0.429	

Table 4. According to Table 4, the data obtained are only defecation behaviors that do not meet the standards as the most dominating variable in stunting incidence. Multiple logistic regression analysis yielded the mathematical formula  $y = -0.847 + 1.394 * 1$  (defecation behaviors) with a value of  $Y = 0.547$ . According to the multiple logistic equation, we find the result below:

$$p = \frac{1}{1 + 2.72^{-0.547}}$$

$$p = 0.633 \text{ (63.3\%)}$$

According to the calculation results, if the respondent has a risk factor for defecation practices that do not fulfil the standards, there is a 63.3% possibility of stunting in children (probability value 0.633). Other variables account for the remaining 36.7%.

## Discussion

### 1.1 Description of Respondents with Stunted and Non-Stunted Toddlers

Toddlers are between the ages of 24 and 59 months in both the case group (16 respondents (41%)), and the control group (23 (59%)). According to a study done in the South Lore District, the work area of the Gintu Public Health Center, respondents in the 24-59 month range were 250 respondents (58.82) greater than respondents in the 0-23 month range, approximately 175 respondents (41.18%) (Ramadhan, 2020). This is because children have become active consumers at the age of 24-59 months, and they can choose their meals, such as random snacks, without regard for the type and cleanliness of food. This makes the child more prone to illness and causes the child's appetite to drop, putting the

youngster in danger of stunting (Pranowo, 2021).

The majority of the respondents in the study were male, with 14 respondents (51.9%) in the case group and 13 respondents (48.1%) in the control group. According to a study conducted in the working region of the Gondangrejob Health Center, the population of toddlers consisted of 60 boys (60%) and 40 girls (40%). This study is consistent with previous research. It was also discovered that there were more male respondents, namely around 60 respondents (50.8%), compared to female respondents, namely about 58 female toddlers (49.2%), in the employment area of Health Center X Ogan Ilir Regency. This is because male toddlers in their first 1,000 days of life are more sensitive to malnutrition than girls. Male body size is larger, requiring more nutritional intake, and if nutritional intake is insufficient for an extended period, it can increase growth and development disorders (Asmirin et al., 2021; Marfuah, 2022).

According to the findings of the study, the majority of toddler caregivers were mothers, with 20 respondents (51.3%) in the case group and 19 respondents (48.7%) in the control group. The majority of the 175 respondents (97.2%) are carers for toddlers (Masrul, 2019). The role of the family, particularly mothers, in child care can have an impact on children's growth and development. Maternal parenting refers to the actions of a mother in nurturing and caring for her child. The way a mother cares for her children determines how well she manages the nutritional status of the children in her family (Anindita, 2018).

## 1.2 The Implementation of Personal Hygiene in Families with Stunted and Non-Stunted Toddlers

According to the research, the caregivers, namely 16 respondents (61.5%), did not fulfil the standards with the number of case respondents. This research is consistent with that conducted in Kurma Village, Mapilli District, where it was discovered that the majority of respondents, especially in the case group of 48 respondents (81.4%), did not meet the standards in nail hygiene. Nail hygiene is one form of personal hygiene for a person, thus it is necessary to pay attention to nail hygiene, which is a breeding ground for bacteria that can adhere and create sickness, affecting toddler growth and development (Mia et al., 2021)

The majority of hand wash behaviours, namely 18 respondents (51.4%), did not fulfil the standards in the case group. This research is consistent with a study conducted in Kurma Village, Mapilli District, which discovered that the majority of carers in the case group in hand wash, with a total of 50 respondents (90.9%), did not match the standards (Mia et al., 2021). Using good soap will make children not susceptible to sickness (Permatasari et al., 2021). Hand wash practices that do not satisfy the standards will impact the mother's or caregiver's level of cleanliness when dealing with children and can make children susceptible to disease owing to transmission from unclean hands of mothers and utilised in directly caring for children. Mothers' or caregivers' failure to wash their hands can cause sickness in children, particularly in cases of stunting (Herawati et al., 2020).

The habit of bathing and changing clothing mainly met the standards, with 18 case respondents (50%) and 18 control respondents (50%) participating. This research is congruent, as research conducted in Palembang City discovered that respondents with good personal hygiene were 93 (93%) compared to respondents with poor personal hygiene, namely seven (7%). Personal hygiene is crucial for children's growth and development, as is the cleanliness of the body, food, and surroundings, all of which can help avoid the spread of diseases, particularly infectious ones that run the danger of depleting children's nutritional

reserves and leading to stunting. It is important to practice good hygiene following health regulations, which include taking two daily showers and washing one's hands, feet, and hair (Bella et al., 2020).

With 19 responders (63.3% of the cases), the majority of defecation behaviors did not meet the standards. This study is consistent with that carried out in Kurma Village, Mapilli District, where in a total of 55 case respondents the majority of them had poor latrines (90.2%) (Mia et al., 2021). In addition to serving as a place to dispose of waste, latrines can also contaminate the environment and spread disease. Because dirt will inadvertently mingle with the water, toilets near clean water sources can contaminate those supplies. Bacteria can infiltrate a child's body and prevent nutrients from being absorbed, leading to a variety of illnesses including diarrhea that has a negative impact on children's nutrition, specifically stunting (Zahrawani et al., 2022).

With a total of 18 respondents, smoking is a habit that the majority of families with toddlers who are stunted have (54.5%). This study is consistent with research done in Cibatok 2 Village, Bogor Regency. With a total of 36 respondents (76.6%), researchers discovered that the family with the stunting condition had a history of smoking. Social environment, family, and close friends can all have an impact on someone's smoking behavior. Because of the toxic compounds in cigarettes, smoking can cause some ailments. Children who are exposed to cigarettes are most susceptible to the effects (Maulana & Rompone, 2020; Wati & Ridlo, 2020).

## 1.3 The effect of applying personal hygiene to the stunting occurrences

Based on data analysis using the Chi-square test, it was discovered that there was no correlation between nail hygiene and the prevalence of stunting ( $p$ -value = 0.08); however, when looking at the odds ratio, the OR value was 2.66 or  $OR > 1$ . This shows that nail hygiene who does not meet the standards has a risk of 2.66 times in the stunting group compared to those who meet the standards. This research was strengthened by research conducted in Kampa Sub-District, Kampar Regency, that there was no correlation



between personal hygiene and the incidence of stunting with a p-value = 0.15 ( $p > 0.05$ ) (Yolahumaroh & Afrida, 2022). This study supports research from the Balangkaan sub-district of the Agam Regency, which found no correlation between personal hygiene and the prevalence of stunting (p-value = 0.408) (Amalia et al., 2022). There is no correlation between personal hygiene and stunting; this might be attributed to variables from the amount of information, habit factors and a person's reaction in carrying out personal hygiene practices (Yolahumaroh & Afrida, 2022).

Although there is no significant correlation between nail hygiene and the incidence of stunting, in this study the results showed that carers who did not complete the standards for nail hygiene had 2.66 times the chance of suffering stunting. It can be easier for germs to grow in the nails when they are filthy, which can lead to health issues. Health problems that often occur are worm infections and diarrhea (Jamilatun et al., 2020). Bacteria and germs will nest in the nails and enter the body when eating. These germs can cause health concerns and can cause complications in the digestive system (Nurdin, 2018). Children will experience growth and developmental disruptions as a result, increasing their risk of stunting.

According to the research, out of 50 respondents who did not meet the standards for the hand wash habit, there were 18 respondents (51.4%) who were stunted toddlers. Based on the Chi-square test, there is no significant link between the hand wash habit and the incidence of stunting (p-value = 0.758) with an odds ratio (OR) of 1.21 or (OR > 1). Similarly, there is no association between the hand wash habit and stunting since, in this study, there is a habit of defecating which has a higher influence on the prevalence of stunting. This research is reinforced by research conducted in the Work Area of the Kebunsari Health Center, Wonomulyo District, showing that there is no correlation between the habit of washing hands with soap and the incidence of stunting with a p-value = 0.73 (Permatasari et al., 2021). This research is in line with research conducted in the working area of the Harapan Baru Health Center, In Samarinda City, it was found that there was no correlation between

the hand wash habit and the incidence of stunting with a p-value = 0.116 ( $> 0.05$ ) (Herawati et al., 2020). This study differs from research done in the Gondangrejo Health Center's operating region, where it was discovered that handwashing with soap (hand wash) behavior and the prevalence of stunting in toddlers had a statistically significant correlation with a p-value of 0.041 ( $< 0.05$ ) (Marfuah, 2022).

The practice of hand wash that does not meet the standards will cause germs to be transferred from one person's hands to another, either through direct or indirect contact (Huliatunisa et al., 2020). Dirt and bacteria on hands can cause several diseases such as diarrhea, typhus, skin diseases, worm infections and malnutrition. The practice of hand wash that does not satisfy the standards will influence the quality of cleanliness of the mother or carer when interacting with children and can make the child susceptible to disease owing to transmission from unclean hands of the mother and utilised in taking care of the child directly. The lack of habit of washing hands by mothers or caretakers can cause sickness in children, especially in situations of stunting (Herawati et al., 2020). Hand wash that is carried out correctly will be effective in reducing the number of disease-causing microorganisms such as viruses, bacteria and other parasites that are on the hands (Kemensos RI, 2020).

As 51.4% of the case respondents in this study did not meet the hand wash standards, there is no correlation between hand wash practices and the prevalence of stunting. This figure is not too considerably different from the number of control responders, namely 48.6%. This is why there is no statistically significant link because the percentage of cases and controls is not too far away from the result in hand wash behaviors.

An odds ratio (OR) of 1 or (OR = 1) indicates that the habit of bathing and changing clothing is not associated with the incidence of stunting. There is no statistically significant correlation between the habit of bathing and changing clothes and the incidence of stunting (p-value = 1). This study is consistent with studies from the Balingka Sub-District in the Agam Regency, which found no correlation between personal hygiene and the prevalence of stunting (p-

value = 0.408) (Brown et al., 2013). Research from the Sub-District of Kampa, Kampar Regency, which found no correlation between personal hygiene and the prevalence of stunting, supports this study with  $p = 0.15$  ( $p > 0.05$ ) (Yolahumaroh & Afrida, 2022). There is no correlation between the habit of bathing and changing clothes to the incidence of stunting because a person's hygiene can be caused by the level of knowledge, culture and individual habits in carrying out good personal hygiene or not. Personal hygiene can be carried out utilizing skin care by bathing at least two times a day using clean water and soap, maintaining the cleanliness of the feet, hands and nails by cutting nails once a week and washing hands and feet using soap and cleaning clothes (Bella et al., 2020).

There is no correlation between bathing and changing clothes because the control group contains 50% of respondents who do not meet the standards for bathing and changing clothes, which is the same percentage as the case group, which contains 50% of respondents who do not meet the standards for bathing and changing clothes. In addition, this study found that most of the respondents had a habit of bathing and changing clothes that complied with the standards. This could be because one of the weather factors in the Limapuluh and Rumbai Bukit Health Centers' working areas was hot and humid enough that the respondents were better at bathing and changing clothes.

There is a significant correlation between the habit of defecating and the incidence of stunting ( $p$ -value = 0.021), with an odds ratio (OR) of 4.03 or ( $OR > 1$ ), indicating that defecation behaviors that do not meet the risk standards are 4.03 times more likely to be stunted than those who do. This study was bolstered by a study conducted at the Cicalengka Health Center, which discovered a significant correlation between the availability of healthy latrines and the incidence of stunting with a  $p$ -value = 0.004 ( $p < 0.05$ ). Other studies also obtained the same results, research conducted in Kurma Village found that there was a correlation between family latrines and stunting with a  $p$ -value = 0.029 ( $p < 0.05$ ) (Basyariyah et al., 2022; Mia et al., 2021).

Latrines that do not meet standards can cause infectious disorders such as helminthiasis and diarrhea owing to inadequate hygiene and sanitation and can interfere with the absorption of nutrients. Latrines that do not meet the standards will easily transmit faecal-oral infections from various media such as soil, water or vectors that carry feces. If the nutrient absorption process is disrupted it can cause growth disturbances in toddlers, which can lead to stunting.

There is no significant correlation between smoking habit and stunting ( $p$ -value=0.37), with an odds ratio (OR) of 1.71 or ( $OR > 1$ ). This shows that there are 1.71 risky smoking habits in the stunting group compared to those who do not have smoking habits. This research is in line with research conducted in Cibatok 2 Village, Kab. Bogor found that there was no correlation between family smoking habits and the incidence of stunting, with a  $p$ -value = 0.07 ( $p > 0.05$ ) (Maulana & Rompone, 2020). Another similar study, namely research conducted in the City of Yogyakarta, found that there was no correlation between family smoking habits and the incidence of stunting, with a  $p$  value = 0.601 ( $p > 0.05$ ) (Amalia et al., 2022). This research is not in line with research conducted in the work area of the Kintamani Health Center which states that there is an influence on the correlation between parental smoking behaviour and the occurrence of stunting with a  $p$ -value = 0.011 ( $< 0.05$ ) (Ayu et al., 2020).

Smoking behavior can influence the occurrence of stunting in children; this causes growth disorders in children as a result of children's exposure to harmful chemicals found in cigarettes (Ayu et al., 2020). Children are the ones who are most vulnerable to smoking exposure. The consequences can include preterm delivery, pneumonia, asthma, stunting, and, in the most severe cases, death in children (Maulana & Rompone, 2020)

There is no significant correlation between family smoking behaviour and the incidence of stunting because the percentage of case respondents who have a family smoking habit is 54.5%. These results are not far off from the 45.5% of control respondents who have smoking habits in the family. This is why there is no statistically significant association since the percentage of cases and controls

is not too far different in terms of smoking behaviors.

#### 1.4 The Effect of Simultaneous Application of Personal Hygiene on Stunting Occurrences

According to the final modelling of the multivariate analysis, only respondents with defecation behaviors that did not meet the standards had a 4.03 times greater likelihood of having stunted children than respondents with the latter kind of behavior. From the calculations, it can be inferred that there will be a 63.3% chance of stunting in children if the respondent has a risk factor for improper defecation behaviors (probability value 0.633). Another 36.7% in this case is caused by other variables. This study is supported by research done in the Pangkajene City Health Center's Work Area, which demonstrates that the most prevalent factor that might induce stunting is latrine ownership. From the results of the multivariate final analysis, it was found that 6,289 respondents who did not have healthy latrines were at risk of experiencing stunting compared to respondents who had healthy latrines (Ilahi, Suryati, & Mediani, 2022). Research conducted in Peru stated that unsafe disposal of feces would cause diarrhea, helminthiasis and stunting. in toddlers. As a result, special care must be taken when disposing of feces in latrines that meet the standards. Research conducted in Sidoarjo revealed that there was a significant correlation between the use of unhealthy latrines and 7.3 times the risk of experiencing diarrhea. The use of healthy latrines can be influenced by knowledge, attitudes and ownership of latrines (Basyariyah et al., 2022; Brown et al., 2013 ).

Defecation behaviors that do not meet the standards will trigger disease in infants. If a toddler is prone to illness, particularly diarrhea, for an extended period, it will disrupt nutrient absorption in the digestive process. This will cause disturbances in growth and development in toddlers so the risk of toddlers experiencing stunting will increase. Feces are a source of disease transmission which can contaminate food, drink, water, soil and disease vectors such as cockroaches and flies. The existence of latrines close to clean water sources will indirectly cause dirt to mix with water, and latrines

that do not meet the standards will cause water pollution which can pose a risk of disease, especially stunting (Asmirin et al., 2021; Basyariyah et al., 2022).

#### CONCLUSION

Open defecation has been proven to be a risk factor for stunting in children under five years among the other six independent variables.

The research data can be used by Posyandu cadres and Puskesmas officers to be able to conduct socialization related to proper defecation behaviors so that it can become a target for reducing stunting rates in the working areas of Puskesmas Rumbai Bukit and Puskesmas Limapuluh.

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## *The Effect of SMS Gateway Intervention on Increasing Knowledge in Pregnant Women with Anaemia*

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### ABSTRACT

**Background:** Anemia in pregnancy is one of the indirect causes of the high maternal mortality rate (MMR) in Indonesia. To prevent and overcome anemia in pregnancy, an Iron supplement tablets program (IST) is carried out. However, this Programme has yet to show tangible results. One of the challenges is a low mother's compliance to consuming IST due to a lack of knowledge. Today, Short Messaging Service (SMS) appears to be an alternative to health promotion media. **Objective:** This study aims to determine the effect of SMS gateway on the level of knowledge about IST consumption among pregnant women with anemia. **Methods:** This study is a double-blind experimental research with a Randomized Controlled Trial (RCT) design. We took anemic pregnant women at seven health centers in Makassar City who met the inclusion criteria with a total sample of 68 people (35 control and 33 intervention). **Results:** There was a significant difference in the mean value of pre-test and post-test knowledge levels in the intervention group that received SMS gateway ( $p$ -value = 0.047). However, there is no significant difference in the mean value of pre-test and post-test knowledge between the control and intervention groups ( $p$ -value = 0.215). **Conclusion:** There is an effect of SMS gateway on the knowledge levels regarding IST consumption among pregnant women with anemia.

**Keywords:** Anemia, Iron Supplement Tablets (IST), Knowledge, Pregnant women, SMS gateway

### INTRODUCTION

The maternal mortality rate (MMR) in South Sulawesi in 2018 was 139 people, which increased in 2019 to 144 people. According to the Indonesian Ministry of Health, the most common cause of maternal death in South Sulawesi in 2019 was bleeding, which is indirectly caused by anemia in pregnancy (The Ministry of Health of Indonesia, 2020b). Globally, anemia is a health problem experienced by 36.8% of pregnant women worldwide, half of which is due to a lack of iron (Karami et al., 2022). Anemia in pregnancy significantly affects maternal and fetal mortality and morbidity. Pregnant women who suffer from anemia increase the risk of maternal death by 3.7 times higher when compared to mothers with anemia (The Ministry of Health of Indonesia, 2018). The results of the Basic Health Survey or in Indonesia Riset

*Kesehatan Dasar* (2018) stated that 48.9% of pregnant women in Indonesia experienced anemia (The Ministry of Health of Indonesia, 2020). Meanwhile, the number of pregnant women suffered from anemia in Makassar City increased from 2.189 cases in 2018 to 2.223 cases in 2019 (City Health Office of Makassar, 2020).

The government has made a significant effort to prevent and overcome anemia in pregnancy by providing iron supplement tablets (IST) (The Ministry of Health of Indonesia, 2021a). The IST program still needs to overcome challenges such as mothers' lack of compliance in consuming IST, namely unfavorable attitudes and actions, knowledge, and side effects caused by the IST (Mardhiah and Marlina, 2019). In addition, to support the IST program, Indonesia has made several efforts to overcome anemia in pregnancy by

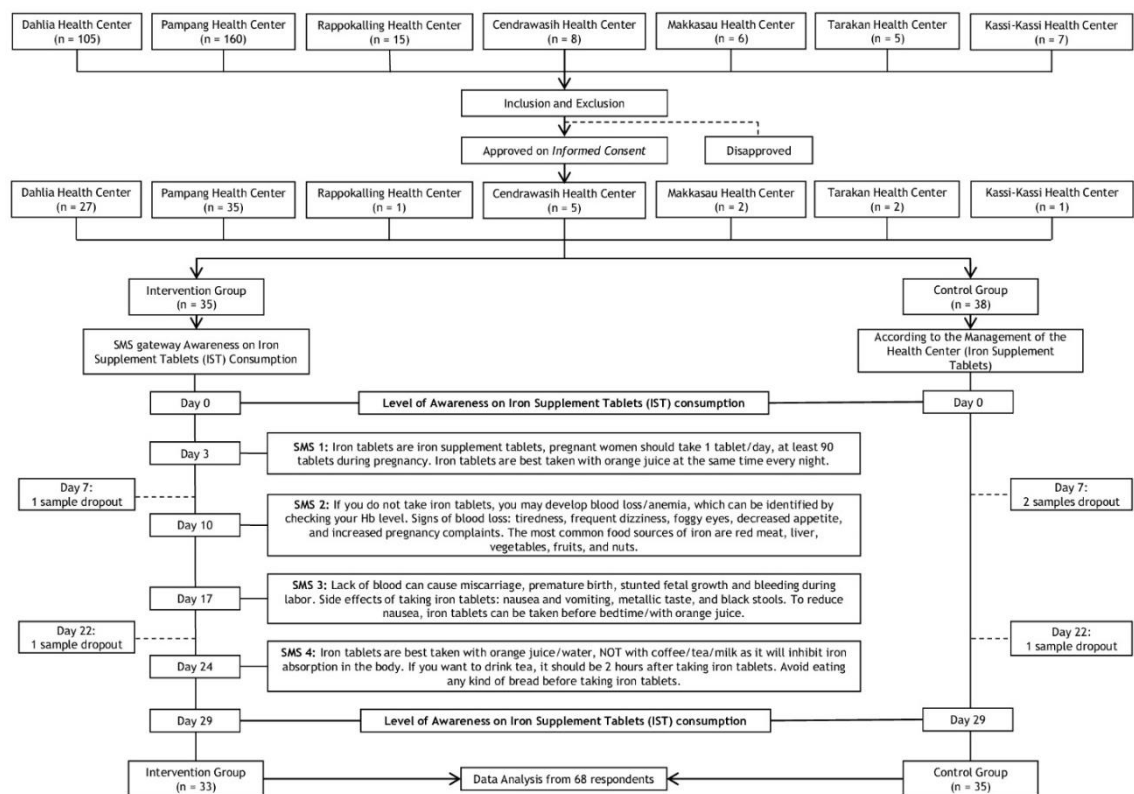
involving husbands, families and the environment of pregnant women (Triharini, 2019). The knowledge level is essential to underlie changes in a person's behavior. Recently, health promotion has used many media such as TV, posters, leaflets, and booklets. Short Message Service (SMS) is one of the alternative media technologies that offers several advantages, namely, low cost and quick delivery; therefore, it will be easier for pregnant women to get information about IST without visiting a health facility (Tasya and Yani, 2019). During the Covid-19 pandemic, the government advised pregnant women to communicate by contacting midwives or health workers via telephone, SMS, social media or chat

applications if they have questions (The Ministry of Health of Indonesia, 2020a).

This study aimed to assess the effect of providing information through the SMS gateway method in increasing the knowledge level of pregnant women about anemia.

## METHODS

This study was a double-blind, randomized controlled trial (RCT) design. The study was conducted from January 2021 to April 2021 in Makassar City at seven health centers: Pampang, Dahlia, Cendrawasih, Makkasau, Tarakan, Rappokalling, and Kassi-Kassi.



**Figure 1.** Research Flowchart

We obtained 73 pregnant women that met the inclusion criteria. The inclusion criteria in this study were pregnant women with anemia at <32 weeks of gestation who received IST from the health centers, pregnant women who had mobile phones, could communicate well and were willing to participate in the study. Samples were excluded if she could not read or operate a cell phone. During the study, there were five dropout

samples. Therefore, the final sample size was 68 people (35 samples from the control group and 33 samples from the intervention group). Research assistant 1 assigned samples to the control or intervention group by simple randomization methods. We use SMS software by Gili-SMS®. Gili-SMS was installed to the computer first, then connected to the modem (Wardono, 2020). After that it could be used to send

SMS to many numbers at once. We use Gili SMS for the broadcasting function, making it easy to send SMS to many respondent numbers because SMS can be set to be sent at one time. Gili SMS can also send long SMS with a limit of 1,600 characters so that the information we send is not truncated when it reaches the respondent. We obtained questionnaire from previous research regarding knowledge and attitude on IST in pregnant women (Verrayanti, 2018) and the text was customized to be as SMS information. SMS sent using the Gili SMS software from computer to mobile phone are received exactly the same as what was sent from the computer and are immediately received in the same minute, there is no difference in time from sending the message from the laptop to delivered at the recipient's number. SMS gateway delivery was carried out by research assistant 2, who was blinded from the participant group, the assistant was only tasked to send the SMS and ensure whether the respondents received and read the SMS.

#### Questionnaire

The questionnaire consisted of 20 multiple-choice questions with five answer options to assess the respondents' knowledge of IST consumption. Questions in the questionnaire included what respondents knew about IST, whom it was given to, how to consume it, what its benefits are, what side effects can arise when consuming IST and how to deal with them, and what foods contain much iron to consume besides IST (Verrayanti, 2018). If the respondents choose the correct answer, they will get 5 points; the total score is 100 for all the correct

answers. We delivered the questionnaire via a Google Form. Respondents could answer the questionnaire independently or with help from an enumerator over the phone. All respondents completed the questionnaire on day 0 as a pre-test and on day 29 as a post-test.

#### Data Analysis

Data analysis used in this study was the Statistical Package for the Social Sciences (SPSS) version 25 application, using univariate analysis to determine the baseline characteristics of respondents. We calculated a relationship between variables using Paired T-Test within groups and Independent T-Test between groups.

#### Research ethics

This research received Ethical Feasibility on January 7th, 2021, from the Health Research Ethics Commission (KEPK) of Alauddin Islamic State University with letter No.E.039a/KEPK/FKIK/I/2021.

## RESULTS AND DISCUSSION

The total number of respondents were 68 pregnant women and the spouse, with most of the respondents in this study aged 26-35 years old (45.6%) and in the second trimester of their pregnancy (69,1%). Both respondents and their spouses graduated from senior high school, 52.9% for the mother and 58.8% for the husband. Although 82.4% of the respondents were housewives, their spouses were employed with a total monthly household income of IDR 1.000.000 to IDR 3.000.000 (51.5%). Finally, about 33.8% of the respondents received less support from their husbands.

**Table 1.** Characteristics of respondents

Characteristics	Group				P value <sup>1</sup>
	Control		Intervention		
	n	%	n	%	
<b>Mother's Age (Years)</b>					
17 - 25	12	34.3	16	48.5	1.43
26 - 35	18	51.4	13	39.4	
36 - 45	5	14.3	4	12.1	
<b>Mother's Education</b>					
No Education	0	0	1	3	3.68
Elementary Graduate	5	14.3	9	27.3	
Junior School Graduate	4	11.4	2	6.1	
Senior High School Graduate	19	54.3	17	51.5	
Bachelor's Degree	7	20	4	12.1	
<b>Husband's Education</b>					
No Education	0	0	1	3	2.54
Elementary Graduate	7	20	6	18.2	



Junior School Graduate	4	11.4	3	9.1	
Senior High School Graduate	19	54.3	21	63.6	
Bachelor's Degree	5	14.3	2	6.1	
<b>Mother's Occupation</b>					
Working	6	17.1	6	18.2	0.01
Not working	29	82.9	27	81.8	
<b>Husband's Occupation</b>					
Working	34	97.1	32	97	0.002
Not working	1	2.9	1	3	
<b>Monthly Income</b>					
< IDR 1,000,000	9	25.7	11	33.3	0.47
IDR 1,000,000 - IDR 3.000.000	19	54.3	16	48.5	
> IDR 3,000,000	7	20	6	18.2	
<b>Length of Pregnancy</b>					
Trimester I	5	14.3	11	33.3	4.11
Trimester II	28	80	19	57.6	
Trimester III	2	5.7	3	9.1	
<b>Parity</b>					
0 (Nulliparous)	10	28.6	11	33.1	2.49
1 (Primiparous)	11	31.4	6	18.2	
2 - 5 (Multiparous)	14	40	15	45.5	
>5 (Grandemultipara)	0	0	1	3	
<b>Antenatal Care Frequency</b>					
1	13	37.1	14	42.4	2.15
2	7	20	9	27.3	
3	9	25.7	4	12.1	
≥4	6	17.1	6	18.2	
<b>Hb Levels</b>					
10.0 - 10.9 gr/dL	19	54.3	16	48.5	0.22
7.0 - 9.9 gr/dL	16	45.7	17	51.5	
< 7 gr/dL	0	0	0	0	
<b>Husband's Support</b>					
Good	10	28.6	6	18.2	1.02
Fair	14	40	15	45.5	
Less	11	31.4	12	36.4	

<sup>1</sup>Chi-square test

**Table 2.** Pre-test and Post-test Knowledge Level in Control and Intervention Groups

Group	Pre-test Knowledge (Mean ± SD)	Post-test Knowledge (Mean ± SD)	P value <sup>1</sup>
Control	61.86 ± 15.72	62.29 ± 13.89	0.87
Intervention	52.73 ± 15.96	57.42 ± 17.46	0.05*

<sup>1</sup>Paired t-test

We found differences in pre and post-test scores, the level of knowledge was slightly higher in the intervention group (p value = 0.05) (Table 2). However, in Table 3 there was no significant difference between the control

and intervention groups level of knowledge (p value = 0.22). In Table 3 it can be seen that there was no difference in consumption of iron tablets in the two groups (p value = 0.89).

**Table 3.** Pre-test and Post-test Knowledge Level and IST Consumption between Control and Intervention Groups

Variables	Group		P value <sup>1</sup>
	Control (Mean ± SD)	Intervention (Mean ± SD)	
Level of knowledge	0.43 ± 14.92	4.70 ± 13.04	0.22
Iron intake consumption	24.03 ± 12.86	24.45 ± 11.55	0.89

<sup>1</sup>Independent t-test

## Discussion

Our study found an increase in knowledge regarding IST in the

intervention group which was not shown in the control group. Nevertheless, the consumption of IST was similar between groups. SMS media provided convenience in providing knowledge about IST consumption to pregnant women; this method was more practical, did not require an internet connection, low cost, was more efficient in time and effort, without reducing the quality of the material and health education to be delivered, and can be done quickly and continuously (Balci and Kadioglu, 2019; Nursalam, Dewi and Widhiastuti, 2020). Kodama *et al.* (2021) found that participants were satisfied with the messages sent because they contained useful and easy-to-understand information for pregnant women. Participants also got the convenience of being able to access information easily at any time because it was on their cell phones (Kodama *et al.*, 2021).

SMS gateway intervention was found to significantly increase the level of knowledge on IST. Previous studies confirmed the effectiveness of this method for various things, such as increasing pregnancy knowledge and compliance on IST by sending SMS every day for two weeks (Candradewi *et al.*, 2021), increasing husbands' knowledge about vasectomy by SMS sent twice a month (Tasya and Yani, 2019), increasing antenatal care compliance and the ability to early detection of danger signs in pregnant women (Coleman *et al.*, 2020; Jones *et al.*, 2020; Ummah, Kostania and Rosalinna, 2020), increasing knowledge and antenatal care visits for pregnant women after being given education via SMS (Kamalah and Harlinah, 2021), increasing knowledge about sexual and reproductive health in adolescents and lasting even after three months post-intervention (Ujang and Sutan, 2018) and increasing patient compliance with hypertension treatment significantly. They found that participants were satisfied with the information in the message and it influenced them to follow a healthy lifestyle (Nursalam, Dewi and Widhiastuti, 2020). A once a week text message can improve proper breastfeeding practices because the information can be trusted with easy and flexible access (Jiang *et al.*, 2018).

Knowledge is an internal factor that influences the formation of a behavior.

Knowledge that underlies a behavior will cause the behavior to last longer. A person's behavior will have an impact on his health status (Notoatmodjo, 2018). Knowledge plays an important role in determining complete behavior because knowledge will form beliefs which then, in perceiving reality, provide a basis for decision-making and determine behavior toward certain objects so that it will influence a person's behavior (Aviantika and Rapingah, 2021). Several factors might influence knowledge such as age, education, environment, experience, socio-culture, and economic status (Budiman and Riyanto, 2015; Ummah, Kostania and Rosalinna, 2020). We have assessed those factors representatively by questioning age, education level, family income, husband's support, and the parity. Most of our respondents were 27 years old. Study reported that a person's mindset and capacity will develop with age and the age between 27-35 years was considered a well-received informant (Budiman and Riyanto, 2015; Galaupa and Supriani, 2019). The majority of respondents and spouse had a high school diploma. The higher the level of someone's education, the easier it is to receive information resulting in richer knowledge. On the other hand, less education will hinder one's development of newly introduced things (Budiman and Riyanto, 2015; Ummah, Kostania and Rosalinna, 2020). There was found a significant relationship between education level and level of knowledge and study found that the higher a person's education, the more knowledge he has (Ningsih, Triana and Maimunah, 2021; Damayanti and Sofyan, 2022). We assumed that high school graduate background level of education might probably affect their ability to analyze and apply information they received. The majority of respondents had income in the range of Rp1,000,000 - Rp3,000,000. This amount of income is included in a low socioeconomic group because it has not yet reached the minimum wage, so this can be one of the factors that affect their ability to apply or implement information. Economic status is one of the factors that can affect someone's knowledge, because it determines whether a person can get facilities to support certain activities that can increase their knowledge (Budiman and

Riyanto, 2015). Moreover, one's knowledge can also be influenced by experiences, both directly and indirectly, for example pregnancy events. Experience can be related to parity as stated in Kusumastuti's (2018) research that mothers with 0 parity or nulliparous who are pregnant for the first time do not have experience in pregnancy which can affect respondents' knowledge about high risks in pregnancy (Kusumastuti, 2018). Both groups in this study had a majority of 2-5 parities (48.4%) which indicates that respondents are already aware of IST consumption from previous pregnancy experiences. Support from husband and family as the closest environment to pregnant women plays an important role in influencing the psychology and motivation of mothers in carrying out health behaviors. With good support, the mother will pay attention to the health of herself and her fetus, one of which is by increasing knowledge about maintaining health during pregnancy (Ummah, Kostania and Rosalinna, 2020). These factors may affect their ability to analyze and apply the information they receive so that it can affect their knowledge and change the way they maintain health during pregnancy, one of which is by taking IST.

As mentioned above, SMS provides several advantages compares to other information tools such as cost effective since SMS does not require an internet connection, SMS can also reach areas with poor signal, so that everyone can get information even if they live in a place with poor signal. These SMS's characteristics are suitable for our respondents that mostly live with low economic status.

Although SMS have many strengths to deliver health information, we cannot deny that today we have other alternative media that more popular than SMS. Nowadays, people are already using smartphones, and one of the most widely used message media is WhatsApp. Through the WhatsApp group, the learning process is more enthusiastic because there are more interactive discussions, especially for some users who have low self-confidence if they have to discuss face-to-face (Handayani and Milie, 2020; Sulistianingsih and Hasyim, 2021; Arisani and Wahyuni, 2023). Similarly with WhatsApp, Facebook is the most used

social media by women, followed by Instagram and TikTok. All this tools are equipped with photos and videos which bring them to be more interactive and interesting (Skouteris and Savaglio, 2021; Artikasari, Susilawati and Mayang Sari, 2022; Nurcandrani et al., 2022).

The reason why there were no significant differences in the level of knowledge between the control and intervention groups could be caused by the number of media to get information easily nowadays, variations in individual characteristics of respondents, and the lack of respondents' awareness regarding the importance of IST consumption. The control group who did not receive the SMS intervention could also increase their knowledge about IST because they received information from health workers during ANC visits.

Some previous studies that used SMS as a medium for health interventions conducted informed consent directly to create a social relationship between researchers and respondents (Herlina, 2018; Salsabila, Utami and Nugraheni, 2018; Tasya and Yani, 2019). This could not be carried out in this study because it was conducted during the Covid-19 pandemic.

## CONCLUSION

This study concluded that there was a significant increase in knowledge in the intervention group given an SMS gateway containing information about iron supplement tablets (IST), but there was no significant difference in the difference between the scores of the control group and the intervention group.

This study provided evidence that SMS gateway can be an alternative media for knowledge education to prevent or overcome the incidence of anemia in pregnancy. Future researchers should conduct research with a larger sample size, and conduct direct interaction to build bonds and more intense follow-up with research respondents.

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## ***Use of Android-Based Flipbook Educational Media to Increase Knowledge, Beliefs, Attitudes, and Intentions of Prospective Brides in Stunting Prevention in Semarang City***

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### **ABSTRACT**

**Background:** The prevalence of stunting in Semarang City is still relatively high. Low public knowledge about stunting prevention can increase the incidence of stunting. Stunting can be prevented before pregnancy. Prospective brides are strategic targets in stunting prevention so that they can prepare for a healthy pregnancy. Increasing the knowledge of the prospective brides can be done by providing education using media that is following the characteristics of the prospective brides, namely using Android-based flipbook media. **Objective:** The study aims to analyze the effect of education using Android-based flipbook media on increasing knowledge, beliefs, attitudes, and intentions of prospective brides in stunting prevention in Semarang City. **Method:** This study used a quasi-experimental research design with a nonequivalent control group design. The sample of the research was prospective brides totaling 94 people, consisting of treatment and control groups of 47 people. Data collection used pre-test and post-test questionnaires to measure prospective brides' knowledge, beliefs, attitudes, and intentions in stunting prevention. **Results:** The results showed that there were significant differences in the average knowledge score ( $p = 0.001$ ), beliefs ( $p = 0.016$ ), attitude ( $p = 0.001$ ), and intention ( $p = 0.001$ ) of prospective brides in stunting prevention. So it can be concluded that education about stunting prevention using Android-based flipbook media influences increasing knowledge, beliefs, attitudes, and intentions of prospective brides in stunting prevention. The greatest influence is shown on the knowledge variable, which is equal to 29,7%.

**Keywords:** Android-based flipbook, education; prospective bride, stunting prevention

### **INTRODUCTION**

Stunting is a condition of failure to thrive in children under five due to chronic malnutrition, especially in the first 1000 days of life, which can occur since the baby is still in the womb and early after the baby is born. However, the condition of stunting is usually only known after the child is 2 years old. Stunted and severely stunted children are those with body length or height according to age compared to the standard from the WHO-MGRS (World Health Organization-Multicentre Growth Reference Study) (Alfi et al., 2021). Children are categorized as stunted if they have a z-score of less than -2SD/standard deviation and less than -3SD as severely stunted (Alfi et al., 2021; WHO, 2014).

Stunting remains a serious problem in the world. Globally, in 2020 it was reported that 149,2 million children were stunted (WHO, 2021). The prevalence of stunting in Indonesia based on the Global Nutrition Report in 2018 was ranked 108<sup>th</sup> out of 132 countries, while in Southeast Asia the prevalence of stunting in Indonesia was the second highest after Cambodia (Kempppa RI, 2020). According to Basic Health Research data, the national stunting rate decreased in 2013 by 3,2% and in 2018 by 30,8%. The Indonesian Children's 29,7% (Alfi et al., 2021). Central Java Province is one of the provinces with a high prevalence of stunting children. Based on the results of Basic Health Research in 2018, the percentage of severely stunted children under 5 years in Central Java Province by

11.2%, while the percentage of stunted by 20.1% (Kemenkes RI, 2019). The results of The Indonesian Children Under 5 Years Nutrition Status Survey in 2019 reported the prevalence of stunting children in Central Java Province by 27.7% and the results of The Indonesian Nutritional Status Survey in 2021 by 20.9% (Kemenkes RI, 2021). Based on the Decree of the Minister of National Development Planning No. 42 of 2020 concerning the Determination of Regency/City Expansion of Focus Areas for Integrated Stunting Reduction Interventions in 2021, Semarang City is one of the cities that is the focus location of integrated stunting reduction interventions. The results of monitoring the nutritional status of children under 5 years in Semarang City showed that there was an increase in stunting prevalence in toddlers in 2015-2017, the figures were 1.4%, 16.5%, and 21% respectively (Cahyati et al., 2019; Meikawati et al., 2021). The prevalence of stunting children in Semarang City in 2021 is based on the results of the Indonesian Nutritional Status Survey by 21.3% (Kemenkes RI, 2021).

Stunting becomes an issue because it is associated with an increased risk of illness and death, disorders of brain development, impaired motor development, stunted mental growth of children, and reduced productivity (Abdullahi et al., 2021; Beal et al., 2018; Rahayu et al., 2018). Society often becomes unaware of the stunting problem because its impact is unnoticeable. The impact of stunting on children can trigger other health problems as the child grows older.

Stunting prevention efforts have been carried out to reduce the stunting rate and become one of the goals in the Global Nutrition Targets for 2025. The success of stunting reduction is a key indicator of the second Sustainable Development Goal of Zero Hunger (Beal et al., 2018). Stunting reduction efforts are required to achieve the World Health Assembly's 2025 target which is to reduce the number of stunting cases to 100 million. The priority actions that can be taken to reduce the number of stunting in children under 5 years by 40% are increasing measurements to identify stunting, increasing understanding of stunting, increasing the scope of stunting prevention activities, increasing nutrition

and maternal health improvement interventions starting from adolescence, conducting interventions to improve exclusive breastfeeding practices and complementary foods for breastfeeding, and strengthening community-based interventions by improving water, sanitation, and hygiene (WASH) to prevent infectious diseases in children, such as diarrhea, malaria, and worm disease (WHO, 2014).

Stunting prevention can be done before pregnancy or during the preconception period, which is an important stage to determine a successful pregnancy. The targets range from teenagers to prospective brides and mothers who delay pregnancy. Dealing with stunting problems should be done early before a child is born to break the stunting chain (Rahayu et al., 2018). Prospective brides are the childbearing age group that can be the most strategic targets for the preconception nutrition intervention program because they are the group that is ready to get pregnant. Therefore, it will be more effective if the intervention program to prevent stunting is carried out in groups of prospective brides.

Based on the above, stunting prevention during the preconception period is important in reducing stunting. With the stunting prevention program in the preconception period, it is hoped that prospective mothers can prepare for their pregnancy well so that they can prevent stunting in their children. One of the stunting prevention efforts that can be done since the preconception period is by increasing the knowledge of prospective brides through premarital education about stunting prevention through prospective bride and groom classes facilitated by the Public Health Center and Office of Religious Affairs. However, the implementation of the prospective bride and groom class is still not optimal, namely the frequency of implementation is still lacking and the material presented does not explain stunting in detail.

For the information or message conveyed to be received and digested easily, education needs to be supported by appropriate educational media. Media selection is usually determined by the number of targets, geographical circumstances, participant characteristics, and supporting resources.



The use of appropriate media helps clarify the information conveyed (Anggraeni, 2019). Android-based flipbooks have the advantages of being easily accessible and having an attractive and appropriate appearance if given to prospective brides who have characteristics whose daily lives are inseparable from digital technology.

After obtaining education, it is hoped that there will be an increase in knowledge about preventing stunting in prospective brides so that they will form the belief to change their attitude according to the knowledge they have. Then the attitude toward the behavior will raise the intention to behave in stunting prevention. According to the theory of planned behavior, intention affects behavior (Ogden, 2007). Behavioral intention is the competency of the individual in carrying out a behavior (Wikamorys & Rochmach, 2017). The prospective brides will intend to carry out stunting prevention behavior if it is supported by positive factors toward stunting prevention behavior. One of the main predictors that influence behavioral intentions is an attitude toward the behavior (Ogden, 2007). Attitudes are determined by individual beliefs about the results of carrying out the behavior (beliefs about outcomes) and are weighed by the evaluation of these outcomes (Glanz et al., 2015). Therefore, it is important to measure the increase in knowledge, beliefs, and attitudes until the intentions of the prospective brides in preventing stunting so that know how far the intention of the prospective brides is behavior to prevent stunting.

This study aims to analyze the effect of education using Android-based flipbook media on increasing knowledge, beliefs, attitudes, and intentions of prospective brides in stunting prevention

## METHODS

This research was quantitative and used a quasi-experimental method with a nonequivalent control group design. The research was conducted in Semarang City from November 2022 - February 2023. The population of this study was prospective brides in Semarang City, while the research sample was prospective brides who were registered to be married at the Office of Religious Affairs in several sub-districts in Semarang

City (District of East Semarang, North Semarang, Pedurungan and Tembalang). The number of samples in this study was 94 people, consisting of treatment and control groups each of 47 people. A treatment group was given intervention, namely stunting prevention education using Android-based flipbook media, delivered to premarital guidance classes at the religious affairs office including a brief stunting explanation and followed by discussions through WhatsApp groups and online meetings. The control group was only accepting stunting education at the religious affairs office, without discussion through WhatsApp groups and online meetings. Stunting material was included in the material presented in prospective bride and groom classes or premarital guidance but not been presented in detail. The sampling technique used the consecutive sampling method. The research was conducted by providing interventions with stunting prevention education using Android-based flipbook media with a class method. Furthermore, discussions through WhatsApp groups for three weeks and online meetings with Zoom meetings so that interactive communication between researcher and respondents. Each discussion group consists of 8-10 people. The discussion was carried out for three weeks because changing knowledge to intention to behave needs a process, namely education and several discussion sessions. Data collection on knowledge, beliefs, attitudes, and intentions in stunting prevention was carried out before and after the intervention using pre-test and post-test questionnaires. Before the questionnaire was used, the validity and reliability were tested. The pre-test data were taken before the intervention, while the posttest were taken in the fourth week after the intervention. Data analysis used independent t-test, paired t-test, and MANOVA multivariate analysis.

This research has received ethical approval from the Health Research Ethics Commission of the Faculty of Public Health, Diponegoro University No: 396/EA/KEPK-FKM/2022.

## RESULTS AND DISCUSSION

Based on the results of interviews with 94 prospective brides registered at

the Office of Religious Affairs in East Semarang, Pedurungan, North Semarang, and Tembalang sub-districts, a description of the characteristics of the prospective

brides was obtained which included age, education, occupation, and information accessibility.

**Table 1.** Description of Respondent Characteristics

Variable	Treatment Group		Control Group		Total		P Value
	N	%	N	%	N	%	
<b>Age</b>							
< 20 years	0	0	1	2,13	1	1,06	0,315
20-35 years	47	100	46	97.87	93	98.94	
> 35 years	0	0	0	0	0	0	
<b>Level of Education</b>							
No School	0	0	0	0	0	0	0.380
Primary School	0	0	0	0	0	0	
Junior High School	1	2.13	0	0	1	1.06	
Senior High School	17	36.17	22	46.81	39	41.49	
College	29	61.70	25	53.19	54	57.45	
<b>Background of Education</b>							
Health	7	14.89	5	10.64	12	12.77	0.536
Non-Health	40	85.11	42	89.36	82	87.23	
<b>Occupation</b>							
No Work	1	2.13	5	10.64	6	6.38	0.057
Government employees	1	2.13	4	8.51	5	5.32	
Private employees	31	65.96	28	59.57	59	62.77	
Laborer	0	0	3	6.38	3	3.19	
Enterpriser	7	14.89	5	10.64	12	12.77	
Other	7	14.89	2	4.26	9	9.57	
<b>Field of Occupation</b>							
Health	6	12.77	4	8.51	10	10.64	0.503
Non-Health	41	87.23	43	91.49	84	89.36	
<b>Information Accessibility</b>							
Have Access	36	76.60	42	89.36	78	82.98	0.100
Never Access	11	23.40	5	10.64	16	17.02	

Table 1 shows that most of the research respondents have an age range of 20-35 years (98.94%). This age included the reproductive age category. According to the Indonesian Ministry of Health, the reproductive age limit for women is 15-49 years (Kemenkes RI, 2018). However, 20-35 is the best age for reproduction because the reproductive organs still function properly (Azizah et al., 2022).

Prospective brides who are still relatively young in general do not have enough knowledge and experience in preparing for life after marriage, both in terms of health and other matters. They need premarital guidance including health education. Unpreparedness in marriage can have a major impact on life and a negative impact on their children (Fahlevi & Riyanto, 2022). In this case, the prospective brides need health education about stunting prevention to prepare for a healthy pregnancy and reduce the risk of having a stunted child.

Prospective brides have a majority senior high school education level

(41.49%) and college (57.45%), with educational backgrounds in non-health fields (87.23%). The higher level of education, it will affect the level of knowledge. As the results of the study stated that there was a relationship between education level and knowledge about stunting prevention (Kristiyanti et al., 2021). However, there was the result of another study showed that there was no significant relationship between education level and knowledge about stunting (Rahmah et al., 2023).

The prospective brides have a variety of jobs, the most dominant being private employees (62.77%) with jobs in the non-health sector (89.36%), and have accessed information about stunting (82.98%). Even though they have an educational background and work in the non-health sector they are rarely exposed to information about stunting; they seek health information, especially about stunting, by accessing information from various media that can be accessed via the internet and social media. Social

media is in great demand as a source of health information, while the internet is an alternative to meeting health information needs because it is more effective and efficient (Meo & Ganika, 2021). In addition, information is also obtained from families, counseling by health workers, health cadres, etc.

The statistical test results showed that there were no differences in characteristics of the respondents including age, education, occupation, and information accessibility between the treatment and control groups ( $p$ -value > 0.05). This means that the treatment and control groups have the same characteristics.

**Table 2.** Preliminary Description of Knowledge, Beliefs, Attitudes, and Intentions of Prospective Brides About Stunting Prevention in Treatment and Control Groups

Variable	Treatment Group		Control Group		P-Value
	Mean Score	Standard Deviation	Mean Score	Standard Deviation	
Knowledge	67.09	22.46	67.39	16.81	0.942
Belief	76.91	9.72	83.27	12.17	0.006
Attitude	80.54	9.34	82.89	10.93	0.265
Intention	39.95	29.37	32.86	25.16	0.212

Table 2 shows an initial description of the knowledge, beliefs, attitudes, and intentions of prospective brides regarding stunting prevention before being given the intervention. Based on the results of statistical analysis using the independent t-test as presented in Table 2, it is known that there are no significant differences in knowledge, attitudes, and intentions of prospective brides in preventing stunting between treatment and control groups at the beginning of the study ( $p$ -value > 0.05). Whereas the belief variable has a  $p$ -value of 0.006, meaning that there is a difference in beliefs of prospective brides about the impact of stunting prevention behavior between treatment and control groups at the beginning of the study.

There was no significant difference in the knowledge of prospective brides about stunting prevention before being given education about stunting prevention using Android-based flipbook media between treatment and control groups ( $p = 0.942$ ). This shows that the knowledge of prospective brides at the beginning of the study in treatment and control groups was the same. This can be seen from the mean score of knowledge at the beginning of the study was almost the same, the treatment group at 67.09, and the control group at 67.39. The results of previous studies also stated that there was no significant difference in the average knowledge value of the prospective brides between treatment and control groups before being given the intervention ( $p = 0.131$ ) (Sarman & Fauzan, 2022).

There was a significant difference in the prospective bride's belief in the

impact of stunting prevention behavior before being given education about stunting prevention using Android-based flipbook media between treatment and control groups ( $p = 0.006$ ). This shows that the beliefs of the prospective brides at the beginning of the study were not the same in the treatment and control groups. The mean value of belief score at the beginning of the study in the treatment group was 76.91 and in the control group 83.27. Differences in beliefs between the treatment and control groups can be caused by the interventions given to prospective brides outside of research activities, for example from activities carried out by public health centers and family assistance teams to increase the knowledge of prospective brides about stunting. Several sub-districts in Semarang City have implemented activities to accelerate stunting reduction, especially in areas with high stunting cases, such as in North Semarang District. North Semarang District is the focus location of research for the control group. The high number of stunting cases in North Semarang has caused this area to receive more attention from the local government in handling stunting reduction. Therefore, the control group in this study had greater beliefs in the impact of stunting prevention behavior compared to the treatment group due to increased knowledge about stunting obtained from interventions outside the study.

There was no significant difference in the attitude of prospective brides in their behavior to prevent stunting before being given education about stunting

prevention using Android-based flipbook media between treatment and control groups ( $p = 0.265$ ). This shows that the attitude of prospective brides at the beginning of the study in treatment and control groups was the same. This can be seen from the average attitude score at the beginning of the study was almost the same, with the treatment group at 80.54 and the control group at 82.89. Likewise, the results of previous studies stated that there was no significant difference in the average value of the attitudes of prospective brides between treatment and control groups before being given the intervention in the form of social media-

based nutrition education ( $p = 0.132$ ) (Sarman & Fauzan, 2022).

There was no significant difference in prospective brides' intention to prevent stunting before being given education about stunting prevention using Android-based flipbook media between treatment and control groups ( $p = 0.212$ ). This shows that the intentions of prospective brides at the beginning of the study in treatment and control groups were the same. The mean score of intention at the beginning of the study in the treatment group at 39.95 and in the control group at 32.86. At the beginning of the study, the mean score of intention in both groups was still low.

**Table 3.** Differences in Knowledge, Beliefs, Attitudes, and Intentions of Prospective Brides in Stunting Prevention Between Before and After Intervention

Variable	Group	The Difference in Mean Score	Standard Deviation	P-Value
Knowledge	Treatment	24.00	23.61	0.001
	Control	6.33	11.60	0.001
Belief	Treatment	12.52	9.67	0.001
	Control	0.22	9.51	0.876
Attitude	Treatment	13.13	9.53	0.001
	Control	2.85	8.02	0.019
Intention	Treatment	30.50	20.91	0.001
	Control	12.29	19.14	0.001

Based on the results of statistical analysis used paired t-test as presented in Table 3, it shows that in the treatment group, there are no significant differences in knowledge, beliefs, attitudes, and intentions of the prospective brides in preventing stunting between before and after the intervention, with  $p$ -value  $< 0.05$ . In the control group, the variables that showed significant differences between before and after intervention were knowledge, attitudes, and intentions ( $p$ -value  $< 0.05$ ). Whereas for the belief variable, there was no difference between before and after intervention ( $p$ -value = 0.876).

There was a significant difference in knowledge of prospective brides about stunting prevention between before and after being given education about stunting prevention using Android-based flipbook media in the treatment group ( $p = 0.000$ ). The results of this study are following research conducted by Fitriami and Galaresa (2021), who used an Android application to provide education about stunting prevention. The results reported that there was a significant difference in increased pre-test and post-test scores of

mothers' knowledge ( $p = 0.001$ ) (Fitriami & Galaresa, 2021). Other studies with family-based nutrition education interventions also reported differences in pre-test and post-test knowledge of stunting prevention with a  $p$ -value = 0.001 (Setia et al., 2020). Likewise in the control group, the results of statistical tests showed that there was a significant difference in the knowledge of prospective brides about stunting prevention before and after being given education about stunting prevention using Android-based flipbook media ( $p = 0.001$ ). This result is inconsistent with previous research which stated that there was no difference in knowledge between pre-test and post-test in the control group ( $p = 0.214$ ) (Fauziatin et al., 2019). Other research also stated that there was no significant difference in knowledge between the pre-test and post-test in the control group ( $p = 0.660$ ) (Sarman & Fauzan, 2022). The increase in knowledge in the control group could occur due to information about stunting obtained from sources other than this study. The prospective brides used the internet to find information about stunting. But

according to the increase in knowledge scores, the group that was given education using Android-based flipbook media had a higher score increase. This showed that the Android-based flipbook has a good effect on increasing knowledge.

There was a significant difference in prospective bride's belief in the impact of stunting prevention behavior between before and after being given education about stunting prevention using Android-based flipbook media in the treatment group ( $p = 0.001$ ). The results of this study are in line with research by Fadhilah et al. (2020) which stated that there were differences in the beliefs of adolescent mothers regarding exclusive breastfeeding before and after treatment using leaflets, booklets, and videos with  $p$ -value = 0.001 (Fadhilah et al., 2020). Whereas in the control group, there was no significant difference in the beliefs of prospective brides about the impact of stunting prevention behavior before and after being given education about stunting prevention using Android-based flipbook media ( $p = 0.876$ ). The results of this study are consistent with previous research which stated that there was no difference in beliefs before and after treatment using leaflets, booklets, and videos in the control group ( $p = 0.094$ ) (Fadhilah et al., 2020).

There was a significant difference in the attitude of prospective brides regarding their behavior to prevent stunting between before and after being given education about stunting prevention using Android-based flipbook media in the treatment group ( $p = 0.001$ ). The results of this study are in line with previous research which stated that there were significant differences in increased pre-test and post-test scores of maternal attitudes after providing stunting prevention education using the Android application ( $p = 0.001$ ) (Fitriami & Galaresa, 2021). Other studies also stated that there were differences in pre-test and post-test attitudes in preventing stunting with  $p$ -value = 0.001 after treatment using a family-based nutrition education intervention (Setia et al., 2020). Likewise in the control group, statistical analysis results showed that there was a significant difference in the attitude of prospective brides in behavior to prevent stunting before and after being

given education about prevention stunting using Android-based flipbook media ( $p = 0.019$ ). This result is in contrast to the research conducted by Fauziatin et al. (2019) who used flipchart media in health education about stunting prevention in prospective brides. The study stated that there was no difference in the average attitude score between the pre-test and post-test regarding stunting prevention ( $p = 0.967$ ). This means that there is no increase in the average attitude score between the pre-test and post-test in the control group. This was because the control group did not acquire the same knowledge about stunting prevention as the treatment group (Fauziatin et al., 2019). This was supported by other research which also stated that there was no significant difference in attitude between pre-test and post-test in the control group ( $p = 0.080$ ) (Sarman & Fauzan, 2022). The attitude improvement in the control group can occur because the knowledge of prospective brides in this group has increased even though they did not receive education about stunting prevention. Because prospective brides obtain information about stunting from sources other than this research, this can increase the knowledge of prospective brides, influencing attitudes in behavior to prevent stunting.

There was a significant difference in the intention of prospective brides to behave in preventing stunting between before and after being given education about stunting prevention using Android-based flipbook media in the treatment group ( $p = 0.001$ ). The results of this study are in line with previous research which stated that there were differences in intentions of teenage mothers regarding exclusive breastfeeding before and after treatment using leaflets, booklets, and videos with  $p$ -value = 0.001 (Fadhilah et al., 2020). Likewise in the control group, statistical analysis results showed that there was a significant difference in the intention of prospective brides to behave in preventing stunting between before and after being given education about stunting prevention using Android-based flipbook media ( $p = 0.001$ ). This result is not following other studies, which reported that there was no difference in the intentions of adolescent mothers regarding exclusive breastfeeding before and after treatment using leaflets,

booklets, and videos with  $p$ -value = 0.135 (Fadhilah et al., 2020).

### The Contribution of Providing Education Using Android-Based Flipbook Media on Increasing the Knowledge, Beliefs, Attitudes, and Intentions of Prospective Brides in Stunting Prevention

**Table 4.** The Effect of Providing Education Using Android-Based Flipbook Media on Increasing the Knowledge, Beliefs, Attitudes, and Intentions of Prospective Brides in Stunting Prevention

Variable	Mean Difference	P-Value	95% CI	R Square
Knowledge	17.37	0.001	11.838 - 22.897	0.297
Belief	5.95	0.016	1.134 - 10.762	0.061
Attitude	7.92	0.001	3.847 - 11.999	0.139
Intention	25.30	0.001	15.740 - 34.851	0.231

Based on Table 4, the results show that there are significant differences in mean scores of knowledge ( $p = 0.001$ ), beliefs ( $p = 0.016$ ), attitudes ( $p = 0.001$ ), and intentions ( $p = 0.001$ ) of prospective brides in stunting prevention. This means that there was an effect of providing education about stunting prevention using Android-based flipbook media on increasing the knowledge, beliefs, attitudes, and intentions of prospective brides in stunting prevention. The results of previous research stated that education on stunting using an Android application increased mothers' knowledge and attitudes at the Tenayan Raya Pekanbaru Health Center ( $p = 0.001$ ) (Fitriami & Galaresa, 2021). Other studies also stated that the WhatsApp group as an educational tool proved effective in increasing the knowledge and nutritional attitudes of pregnant women. WhatsApp groups can be used as an educational alternative for pregnant women during the Covid-19 pandemic because they do not require face-to-face meetings (Melati & Afifah, 2021).

The effect of providing education on increasing the knowledge score is at 29.7%, belief score at 6.1%, attitude score at 13.9%, and intention score at 23.1%. The greatest influence is shown on the knowledge variable, which is equal to 29.7%. The effect of education on increasing the knowledge of prospective brides about stunting prevention is considered effective because there is a significant increase in scores after being given education using Android-based flipbook media.

Multivariate analysis was conducted to analyze the effect of providing education about stunting prevention using Android-based flipbook media on increasing the knowledge, beliefs, attitudes, and intentions of prospective brides in stunting prevention. The statistical test used MANOVA.

There are limitations of this study such as the time to collect research data, could not be carried out simultaneously because the number of respondents was limited so it required a longer time. The researcher conducted home visits to provide education to several respondents who were busy. This meant that not all educational processes were carried out using the class method.

### CONCLUSION

There was an influence of education about stunting prevention using Android-based flipbook media on increasing the knowledge, beliefs, attitudes, and intentions of prospective brides in stunting prevention. The greatest influence is shown on the knowledge variable, which is equal to 29.7%. The effect of education on increasing the knowledge of prospective brides about stunting prevention was considered effective because there was a significant increase in scores after being given education using Android-based flipbook media followed by discussions through WhatsApp groups and online meetings. In particular, the health office can use Android-based flipbook media as an alternative learning medium in providing education about stunting prevention for prospective bride and groom classes held by the public health center.

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## Alternative Media to Increase Knowledge About COVID-19 Vaccination in Children

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### ABSTRACT

**Background:** Several vaccination programs for children have not been maximized. The phenomenon of low vaccination coverage in children can be attributed, in part, to the role played by information distribution. Public service advertisements have been widely studied for their effectiveness but are limited to social media. Public service advertisements can be combined with a game. Games are used for health promotion media with various themes and are considered effective. Print media such as posters and combinations with games are media that need to be studied in this digital era. **Objective:** This study aims to develop public service advertising media to invite COVID-19 vaccinations. **Method:** This research uses research and development (R&D) with ADDIE stages. The intervention study was conducted in Makassar, South Sulawesi, and involved 40 grade 4 and 6 elementary school students and 65 parents. The intervention was carried out at school by combining posters and pinball games. Measurements are managed with a validated questionnaire to assess knowledge and perceptions. Data were analyzed using the Wilcoxon test. **Results:** 1) The quality of the media combination of posters and pinball games obtained a score of 3.023 which was included in the qualification of "good" with the recommendation "need some revision" 2) the application of a combination of posters and pinball games affected the knowledge of children; parents' knowledge is fair and good, and parents' perceptions are positive. **In conclusion,** the poster combination game is an alternative media to promote the uptake of COVID-19 vaccination among elementary school students and their parents.

**Keywords:** Children, knowledge, pinball game, posters, COVID-19 Vaccination

### INTRODUCTION

In mid-December 2019, an infectious disease was caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). This disease started in Wuhan, China, and has spread throughout the country and many countries worldwide (Yezli & Khan, 2020). COVID-19 raises many other problems, such as regarding the economy, education, tourism, and social, and even has implications for forest degradation in Indonesia ; (Delgado-Gallegos et al., 2022; She et al., 2020). Efforts to prevent disease in children during a pandemic are significant because COVID-19 can affect all ages, including children. The number of children with coronavirus disease-2019 (COVID-19) has also increased significantly (7.4 million) (She et al., 2020).

Various efforts have been made, such as implementing health protocols, but other interventions are needed that are more effective. (Kemenkes RI Dirjen P2P, 2020) Another intervention step is the COVID-19 vaccination policy complementing prevention. Therefore, various countries are trying to develop an ideal vaccine for SARS-Cov-2, especially when there are many new variants. (Delgado-Gallegos et al., 2022) Vaccination is an intervention that can more effectively break the chain of transmission of COVID-19 (Cerda & Garcia, 2021). The vaccine program was eventually resumed for the pediatric population (Delgado-Gallegos et al., 2022). In Indonesia, COVID-19 vaccination can be given to children aged six to eleven years. Vaccination is essential for public health, but people's willingness to receive vaccinations has decreased in

2019). Several vaccination programs for children have not been maximized (Maryam *et al.*, 2019). The role of information dissemination is one of the factors causing low immunization coverage in children.

Dissemination of information about the importance of vaccination for children needs to be encouraged, and one way is through public service advertising. One of the studies from Mexico states that a strategy that can be promoted is by providing information regarding the advantages of vaccines and others (Delgado-Gallegos *et al.*, 2022). Public service advertising must be able to attract the attention of the target audience and create interest to be able to move people's desire to change behavior. Public service advertisements have been widely used and tested for their effectiveness on health behavior (Ananda Pratiwi & Hidayat, 2020; Barik *et al.*, 2019; Putri Kusanti & Leliana, 2018). Public service advertisements are in the form of mass media and print. Print media such as posters are still widely used in this digital era. Health media in the form of posters with a combination of games shows more effectiveness than single media (Barik *et al.*, 2019). However, research on public service advertisements for the COVID-19 vaccination in the form of poster print media combining games for children and parents has not yet been found. The urgency of this research is the importance of giving vaccinations amid the rise of hoax information related to COVID-19 vaccination in various countries, which results in low vaccine coverage for children.

Posters are a form of traditional print media. Even though we are currently in the digital era, posters remain the choice of media for health promotion education in various countries and show higher effectiveness when combined with other media such as games, videos, and others. Posters as print media contain information that is easy to find and use in public places. Posters play a role in conveying ideas to audiences quickly and can be used as learning media (Jatmika *et al.*, 2019). Posters as health media effectively influence health behavior because they have a display in the form of pictures, colors, and valuable message content (Jatmika *et al.*, 2019). Print media must be adjusted to the target

audience and community literacy (Al-tammemi & Tarhini, 2021). Things that must be considered in making digital media for health information are psychological barriers, the fear of hoaxes and semantic obstacles in the form of unfamiliar scientific or medical language (Prasanti, 2017). Print media in the form of posters may also have obstacles in its delivery, but not much research has been done. Media posters as public service advertisements regarding child vaccination have also not been widely carried out. Other public service advertisements can be combined with a game. Games are used for health promotion media with various themes and are considered effective (Barik *et al.*, 2019). The game method is not only used for health promotion but is also widely used for learning at multiple levels of education with various purposes. Games are not only popular with children but also among adults (Yunanto & Rochimah, 2017). Pinball has been used as a medium for learning accounting and Arabic, which shows changes after its use (Ksatriani, 2018; Rosikin, 2017).

Pinball is a game that aims to prevent the ball from falling into the hole at the bottom of the game layout while pursuing the highest score by hitting the ball with various objects in the game. Pinball is included in the type of arcade game because it is designed to have a box/machine and also a ball shooting tool to play. The pinball game as a medium in public service advertisements in combination with posters as an invitation to vaccinate against COVID-19 has not caught the attention of many researchers. The purpose of this research is to develop public service advertisements as a medium for promoting COVID-19 vaccination invitations through a combination of posters and pinball games for elementary school-age children and parents and then to see the implications for health behavior, knowledge of children and parents and parents' perceptions.

## METHODS

This study uses the research development type or Research and Development (R&D). The research stages include ADDIE (analysis, design, development, implementation, and

evaluation) (Almomen et al., 2016; Kardosod et al., 2023; Lu & Sides, 2022; Nurbaeti et al., 2021; Sahaat et al., 2020). In the analysis stage, it is carried out by identifying the lack of interest in the child age group in the COVID-19 vaccination. This stage is carried out by observing the health center and vaccination coverage through the website. This stage produces data in numbers and poster material content. The material has been adapted to the main poster from the Ministry of Health of the Republic of Indonesia. The design stage is designing a poster design and a pinball game design. The combination media such as posters and pinball games have the potential to be effective media for health education, targeting school-age children (Barik et al., 2019). The graphic design and physical appearance of the poster can determine its success in promoting knowledge transfer (Ilic & Rowe, 2013). The distribution of health-educational posters is recommended in situations where it is necessary to reach a wide audience over a long period of time (Hasanica et al., 2020). Pinball serves to attract children's interest. The development stage carried out was the product validation process by experts. Then, pinball games and posters were assessed for their feasibility by one material expert (public health lecturer), one media expert (design expert), and one health practitioner (health promotion expert, Ministry of Health of the Republic of Indonesia). The validation results from the experts became the basis for developing posters and pinball games. After that, implementation or field tests were conducted at elementary schools at SDN 01 Sudirman in Makassar City, South Sulawesi. The field test used a quasi-experimental method without a control group. A combination of posters and pinball games was posted on the school wall for one unit.

This research was conducted in June-August 2022 at SDN 01 Sudirman, South Sulawesi. The population in this study were all students in grades 4 and 6, both boys and girls. The sample in this study was 40 children and 65 parents. AA 25 children did not complete the questionnaire, so there were differences in the number of samples of children and parents. The sampling technique in this study was total sampling in grades 4 and 6

at SDN 01 Sudirman. At the evaluation stage, questionnaires were given before and after to test the effectiveness of the implementation of posters and pinball games in schools for children and parents. The evaluation included the target knowledge and perception. Primary data were collected twice, before and after the two-week intervention. The choice of two weeks of intervention was based on the research objectives to see an increase in children's knowledge regarding COVID-19 vaccination based on the media that had been used. This is in accordance with research showing an increase in knowledge for two weeks using media such as WhatsApp, digital story and posters (Ariestantia & Utami, 2020; Wyatt & Hauenstein, 2008; Young et al., 2013). were collected through interviews and questionnaires, which had been tested for validity and reliability. Data processing includes verification, coding, entry, cleaning, and analysis. Data were processed and analyzed descriptively and inferentially using SPSS 22.0. Variable levels of knowledge for children and parents and parental attitudes are processed by adding up the score of each question based on the appropriate answer divided by the total score multiplied by one hundred. The knowledge category uses high (score > 80%), fair (60-80%), and less (score < 60%) categories of the total score. Questionnaires about parental perceptions have been tested for validity and reliability with a Cronbach's alpha of 0.835. The statistical test used was the Wilcoxon test because the data distribution was not normal for children's knowledge before and after. The knowledge and perceptions of parents are only seen after the intervention, which was analyzed using chi-square.

## RESULTS AND DISCUSSION

The results are adjusted to research and development through the ADDIE stages (needs analysis, making a poster and pinball game designs, product development involving media and health promotion and media experts, and implementation and evaluation).

### Analysis Stage

At the needs analysis stage, the researchers conducted observations at target schools and local health centers.

Based on the results of initial observations, it was found that less than 50% of elementary school students had not carried out the COVID-19 vaccination, and there was no public service advertising media such as posters in schools. The following observation is to identify service advertisements in the community related to COVID-19 vaccination for elementary school children. Based on search results through the Ministry of Health website, posters are one of the media for public service advertisements to invite COVID-19 vaccinations, both for children and even older people. There has not been found any posters aimed at ages 6-11 years. Based on further observations, not many posters have been combined with other methods, such as games. The results of a systematic review show that combining posters with other media, such as games, videos, and e-mail, leads to higher application (56.3%) compared to only posters (18.7%) (Barik et al., 2019). Types of games in health education have different levels of effectiveness, and some researchers consider that games can give players a sense of enjoyment (Nakao, 2019). Thus, the combination with the game has the potential to be effective and provide a sense of enjoyment.

**Design Stage**

This stage is an advanced stage of the gap in the analysis stage. In this stage, we designed public-service advertising media such as posters. Then it was combined with a pinball game. The pinball game has an ergonomic shape, is

flexible, is easy for children to play, is matched in size, and has an attractive color combination. The game adds fun for children and is made into a printed poster (Muslimin, 2015). The Educational Game Tools provide these criteria for the target age of 10 years but need further SNI testing. Pinball game is one of the methods used in learning, which is considered effective in improving and motivating students. The results of research conducted by Ksatriani (2018) showed that the pinball game could increase motivation by 10.8% from 75.11% to 85.19%, with a gain score reaching 0.4%, which is in the medium category (Ksatriani, 2018). Learning math counting skills using pinball games is proven to improve math skills by more than 80% (Sari, 2022). Therefore, in this study, we developed posters combined with pinball games to invite COVID-19 vaccinations for elementary school children and their parents. The contents of the combination pinball game poster consist of information regarding the purpose of the vaccine, vaccine location, and vaccine dosage and are equipped with pinball games for children. The pinball game contains material related to COVID-19 prevention such as the use of masks, hand sanitizers, hand washing, and checking temperatures. The poster describes vaccine knowledge, while the pinball game is used as an attraction so the target can have a memorable experience reading the persuasive poster. The pinball game combination poster intended for elementary school-age children at an early stage is shown in Figure 1 part A.



**Figure 1.** Posters and pinball game

### Development Stage

The development stages are the stages in the development of poster products and pinball games. This stage involved several experts, such as media experts, health promotion experts, and academics. At this stage, it produces some input from several experts as expert

judgment prior to dissemination or field testing on a large scale. Poster and pinball game validation tests include aspects of format, content, language, and effectiveness. The following is a resume validation results through expert judgment.

**Table 1.** Resumes of Several Experts Validation Results

No	Validator	validator score				mean	qualification	Recommendation
		format	content	language	effectivity			
1	Media expert	2	3	2	3	2.5	Not good	Major revision
2	Health promotion expert	4	3.25	3	3	3.3	Very good	No revision
3	Academic (lecturer)	3	3.5	3	3,6	3.27	Good	Minor revision
mean						3.023	Good	Minor revision

The table shows that the average validation value reaches 3.023 with a good category and minor revision. Some of the inputs that have been generated are the compatibility of the poster and layout, as well as the entire poster and the use of language that is adapted to the target in elementary school children and parents. In use of solicitation words in posters, the poster form is adapted to the theme of the poster, namely the COVID-19 vaccination, so that it can be in the form of a COVID-19 vaccine bottle. Children prefer to choose the bright color in the poster because their eyes have not fully developed yet and the bright color is more stimulating and interesting (Saudin & Zainal, 2018). Bright colors for children are pink, red, yellow, green, purple and blue. These color preferences have the emotional aspect such as happy, strength, and excitement (Boyatzis, 1993). In the literature, it has been stated that young children prefer bright colors, but in primary education, they prefer pastel colors and tones (Kurnaz et al., 2022). The color of the poster is suggested to be pink and Tosca. Layout is suggested to be one groove when viewed so that the reader can only see vertically from top to bottom. One of the layout principles is sequence. Some sequences that are often encountered use letters such as Z, C, L, T, and I. This is to make it easier to read the information on the poster (Landa,

2011). The initial position of the pinball game is on the side. At the development stage, the pinball game is placed in a lower position. This study did not pre-test media with children directly due to research limitations. This research focuses on testing media based on experts and scientific references. This can be input for further research so that media can be pre-tested for children. Overall changes the posters and pinball games can be seen in Figure 1, part B.

### Implementation Stage

At this stage, the product that has been designed was tested on a small scale, in an elementary school with research subjects in grades 4 and 6 of elementary school. The number of students involved in this study, according to the completeness of the questionnaire, was 40 for children and 65 for parents. At the preparatory stage, the researcher prepared a questionnaire before the intervention was carried out aimed at children and parents. The research team also provided socialization or information related to posters and pinball games to grade 4 and 6 students in the class. As for parents, information was provided through social media by providing videos related to the poster and how to play the pinball game on the poster. The research team put up posters at school on the walls, which were intended to provide various information to students so that

students would not be unfamiliar with the addition of posters at school. A poster was posted at one point in the school. The poster was placed in an open place so that parents would be exposed to the information.

### Evaluation Stage

The evaluation stage is the last stage of a series of development research activities. This stage tests the effectiveness of promotional media calling for COVID-19 vaccination on the knowledge of children, parents, and parent's perceptions of COVID-19 vaccination. Questionnaires at this evaluation stage were given to children and parents after two weeks of implementation/intervention.

### Effect of Posters on COVID-19 Vaccination Knowledge

Knowledge about public service advertisements and COVID-19 vaccination in children before being given the pinball game combination poster obtained the results of knowledge with a fair level of 28 children (70%) with a score of 60-80 with an average score of 62. Meanwhile, after the intervention, there was an increase in the level of knowledge, and the average score was 83, which can be seen in Table 2.

**Table 2.** Knowledge Level of Children Before and After Intervention (n=40)

Knowledge	Category	Children n (%)
Pre test	Less	12 (30)
	fair	28 (70)
	good	0
	score average	62
Post test	Less	1 (2.5)
	Fair	27 (67.5)
	good	12 (30)
	score average	83

As for the results of the comparison of knowledge before and after giving posters and games, 26 children experienced an increase, and 14 children did not experience a gain after being given the intervention. The Wilcoxon test results showed ( $p=0.0001$ ). Statistically, it shows that  $p < 0.005$ , so there is a significant difference in knowledge between before and after giving the game combination poster. In line with research

conducted on nutrition awareness interventions through poster media, it shows effectiveness in early childhood (Winingsih et al., 2020).

One of the determining factors for the success of learning is the media. The media has the function of clarifying a message. The pinball game poster media combination in this study uses visualization that is in line with the target, elementary school-age children, cheerful colors, legible writing, and the form of a poster in the condition of a COVID-19 vaccination bottle. The child will be interested in the colors and images on the poster. Research conducted on nutritional disc media is increasingly being accepted by the target because it pays attention to the color and image aspects that are tailored to the target (Mahmudah & Sari, 2021). Visualization on posters is considered to be able to increase the effectiveness of information media by 40% in increasing one's knowledge (Okinarum et al., 2017) The visualization depicted through the poster is expected to be accepted so that it is captured by the five senses. The more the five senses are involved, the clearer the knowledge obtained will be. This is the principle of educational media (Mahmudah & Sari, 2021).

The combination of posters with pinball games is a strategy to get children interested in seeing posters repeatedly. A number of researchers have also provided posters placed in schools which have shown effectiveness but other strategies are needed so that children often witness the posters (Caesar, 2020; Winingsih et al., 2020). Playing pinball games can be an alternative to increase the frequency of exposure to COVID-19 vaccination posters. Pinball games are often used in the learning process. The pinball game is considered a cooperative learning model that is easy to apply to various age groups, involves the role of students as peer tutors, and contains elements of play and reinforcement (Kurniawan, 2019). Increased knowledge is expected to be capital in taking action. The action aimed in this poster call is the COVID-19 vaccination for elementary school-age children. A person's actions are influenced by the knowledge or cognition that has been obtained (Sidabutar & Sumantrie, 2021). COVID-19 vaccination measures for children are still accompanied by their

parents. The development of posters in this study involved children as well as parents.

Parental knowledge after giving the pinball game combination poster is described in Table 3. The level of parental knowledge was not tested based on before and after the intervention. This is because the data before the

intervention did not meet the number of samples. Based on Table 3, it was found that knowledge of the fair and good categories was higher in the female sex with statistically significant results. The other variables (occupation, income, education, child exposure, and age) are not statistically significant.

**Table 3.** Parental Knowledge of Public Service Advertisements and Vaccinations (n=65)

Variable	Group	N (%)		P-value
		Good and fair	less	
Gender	men	28 (46.7)	0	0.043
	women	32 (53.3)	5 (100)	
Working experience	work	37 (61.7)	2 (40)	0.342
	Does not work	23 (38.3)	3 (60)	
Income	< 2 million	42 (70)	3 (60)	0.639
	>2 million	18 (30)	2 (40)	
Education	low	14 (23.1)	1 (20)	0.971
	Middle	21 (35.0)	2 (40)	
	high	25 (41.7)	2 (40)	
Child exposure	+	9 (15)	0	0.351
	-	51 (85)	5(100)	
Age	<35	22 (36.7)	1 (20)	0.454
	>35	38 (63.3)	4 (80)	

chi-square trend

In general, the level of parental knowledge regarding COVID-19 vaccination is in the fair-good range. Parents' knowledge of COVID-19 vaccination is expected to be a domain factor so that they can vaccinate their children with against COVID-19 in elementary schools. Based on the results of initial observations that, less than 50% of elementary school-aged children in the target areas had not received the COVID-19 vaccination. Good knowledge of vaccinations is a factor for someone to take or receive a COVID-19 vaccination. This study shows that parents have good knowledge of vaccinations, so they play a significant role in carrying out COVID-19 vaccinations for their children in elementary schools (Bakrie et al., 2022). The attitude of acceptance of people in making decisions for the COVID-19

vaccination varies, some refuse and are enthusiastic (Bakrie et al., 2022).

Perceptions based on the TPB (theory of planned behavior) theory of parents toward COVID-19 vaccination after being given an intervention can be seen in Table 4. The perceptions used in this study were positive attitudes and subjective norms of parents towards co-19 vaccination. Based on Table 4, it can be seen that parents have a positive attitude towards the perception of COVID-19 vaccination. Parents agree that primary school-aged children are given the COVID-19 vaccination, and there is an attitude toward the importance of giving the vaccine, the function of the vaccine, and its effectiveness. In addition, the family also plays a role in administering the COVID-19 vaccination.

**Table 4.** Parental Perceptions of COVID-19 Vaccination Based on TPB Theory (n=65)

Perception	Strongly disagree	Disagree	Agree	Strongly agree
<b>Positive Attitude of Parents on COVID-19 Vaccination</b>				
Parents need to consider supporting the COVID-19 vaccine for their children	1 (1.4)	14 (20.3)	35 (50.7)	15 (21.7)
The COVID-19 vaccine is essential for elementary school-age children.	-	18 (26.1)	31 (44.9)	16 (23.2)

The COVID-19 vaccine is effective in protecting elementary school-age children.	-	17 (24.6)	34 (49.3)	14 (20.3)
The COVID-19 vaccine can contribute to controlling the spread of transmission in Indonesia	3 (4,3)	10 (14.5)	36 (52.2)	16 (2.2)
<b>Subjective norm</b>				
The family plays a supportive role in administering vaccines to children	3 (4.3)	14 (20.)	34 (49.3)	14 (20.3)

This study discusses parents' perceptions of COVID-19 vaccination after being given an intervention at school. Parents' perceptions of the COVID-19 vaccination after being given the pinball game combination poster can be seen in Table 4. Parents showed positive perceptions. This perception is based on the theory of planned behavior with positive attitude variables and subjective norms. Regarding positive attitudes, it was found that parents generally agreed that parents would consider co COVID-19 vaccination for their children who were still in elementary school. This is felt by parents about the importance of the COVID-19 vaccine for children. This is one way to prevent the transmission of COVID-19 that occurs in children. Parents also have a good perception of the effectiveness of the COVID-19 vaccination. The effectiveness of the COVID-19 vaccine is the reason for someone to make a decision to vaccinate and control the spread of COVID-19 (Bakrie et al., 2022).

Promotional media for the invitation to COVID-19 vaccination in Indonesia range from print to digital, with various targets from children to the elderly. The promotional media for the invitation to the COVID-19 vaccination uses a communication strategy so that the target audience can understand well, maintain motivation, and accept the information that has been provided. Print media is one of the media that can be used for public service advertisements. Posters calling for COVID-19 vaccination for children are aimed explicitly at elementary school-age children (6-12 years). This poster contains a call for COVID-19 vaccination, vaccination functions, and places for vaccination services. Besides that, it is equipped with pinball games. This pinball game is intended for children, and parents or teachers can also accompany this game. The pinball game in the vaccination invitation poster can attract children, so

children will often be exposed to information from the poster or the pinball game.

## CONCLUSION

The combination of posters and pinball games on the call for COVID-19 vaccination can be an alternative media for public service advertisements, especially in elementary schools. This can be seen based on the increase in elementary school children's knowledge scores before and after the intervention, and there is a significant difference. Parental knowledge of vaccination is at a fair to good level. The attitude of parents toward the COVID-19 vaccination after being given posters and pinball games at school showed a positive attitude. It is hoped that knowledge and a positive attitude will form positive actions toward the invitation to vaccinate against COVID-19 for elementary school-age children. The weakness in this study is that the intervention was only carried out for two weeks, so changes in behavior could not be seen; The number of samples between children and parents should have been the same; The media, particularly in pinball design, remains very rudimentary, necessitating further enhancements to foster heightened levels of student engagement and attentiveness and this study did not pretest media directly to children. Suggestions are for schools and health centers to be able to collaborate to increase children's and parents' knowledge regarding health, including information about vaccination invitations, so that vaccination coverage is wider. One of the media that can be used to disseminate information is posters combined with games.

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## *The Correlation of Sociodemographic Status, Knowledge and Attitudes with Pregnant Women's Practice Regarding COVID-19 Vaccination*

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### ABSTRACT

**Background:** Pregnant women become a high-risk group that could get infected with COVID-19 during the pandemic. Maternal mortality also has increased during the COVID-19 pandemic. Based on this, vaccination for COVID-19 becomes one of the ways to prevent the transmission of COVID-19 to pregnant women. However, there are still high doubts about the vaccine for COVID-19, especially among pregnant women. As such the authors are interested in seeing the correlation between sociodemographic status, knowledge, and attitudes with pregnant women's practice regarding COVID-19 vaccination. **Objective:** This study focused on evaluating the correlation of sociodemographic status, knowledge and attitudes with pregnant women's practice regarding COVID-19 vaccination. **Methods:** This cross-sectional study was performed on 136 pregnant mothers determined through purposive sampling method and implemented from February-March 2023 at Kassi-Kassi Public Health Center using a questionnaire consisting of respondent characteristics, knowledge related to COVID-19 vaccination, and attitudes toward the COVID-19 vaccination. The analysis of the data was done univariately, then bivariate using a comparative Chi-square test. **Results:** The correlation between variables was analyzed using the Chi-Square comparison test and significant correlation was obtained for parity ( $p$ -value;  $0.000 < 0.05$ , OR; 1.91, CI; 1.55-2.34), age ( $p$ -value;  $0.000 < 0.05$ , OR; 33.67, CI; 11.04-102.63), work status ( $p$ -value;  $0.045 < 0.05$ , OR; 3.40, CI; 1.10-10.47), educational level ( $p$ -value;  $0.040 < 0.05$ , OR; 2.77, CI; 1.14-6.72), knowledge ( $p$ -value;  $0.000 < 0.05$ , OR; 8.45, CI; 3.64-19.61), and attitude ( $p$ -value;  $0.000 < 0.05$ , OR; 9.20, CI; 3.88-21.78). However there is a non-significant correlation for the monthly income category ( $p$ -value:  $0.269 > 0.05$ , OR; 2.18, CI; 0.69-6.86). **Conclusion:** There is a significant correlation between sociodemographic status (parity, age, work status, and educational level), knowledge, and attitude with pregnant women practices regarding COVID-19 vaccination.

**Keywords:** Attitudes, Covid-19 Vaccination, Knowledge, Practice, Pregnant Women

### INTRODUCTION

The World Health Organization (WHO) announced the emergence of Coronavirus Disease 2019 (COVID-19) in February 2020. As for Indonesia, the first case of COVID-19 was announced in March 2020. In this first case, two cases were found and since then it has continued to increase until finally in July 2021 the number of daily cases reached 51,000 new cases with a death rate of 2,000 cases per day (Burhan et al., 2022).

Pregnant women become a high-risk group that could get infected by COVID-19 (Dashraath et al., 2020). Based on research conducted by Antoun et al. (2020), from 23 patients with positive results for COVID-19, 70% of the patients were Asian. The severity of symptoms ranged from mild in 65.2% of patients, moderate in 8.7%, and severe in 34.8%. Approximately 17.4% (four cases) had severe respiratory distress syndrome which required ICU support, and 4.3% (one case) resulted in maternal death (Antoun et al., 2020).

The mortality of pregnant women in Indonesia has also increased during the COVID-19 pandemic. According to the data from POGI until April, about 16 people died among 536 pregnant patients that were exposed to COVID-19 or it is estimated that for every 1000 pregnant women, 32 of them died. That is more than 10 times than in non-pandemic conditions with the average maternal mortality rate being three deaths for every 1000 pregnant women (Perkumpulan Obstetri dan Ginekologi Indonesia, 2020).

The spread of COVID-19 has also raised concerns about intrauterine transmission from mother to fetus in pregnant women. Complications that can occur in a fetus with a mother infected with COVID-19 are miscarriage (2%), Intra Uterine Growth Restriction (IUGR; 10%), and premature birth (39%) (Sass et al., 2017).

Based on this, in addition, to the modification of health services for pregnant women, COVID-19 vaccination became one of the solutions to reduce or even prevent transmission of COVID-19 to pregnant women (Burhan et al., 2022). However, there are still high doubts about the COVID-19 vaccination, especially among pregnant women. Based on research conducted by Simanjorang et al. (2022) in a rural area on the Indonesia-Philippines border island, among 557 participants, the prevalence of vaccine hesitancy was high, namely 63.9% of the total respondents (Simanjorang et al., 2022).

To reduce the spread of the disease, the vaccine uptake should be approximately 67%-80% in the general population, but the acceptance of the COVID-19 vaccine especially among pregnant women, is different in every country around the world (Skjefte et al., 2021). The hesitancy toward vaccines has become a global health threat, which was pointed out by WHO in 2019 (Goncu Ayhan et al., 2021).

According to the data from Makassar City Health Office at 2022, in Kassi-Kassi Public Health Center, among 1800 pregnant women that have been registered there, only 50% already got COVID-19 vaccination. However, this percentage was two times higher than the other Public Health Centers in the same work area. This could happen due to the

health promotion performed by the health workers in that Public Health Center.

Due to the high doubts and to increase awareness toward the benefits of taking COVID-19, especially among pregnant women, there are some factors that should be analyzed so there could be an intervention to increase the uptake of the COVID-19 vaccination. That leads the authors to evaluate the correlation of sociodemographic status, knowledge and attitudes with pregnant women's practice regarding COVID-19 vaccination.

## METHODS

This research was from February-March 2023. The research design is quantitative analytic with a cross-sectional study approach. The study was conducted on 136 pregnant women in the working area of the Kassi-Kassi Public Health Center. The sampling method used in this study was purposive sampling. Data collection in this study was carried out through questionnaires that were distributed directly to the respondents.

The criteria for the respondents in this study were women with a gestational age of more than 12 weeks to 33 weeks and who were willing to be respondents. The exclusion criteria were mothers who could not read and write, mothers with unwanted pregnancies, mothers with psychiatric disorders, and mothers who previously had COVID-19 vaccination contraindications.

The instruments in this study consisted of respondent characteristics (parity, age, work status, education level, monthly income, COVID-19 vaccination status), a knowledge questionnaire modified from research by Mohamed et al. (2021), and a modified attitude questionnaire from the study of Galanis et al. (2021). The knowledge and attitude questionnaires were both translated into Indonesian and validated among 20 pregnant women (with each item has values  $<0.05$ ) with Cronbach's alpha values of 0.741 and 0.864, respectively.

The data were analyzed using univariate and then Chi-square comparative tests for the bivariate analysis to see the correlation between sociodemographic status, knowledge, and attitudes toward pregnant women's practice regarding COVID-19 vaccination. This study used ethics from the Health

Research Ethics Committee at Alauddin State Islamic University Makassar with

number: E.49/KEPK/FKIK/II/2023.  
**RESULTS AND DISCUSSION**

**Table 1.** Distribution of Sample Characteristics

Characteristics of Respondents	N	%
<b>Parity</b>		
Primiparous	56	41.2
Multiparous	80	58.8
<b>Age</b>		
Risked (<20 and >35 years)	35	25.7
Unrisked (20-35 years)	101	74.3
<b>Work Status</b>		
Employed	32	23.5
Unemployed	104	76.5
<b>Education Level</b>		
<12 years	26	19.1
≥12 years	110	80.9
<b>Monthly income</b>		
≤IDR 3,000,000,-	112	82.4
>IDR. 3,000,000,-	24	17.6
<b>Knowledge</b>		
Lack of Knowledge	46	33.8
Good Knowledge	90	66.2
<b>Attitude</b>		
Negative Attitude	37	27.2
Positive Attitude	99	72.8
<b>COVID-19 Vaccination Status</b>		
Not vaccinated	38	27.9
Vaccinated	98	72.1

Table 1 shows the distribution of the characteristics of the respondents from 136 samples consisting of parity, age, work status, education, and monthly income. In maternal parity, there were more mothers with multiparity (58.8%) than mothers with primiparity (41.2%). The age of the respondents mostly is in the range of unrisked age (20-35 years) (74.3%), and there are some with risk age (<25 and >35 years) (25.7%). The biggest distribution of work status is unemployed (76.5%) followed by a small percentage of employed respondent (23.5%). The education level mostly taken by pregnant

women was ≥12 years (80.9%) and there are some with <12 years education level (19.1%). The monthly income earned by the mother's family was mostly ≤IDR 3,000,000,- (82.4%) followed by a small group with total income >IDR 3,000,000,- (17.6%).

As for the knowledge and attitudes, it can be seen that the majority of respondents have good knowledge (66.2%) and a positive attitude (72.8%) about the COVID-19 vaccination. As for the status of the COVID-19 vaccination, it can be seen that the majority of respondents already had the COVID-19 vaccination (72.1%).

**Table 2.** Analysis of Correlation between Sociodemographic Status toward Pregnant Women's Practice for COVID-19 Vaccination

Sociodemographic Characteristics	Practice Regarding COVID-19 Vaccination						P-value	OR	95% CI	
	Vaccinated		Unvaccinated		Total				Lower	Upper
	N	%	N	%	N	%				
<b>Parity</b>										
Primiparous	56	100.0	0	0.0	56	41.2	0.000	1.91	1.55	2.34
Multiparous	42	52.5	38	47.5	80	58.8				

<b>Age</b>										
Riskd (<20 and >35 years old)	0	0.0	35	100.0	35	25.7	0.000	33.67	11.04	102.63
Unriskd (20-35 years old)	98	97.0	3	3.0	101	74.3				
<b>Work</b>										
Working	28	87.5	4	12.5	32	23.5	0.045	3.40	1.10	10.47
Unemployed	70	67.3	34	32.7	104	76.5				
<b>Education Level</b>										
<12 Years	14	53.8	12	46.2	26	19.1	0.040	2.77	1.14	6.72
≥ 12 Years	84	76.4	26	23.6	110	90.9				
<b>Monthly Income</b>										
≤IDR 3.000.000	78	69.6	34	40.4	112	82.3	0.269	2.18	0.69	6.86
>IDR 3.000.000	20	83.3	4	16.7	24	17.7				

Table 2 shows the bivariate analysis using the Chi-square test for the correlation of sociodemographic status regarding the respondent's practice for COVID-19 vaccination.

For maternal parity and practice toward COVID-19 vaccination, the number of primiparous women that have been vaccinated is higher (100%) than the multiparous women that have been vaccinated (52.5%) with the *p-value* for the parity 0.000 (OR: 1.91, CI: 1.55-2.34).

This also applies to age, where pregnant women with unrisking age are more willing to be vaccinated (97%) than pregnant women with risking age (0%) with the *p-value* for the age 0.000 (OR: 33.67, CI: 11.04-102.63).

As for the work status, both of the pregnant women that having a job and unemployed, mostly have been taking the vaccine (87.5% and 67.3%). But there are a small amount from both category that are not vaccinated (12.5% and 32.7). For the *p-value* of work status is 0.045 (OR: 3.40, CI: 1.10-10.47).

In the other category, which is educational level, pregnant women with

≥12 years of education are more willing to take vaccination (76.4%) than the pregnant women with <12 years of education (53.8%) with the *p-value* for the educational level 0.040 (OR: 2.77 CI: 1.14-6.72).

Meanwhile for the monthly income, whether pregnant with a monthly income of ≤IDR 3,000,000 or >IDR 3,000,000, more choose to vaccinate (69.6% and 83.3%) but in terms of number, more of the respondents who vaccinate are pregnant women with a monthly income of ≤IDR 3,000,000 with the *p-value* for the monthly income 0.269 (OR: 2.18, CI: 0.69-6.86).

This study show that most of the sociodemographic status (the parity, age, work status, and educational level) as having a significant correlation toward pregnant women practice regarding COVID-19 vaccination with the *p-value*<0.05 respectively and only one aspect (monthly income) with no significant correlation toward pregnant women practice regarding COVID-19 vaccination with the *p-value*>0.05.

**Table 3.** Analysis of Correlation between Knowledge and Attitudes toward Pregnant Women's Practice for COVID-19 Vaccination

Variable	Practice Regarding COVID-19 Vaccination						<i>P-value</i>	OR	95% CI	
	Not Vaccinate		Vaccinate		Total				Lower	Upper
	N	%	N	%	N	%				
<b>Knowledge</b>										
Less Knowledge	2	56.	2	43.	4	33.	0.000	8.4	3.6	19.6
Good Knowledge	6	5	0	5	6	8				
Attitude										
Negative Attitude	1	13.	7	86.	9	66.	0.000	9.2	3.8	21.7
	2	3	8	7	0	2				
	2	62.	1	37.	3	27.	0	0	8	8
	3	2	4	8	7	3				

Positive	1	15.	8	84.	9	72.
Attitude	5	2	4	8	9	8

Table 3 shows the bivariate analysis using the Chi-square test for the correlation of knowledge and attitude with the respondent's practice for COVID-19 vaccination. For knowledge and practice toward COVID-19 vaccination, most of the pregnant women that possess good knowledge about COVID-19 vaccination have been vaccinated (86.7%), and only a small number of pregnant women had good knowledge but didn't vaccinate (13.3%). Meanwhile, pregnant women with less knowledge about the COVID-19 vaccination mostly didn't do the COVID-19 vaccination (56.5%). However, some pregnant women have less knowledge but vaccinate (43.5%). The results in this study obtained a *p-value* between knowledge of pregnant women and COVID-19 vaccination precautions of 0.000, <0.05.

As for attitudes and practice toward COVID-19 vaccination, most pregnant women with a positive attitude chose to vaccinate against COVID-19 (85%) and there were a small number who chose not to vaccinate against COVID-19 (15%). Meanwhile, pregnant women who have a negative attitude regarding COVID-19 and vaccination prefer not to vaccinate (62.2%), but there are still some pregnant women who still choose to vaccinate against COVID-19 (37.8%). This study found that the *p-value* between attitude and practice toward COVID-19 vaccination was 0.000, <0.05.

### Discussion

The study about the side effect of the COVID-19 Vaccination for pregnant women was still limited. This happened because the trial of the COVID-19 vaccine from all companies excluded pregnant women as their trial sample (Leik et al., 2021). However, there are only a few cases that result in severe side effects. Most of the side effects that occur were local side effects, such as injection site pain, and the main systemic side effect was fever (Alinaghi et al., 2022).

Other local and systemic side effects were as follows: rash, fever, severe fatigue, arthralgia, myalgia, headache, sore arm or pain, fatigue, chills, nausea, vomiting, sweating, feelings of joy, joint pain, swelling,

flushing, reduced mental clarity, itching, decreased appetite, decreased sleep quality, palpitations or increased heart rate, heat or cold intolerance, anxiety, heartburn, muscle spasm, nasal congestion, increase in sleep, swollen lymph node and sore throat, dizziness, stomachache, clogged ears, general weakness, non-specified pain, and eye burning or blurred vision (Alinaghi et al., 2022).

Although clinical trial data are not yet available to verify the safe use of the COVID-19 vaccine in pregnancy, a precedent of the effort of past immunizations and the current pandemic provide strong support for vaccination. SARS-CoV-2 infection increases the likelihood of a poor outcome for mother and baby, which could be prevented by vaccination (Chavan et al., 2021).

### 1. Correlation between sociodemographic status and pregnant women's practice toward COVID-19 vaccination

In this study, it has been found that there is a significant correlation between some of sociodemographic aspects, namely parity, age, work status, and educational level. It is shown that primiparous women were more likely to take the COVID-19 vaccine than multiparous women. This result was in line with the study conducted by Bhattacharya et al. (2022) which found that multiparous women had a lower acceptance toward COVID-19 vaccine (41%) than primiparous women (59%). This could happen probably because multiparous women have a higher confidence in giving birth so they didn't concern for the effect of COVID-19.

As for the age, this study has shown that women within age of 20-35 (unrisked age) are taking the vaccine even more than the women with age <20 and >35 (risked age). This can be due to women aged 20-35 having a better and more mature mindset than women aged <20 years. Similarly, women >35 years old have difficulty digesting information and lack in literacy, causing hesitancy toward COVID-19 vaccination (Abedin et al., 2021).



In other aspect, which is work status, this study has found that mostly women taking the COVID-19 vaccine are unemployed. But in terms of the percentage, women working are mostly taking the COVID-19 vaccination (87%) more than unemployed women (67%). This can be due to the influence or policies implemented by companies or workplaces that require their members to be vaccinated.

Furthermore in this study, for educational level, women with  $\geq 12$  years of education are more likely to be vaccinated than women with  $< 12$  years of education. This result was supported by the research from Abedin et al. (2021) that found pregnant women with at least 12 years of formal education are having a higher acceptance than the women that hadn't completed 12 years of education (Abedin et al., 2021).

However, it has been found that monthly income does not significantly affect pregnant women's practices toward COVID-19 vaccination. In this study, there are more pregnant women with  $\leq$  IDR 3,000,000 who are vaccinated than women with monthly income  $>$  IDR 3,000,000. This result was in line with the study from Sezerol and Davun, (2023) which found that the lower income of the pregnant women, the lower of hesitancy toward COVID-19 vaccination. This may be because people with higher incomes have easier access to more sources that may be effective in spreading misinformation on social media, and other misinformation.

## 2. Correlation between knowledge and pregnant women's practice toward COVID-19 vaccination

Knowledge is a collection of information that is produced through a sensing process and underlies the formation of a belief from an individual (Notoatmodjo, 2012). Related to the Lawrence-Green behavioral theory, knowledge is associated as a predisposing factor that will determine one's behavior related to health, such as decisions regarding taking COVID-19 vaccinations as a precaution against COVID-19 (Pakhpahan et al., 2020). In this study, knowledge was tested through the Chi-square comparison test and a relationship was found between pregnant women's knowledge and the practice toward COVID-19 vaccination.

The results obtained in this study are supported by research conducted by Tao et al. (2021) using the cross-sectional method with a sample size of 1392, which obtained a p-value of 0.01,  $< 0.05$  which showed that the higher the knowledge of pregnant women regarding COVID-19 vaccination, the higher they wanted to receive the vaccination (Tao et al., 2021). In another study conducted by Nurdin et al. (2021) using the cross-sectional method on 220 pregnant women, there was found a relationship between the behavior of pregnant women and the level of knowledge of respondents about the transmission of COVID-19 with a p-value  $*0.001 < 0.05$  (Nurdin et al., 2022). The results obtained by Mose and Yeshaneh (2021) through a cross-sectional study found that among 396 pregnant women, those with a good level of knowledge regarding COVID-19 and how to prevent it are easier to take the COVID-19 vaccine compared to pregnant women with lesser knowledge (Mose & Yeshaneh, 2021).

In another study conducted by Aynalem et al. (2022), knowledge is one of the significant factors to encourage pregnant women to take the COVID-19 vaccine. Pregnant women with good information about COVID-19 are about two times more likely to receive a COVID-19 vaccine than their counterparts. That could be explained because pregnant women with good knowledge of the COVID-19 vaccine realize the risk of the COVID-19 virus for themselves and their fetuses so they need to take the COVID-19 vaccine to prevent the risk. In addition, pregnant women with good knowledge about the COVID-19 vaccine will understand more about the benefits of the COVID-19 vaccination program (Aynalem et al., 2022).

Metacognitive knowledge is a combination of all types of knowledge that is influenced by several factors, such as education (formal or non-formal) which is the intellectual foundation for acquiring and understanding knowledge (Irwan, 2017). Age is also a factor for an individual in capturing and processing knowledge growing (Hoff et al., 2018).

## 3. Correlation between attitudes and pregnant women's practice toward COVID-19 vaccination

Attitude is a closed reaction or response from someone to a stimulus or

object, in other words attitude is a person's readiness to act. Attitude is not yet an action or activity, but is a predisposition to a behavior (Pakhpahan et al., 2020). In this study, attitudes were tested through the Chi-square comparison test of bivariate analysis and the results showed that there was a correlation between attitudes with pregnant women's practice for COVID-19 vaccination.

The results of this study are supported by research conducted by Anjelika and Indarjo (2022) as well as Anggrek, Asmin, and Saija (2023), which showed a significant correlation between attitude and participation in COVID-19 vaccination with p-values of 0.027 and 0.002, respectively ( $p < 0.05$ ) (Anggrek et al., 2023; Anjelika & Indarjo, 2022). In a study conducted by Pairat and Phaloprakarn (2022), the number of pregnant women who had been vaccinated against COVID-19 and had a positive attitude was 61.4% of the 171 pregnant women who were respondents. This shows that most pregnant women who vaccinate against COVID-19 have a positive attitude toward vaccination (Pairat & Phaloprakarn, 2022).

As for the research conducted by Taye et al. (2022), respondents who came from pregnant women and women who had given birth having a positive attitude toward vaccines were 8.54 times more likely to receive the COVID-19 vaccine than respondents who had negative attitudes (Taye et al., 2022). This is possible because respondents who have a positive attitude can trust information related to vaccines and comply with instructions given by different guidelines. Another reason is that respondents who have a positive attitude toward vaccines can receive vaccines because of their high desire and willingness to prevent the disease.

According to the theory of planned behavior, a person will comply with a certain behavior or not, in this case getting a COVID-19 vaccination, depending on three main factors. These factors are i) a person's attitude toward vaccination in general and COVID-19 vaccination in particular; ii) attitudes of 'important people' about vaccines; iii) Difficulties or obstacles that are felt in carrying out the behavior, in this case, the obstacles that arise when wanting to

do the COVID-19 Vaccination (Cordina et al., 2021).

Good knowledge and a positive attitude toward COVID-19 vaccination will further boost self-confidence and a desire to vaccinate. Vice versa, lack of knowledge and negative attitudes toward COVID-19 vaccination will cause doubts and reluctance to vaccinate. Specifically in Indonesia, several factors that raise doubts about the COVID-19 vaccination include age, history of co-morbidities, low information about COVID-19, the halalness of the COVID-19 vaccine which is less known considering that Indonesia itself is a country with a majority Muslim population, and distrust of the effectiveness of the COVID-19 vaccine to prevent infection (Anggrek et al., 2023). Good health education and promotion related to COVID-19 vaccination is the key to increasing the acceptance of COVID-19 vaccination in the community, especially among pregnant women.

However, this study has some limitations. In terms of data collection; the distribution of questionnaires took a long time because questionnaires were distributed directly so that they could only be received and filled out by respondents who were present on the spot. This study also only focused on pregnant women and doesn't include the husband even though they have a big role in influencing their pregnant wife to take the COVID-19 vaccine. Also, this study only focused on the COVID-19 vaccine; as the pandemic has passed, the interest to take a review about COVID-19 vaccine will be lesser.

## CONCLUSION

According to the result and discussion about this research, from 136 pregnant women, most of pregnant women that have been vaccinated (72%) are primiparous, 20-35 years old, working, have  $\geq 12$  years of education, but with monthly income  $\leq$  IDR 3,000,000. Also, most of them are having a good knowledge and positive attitude toward COVID-19 vaccination. Pregnant women with these characteristics have shown a higher acceptance toward COVID-19 vaccination. This can be a benchmark to focus more on educating and promoting about COVID-19 vaccination for pregnant women with multiparity, risk age ( $< 20$  and

>35 years), not working, education <12 years, monthly opinion >IDR 3,000,000, have less knowledge and negative attitude related to COVID-19 vaccination so that they have more accurate and precise information related to COVID-19 vaccination and increase the uptake for COVID-19 vaccine among pregnant women.

Researchers hope that the data and information obtained from this research can be an additional reference for health service providers, governments, and institutions to improve health promotion efforts and encourage the uptake of COVID-19 vaccinations, especially for the Kassi-Kassi Public Health Center, which could provide more valid information for all the pregnant women to increase their knowledge and create a positive attitude, especially for those who still afraid to take the COVID-19 vaccine.

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## Analysis of Socio-Demographic Factors Influencing Anxiety in Hemodialysis Patients

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### ABSTRACT

**Background:** Advanced chronic kidney disease patients need hemodialysis, the most used method of renal replacement therapy today. The patient will receive hemodialysis therapy for the rest of their life so that it can have a psychological effect like anxiety. **Aims:** This study aims to examine the socio-demographic variables affecting anxiety in hemodialysis patients. **Method:** This research used a cross-sectional analytical observational study design. A total sampling technique was used in this research. From 113 outpatient hemodialysis patients in March 2023, 80 samples of patients at Roemani Semarang Hospital met the inclusion and exclusion criteria. Inclusion criteria were patients undergoing hemodialysis at Roemani Semarang Hospital who were willing to participate in the study. Exclusion criteria were incomplete questionnaires, patients with impaired consciousness, patients with communication disorders, and patients using anti-anxiety medication. The information collected was primary information from questionnaires and interviews. The data were tested using the Spearman test with a significance level of  $p < 0.05$  for age and family support, and the chi-square test for gender, employment, and educational status. **Results:** The statistical analysis showed a  $p$ -value of 0.704 for age, a  $p$ -value of 0.020 for gender, a  $p$ -value of 0.558 for employment, a  $p$ -value of 0.138 for educational level, and a  $p$ -value of 0.000 for family support. **Conclusion:** The results showed a significant relationship between gender and family support with anxiety levels. The higher the family support, the lower the anxiety level. There is no relationship between age, employment, and education level with the anxiety level of patients undergoing hemodialysis at Roemani Semarang Hospital.

**Keywords:** Anxiety, Hemodialysis, Socio-demographic factors.

### INTRODUCTION

A steady loss of renal function and irreparable kidney damage characterize chronic kidney disease (CKD). Glomerulonephritis, diabetes mellitus, and hypertension lead to kidney injury. Hemodialysis, the most widely used treatment method, is necessary for patients in advanced stages of renal replacement therapy (Jesus et al., 2019).

The purpose of hemodialysis is to prolong the patient's life. Still, it can occasionally harm the patient's quality of life by altering daily routines and lifestyles, such as long-term medication use, water intake restrictions, work schedule disruptions, physical and nutritional limitations, and dependence on treatment schedules. In addition to diminished sex life, existential struggles, and spiritual distress, CKD patients

experience these conditions, exacerbating their physical and psychological problems. These disorders can result in a deterioration in quality of life and physical, mental, and emotional disability (Jesus et al., 2019; (Huang et al., 2021).

Patients undergoing long-term hemodialysis also face various problems, including financial difficulties, difficulty maintaining employment, depression, and fear of death (Fadlilah, 2019). Patients' emotional and psychological needs are frequently disregarded in routine medical practice (Mosleh et al., 2020). These psychiatric comorbidities have the potential to impact the patient's prognosis and mortality if they are ignored. Physicians are increasingly required to evaluate and treat CKD patients with psychological comorbidities (Goh and Griva, 2018).



Hemodialysis therapy in CKD patients is continuous until the end of the patient's life and can, therefore, have a physical, psychological, social, and economic impact on patients. The physical effects experienced by patients, such as weakness, nausea, vomiting, chills, headaches, fatigue, sleep disturbances, back pain, hypotension, and itching, can cause patients to experience limitations and reductions in their activities, affecting their work and economic conditions. In addition, the main psychological problems experienced by patients are such as feelings of guilt for being a burden on others, difficulty accepting their condition, stress, anxiety, frustration, depression, boredom, and indifference (Kao *et al.*, 2020) (Husna, Rohmah and Pramesti, 2021).

These psychiatric comorbidities have the potential to impact the patient's prognosis and mortality if they are ignored. Physicians are increasingly required to evaluate and treat CKD patients with psychological comorbidities and indirect suicide attempts (Thomas Nti and Frances Emily, 2021). Compared to other chronic diseases like diabetes or congestive heart failure, their incidence is significantly higher. In addition to depression, patients also suffered from anxiety with about 50% of patients showing increased levels of anxiety (Qawaqzeh *et al.*, 2023). People with chronic renal disease who are receiving hemodialysis experience anxiety. Anger, nervousness, body tremors, sadness, increased vital signs, and frequent repetition of questions are the characteristics of anxiety. Anxiety is a state that arises when there is a threat of helplessness or lack of control, feelings of loss of function and self-esteem, failure of defenses, and feelings of isolation (Sipayung, 2020). Concerning CKD patients, anxiety significantly affects clinical and psychosocial results (Huang *et al.*, 2021).

Several studies have investigated possible social, clinical, and psychological factors associated with anxiety in patients with CKD. Several socio-demographic characteristics contribute to anxiety, such as age, gender, ethnicity, education, employment, and social support (Goh and Griva, 2018). There is a lack of similar research in the city of Semarang. Therefore, it would be interesting to find out if socio-demographic factors such as

age, gender, educational level, employment, and family support significantly affect anxiety among hemodialysis patients. This study analyzes the socio-demographic characteristics affecting patients' anxiety while receiving hemodialysis at Roemani Semarang Hospital, where the number of chronic kidney disease patients who undergoing hemodialysis at Roemani hospital Semarang is increasing from year to year.

## METHODS

### Study design

This research used a cross-sectional analytical observational study design.

### Sampling

Total sampling is the sampling technique used in this research. From 113 outpatient hemodialysis patients in March 2023, 80 samples of patients at Roemani Semarang Hospital met the inclusion and exclusion criteria. Inclusion criteria: patients undergoing hemodialysis at Roemani Semarang Hospital who were willing to participate in the study. Exclusion criteria: incomplete questionnaire, patients with impaired consciousness, patients with communication disorders, patients using anti-anxiety medication.

### Data source

The study's instrument was a questionnaire asking participants about their identities, including age, gender, education level, and employment status. The Zung Self-Rating Anxiety Scale was used to measure anxiety levels. A Likert scale questionnaire was the method used in this study to measure family support.

### Data analysis

The data were tested using the Spearman test with a significance level of  $p < 0.05$  for age and family support and the chi-square test for gender, employment, and educational status.

### Ethical approval

This research has received an ethically proper decision by the issuance of a letter by the Health Research Ethics Commission (KEPK) Faculty of Medicine Universitas Muhammadiyah Semarang No. 025/EC/KEPK-FK/UNIMUS/2023 according to the seven ethical standards of WHO 2011.

**RESULTS AND DISCUSSION**

**Table 1.** Frequency distribution of hemodialysis patients

Variable	Frequency	Percentage (%)
<b>Gender</b>		
Male	50	62.50
Female	30	37.50
<b>Employment</b>		
Yes	35	43.80
No	45	56.20
<b>Educational level</b>		
Not school	3	3.80
Elementary school	9	11.30
High School	47	58.75
College	21	26.25
<b>Family Support</b>		
Poor	0	0
Moderate	15	18.8
Good	65	81.3
<b>Anxiety Level</b>		
Low	63	78.75
Moderate	17	21.25
High	0	0
<b>Total</b>	<b>80</b>	<b>100</b>

**Table 2.** Age, family support and anxiety level in patients undergoing hemodialysis.

Variable	Minimum-Maximum	Mean	Standard Deviation
Age	21 - 81	51.73	11.96
Family Support	40 - 76	62.01	8.51
Anxiety	21 - 58	30.72	10.80

Age	21 - 81	51.73	11.96
Family Support	40 - 76	62.01	8.51
Anxiety	21 - 58	30.72	10.80

The youngest respondent was 21 years, and the oldest was 81 years. The average age of the respondents was 51.73 years. The majority of 50 respondents (62.5%) were male. Most respondents don't have any job, with 45 respondents (56.2%). Most respondents, 65 (81.3%), had family support that was considered good. Most respondents, 47 (58.75%), had the latest secondary education. On the other hand, only three (3.75%) respondents did not go to school. The analysis results in the table show that the majority of 63 respondents, with a percentage of 78.75%, have a low level of anxiety. The average score for family support is 62.01, and the average for anxiety is 30.72.

**Table 3.** Spearman correlation test results between age and family support with anxiety levels.

Variable	r	p-value
Age	- 0.043	0.704
Family support	- 0.625	0.000

**Table 4.** Chi-square test results between gender, employment, and educational level with anxiety levels.

Variable	Anxiety Level				Total		p-value
	Low		Moderate		n	%	
	n	%	n	%			
<b>Gender</b>							
Male	44	88	6	12	50	100	0.020
Female	19	63.33	11	36.67	30	100	
<b>Employment</b>							
Yes	26	74.28	9	25.71	35	100	0.558
No	37	82.22	8	17.78	45	100	
<b>Educational Level</b>							
No	3	100	0	0	3	100	0.138
Elementary School	5	55.55	4	44.45	9	100	
High School	40	85.10	7	14.90	47	100	
College	15	71.42	6	28.58	21	100	

From the analysis of the relationship between gender and anxiety level, it was found that there were 44 (88%) male respondents who had mild anxiety levels. In comparison, 19 (63.33%) female

respondents had mild anxiety. The results of the chi-square test obtained a value of  $p = 0.020$ . It can be concluded that there is a relationship between gender and the anxiety level of CKD patients undergoing



hemodialysis at Roemani Semarang Hospital.

From the analysis of the relationship between employment and anxiety level, we obtained data that as many as 26 (74.28%) respondents with jobs have mild anxiety levels. In comparison, 37 (82.22%) respondents without a job have mild anxiety. The results of the chi-square test obtained a p-value = 0.558. It can be concluded that there is no relationship between the job and the anxiety level of CKD patients undergoing hemodialysis at Roemani Semarang Hospital.

The results of the Spearman correlation test between age and anxiety level obtained a p-value = 0.704 and a value of  $r = -0.043$ . It can be concluded that there is no relationship between age and anxiety level of CKD patients undergoing hemodialysis at Roemani Semarang Hospital. The older age, the lower the anxiety level detected of CKD patients undergoing hemodialysis at Roemani Semarang Hospital.

The results of the Spearman correlation test between family support and anxiety level obtained a p-value = 0.000 and a value of  $r = -0.625$ . It can be concluded that there is a significant relationship between family support and the anxiety level of CKD patients undergoing hemodialysis at Roemani Semarang Hospital. The higher the family support, the lower the anxiety level of CKD patients undergoing hemodialysis at Roemani Semarang Hospital.

From the results of the analysis of the relationship between education level and anxiety level, it was found that there were 40 (85.10%) respondents having a secondary education level who had a mild anxiety level, 4 (44.45%) respondents who had a primary education level had a moderate anxiety level. The results of the chi-square test obtained a value of  $p = 0.138$ . It can be concluded that there is no relationship between the education level and anxiety level of CKD patients undergoing hemodialysis at Roemani Semarang Hospital.

#### **Relationship between Age and Anxiety Level**

The results of this study indicate that age was not related to the anxiety level of CKD patients undergoing hemodialysis at Roemani Semarang Hospital. This can be due to the mean age of the patients was 51,7 years, which at this age includes

middle aged. About 7% of middle-aged adults (30-59 years) are diagnosed with depression, while very few suffer from by severe anxiety (Sikström, Kelmend and Persson, 2022). Furthermore, older adults with anxiety disorders may be less likely to identify themselves as having a mental health problem. Elderlies are more likely to experience physical symptoms of anxiety than younger people. This age group also has a higher risk of medical problems and may be taking more medication. Both of these things can increase the risk of developing an anxiety disorder. The strengths of aging come from the knowledge and experience gained throughout life. As people age, there is a tendency to avoid information or situations that increase negative emotions (such as anxiety) and put pressure on cognition (Spalding et al., 2021).

The findings of this study are not in line with previous study, which indicated that as a patient got older, somatic complaints were more common, their quality of life was worse, they had fewer social opportunities, and their depression levels were higher. Patient age was inversely linked with anxiety levels, indicating that anxiety was less common in older patients. Eight out of 11 CKD people over 60 had a more significant chance of developing depression than people under 60 years (Mosleh et al., 2020). Another study revealed that older individuals had higher sadness levels and poorer physical well-being. Older individuals showed the highest mood improvement and anxiety decrease. Even though the disparities were widely anticipated, they also explained why older patients reported fewer social activities and interests and distressing sentiments (Gadia P, Awasthi A, Jain S, 2020).

#### **Relationship between Gender and Anxiety Level**

The study's findings revealed association between patients with CKD at Roemani Semarang Hospital's anxiety levels and gender. Other findings revealed that women's anxiety levels were noticeably higher than men's. This discovery is consistent with numerous CKD patient studies from the past. According to certain studies, women typically experience higher levels of anxiety and suicide ideation than men (Mosleh et al., 2020). Women were much more likely than men to have anxiety and cognitive

impairment (Thomas Nti and Frances Emily, 2021). A previous study reported similar results. As for anxiety, it was found to be significantly higher in female CKD patients compared to their male counterparts ( $p$  value=0.027). This could be explained by the greater sensitivity of women to stressful life events such as illness. Hormonal differences may also play a role (Alshelleh et al., 2022).

Several studies suggest that the clinical presentation of men and women with anxiety disorders may differ, although most of these differences are subtle. Women with anxiety disorders tend to report more severe anxiety symptoms and higher levels of impairment than men with anxiety disorders. Women with anxiety disorders also report more somatic complaints than their male counterparts. It is clear that anxiety disorders are more common in girls and women. Although less is known about gender differences in clinical symptoms and their course, women seem to experience more severe and prolonged symptoms than men. There are also gender differences in risk factors for anxiety disorders, which may make women more vulnerable to developing (sub)clinical forms of anxiety (Elizabeth T. Hallers-Haalboom, Joyce Maas, Laura E. Kunst, 2020).

#### **Relationship between Employment and Anxiety Level**

The results of this study suggest that there is no relationship between employment and levels of anxiety. This could be due to the fact that patients do not pay for routine hemodialysis. All respondents in this study used health insurance, namely BPJS Kesehatan. With this health insurance, patients no longer have to pay a large fee to pay for hemodialysis costs, so that the existence of BPJS Kesehatan can reduce the anxiety level of a CKD patient undergoing hemodialysis.

The result of the study aligns with research utilizing the Hamilton Depression Rating Scale, which revealed that  $p$ -value did not indicate significance (Hawamdeh et al., 2017). The results of the Mosleh et al. study, which demonstrated that work was not substantially related to anxiety or depression, are consistent with this (Mosleh et al., 2020). Additionally, it was discovered that patients with less education and those without jobs had a higher risk of developing anxiety. These

patient categories are more likely to have psychological well-being, social connections, and general health, probably due to a lower socioeconomic profile (Goh and Griva, 2018). Unemployment is associated with significantly higher levels of depression and anxiety. This is a major public health concern (Arena et al., 2023). Work is important because it provides income, but it also provides social contacts, structure and social status. Work is therefore an important contributor to quality of life (Knobbe et al., 2022).

#### **Relationship between Educational Level and Anxiety Level**

The finding of this study showed no relationship between level of education and level of anxiety. In this study, the majority of respondents had a high school education (58.75%), a college education (26.25%), and the remainder had a primary education or were not in school. This illustrates the uneven distribution of respondents, so the results do not fit with the theory that education level can affect anxiety levels. Another factor in reducing anxiety as a trait was education (Qawaqzeh et al., 2023). The result is consistent with previous studies, which also found no correlation between respondents' education and anxiety levels. Nevertheless, some research has indicated that individuals with low levels of education and those without jobs are more likely to experience anxiety, presumably due to their low socioeconomic status. Other research has revealed a connection between schooling and anxiety in CKD patients. Compared to the group with more education, patients with less education had higher levels of anxiety and depression (Mosleh et al., 2020).

These findings contradict the widely accepted theory that patients with higher education will have broader knowledge, which will enable them to control themselves in overcoming problems, have increased self-confidence, experience, and the right mindset to overcome situations, quickly understand what will be advised by healthcare professionals, and can reduce anxiety so that it can assist the person in making decisions. In case the patient's level of education is high, the level of anxiety may decrease because the patient will be able to understand what is being communicated by the nurse and will be able to overcome

the anxiety that occurs when undergoing hemodialysis treatment (Sumah, 2020).

### **Relationship between Family Support and Anxiety Level**

The finding of this study showed relationship between family support and level of anxiety. Based on the study's results, the family support of CKD patients in the hemodialysis unit of Roemani Semarang Hospital shows most of them have good support because the family offers hemodialysis patients complete support. One of the finest preventive intervention techniques for family members is family support. Permission can be given by those closest to the person, such as spouses or family members, close friends, and someone with whom they get along (Siburian *et al.*, 2021).

The family environment is inextricably linked to family members. Family members are considered to have access to support and assistance when needed. The family can provide support, for example, help find information related to hemodialysis therapy. Families can also communicate with each other about any discomfort the patient is experiencing and can provide entertainment, encouragement, and motivation for patients undergoing hemodialysis therapy, to keep patients happy and not easily discouraged (Ernawati, 2019).

Family support significantly impacts behavior, which results in the desired health outcomes, making it crucial for patients with chronic conditions, especially those receiving hemodynamic therapy. Family is thought to offer benefits. Thus, it can boost patients' perceptions of control and self-control while lowering anxiety (Sipayung, 2020).

The family has an important role to play in the process of mental and emotional empowerment of CKD patients, particularly in helping them to accept the emotional reactions that occur so that they are ready to take their condition and face the current reality, thereby reducing or even eliminating the patient's anxiety (Aini and Wahyu, 2020).

### **CONCLUSION**

The results showed a significant relationship between gender and family support with anxiety levels. The higher the family support, the lower the anxiety level. There is no relationship between

age, employment, and education level with the anxiety level of patients undergoing hemodialysis at Roemani Semarang Hospital. A multidisciplinary outpatient CKD care program can reduce the severity of psychological disturbance in CKD patients undergoing hemodialysis.

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## A Theoretical Review: Globalization and Preventing Premarital Sex

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### ABSTRACT

**Background:** Globalization is a double-edged sword since it improves human efficiency and effectiveness along with the development of technology. However, the negative impacts of globalization hit developing countries hard, such as the fading of traditional culture and people's tendency to be dependent on developed countries, or people imitate the negative behavior of those living in developed countries. **Aims:** This paper conceptualizes premarital sex behavior, which is a problem in the social environment that occurs in Indonesian society and generally in Islamic countries. The author will reveal sexual problems experienced by adolescents in terms of social phenomena in modern times. In addition, the impact of adolescent sexual behavior before marriage will also be discussed in this article, both in social, cultural, and religious settings. The author also offers alternative solutions to prevent premarital sex behavior in adolescents by looking at the role of the family, social environment, and educational institutions. **Method:** We use the Theory of Planned Behavior and Social Learning Theory approaches to explore the direction of adolescent behavior in making decisions. **Results:** As a result, our model can contribute to future research to research adolescent premarital sex behavior, especially in countries affected by globalization. In addition, we also offer a research model by formulating several propositions that will be a guide for further research. **Conclusion:** Globalization is very influential and we feel it in everyday life. Conditions such as promiscuity, negative internet, premarital sex, etc. can be found in social life. This condition cannot be avoided, which is something that should happen and needs to be addressed wisely by the whole community, especially parents who have teenage children. Several alternatives are offered to overcome this problem, among others, through educational institutions, the role of the family, and the social environment. These three factors are an alternative to preventing adolescent associations that lead to premarital sex.

**Keywords:** Adolescent sex behavior, Globalization, Indonesian adolescent, Premarital sex, Sexual education.

### INTRODUCTION

The phenomenon of premarital sex behavior among adolescents in Indonesia has become a problem that needs special attention. This is because the Indonesian culture that considers premarital sex taboo and a serious problem in the social, cultural, and religious environment is gradually disappearing. Berliana et al. (2018) explained that premarital sex is a socially and culturally taboo thing in Indonesia. Also, a study by Ali (2018) explained that discussion about sex for adolescents in several Muslim countries had been considered taboo. The occurrence of the phenomenon of premarital sex in adolescents cannot be avoided because technological developments in the current

era of globalization have changed the paradigm of society related to premarital sex. Cultural exchange in the era of globalization is very likely to occur to affect the way people perceive premarital sex. A research report by UNICEF explains that as many as 650 million adolescents have had sexual intercourse before turning 18 (UNICEF, 2018), and Indonesia is one of the countries with the largest number in the Asian region (Ali, 2018). The phenomenon shows that the stakeholders need to play their role in overcoming this problem.

The question that concerns us is how is sexual education in Indonesia and several other Islamic countries? Talking about sex in Indonesia and Muslim countries, in general, is a behavior that is considered taboo by the social community

(Akhu-Zaheya & Masadeh, 2015; Ali, 2018; Tsuda et al., 2017). It shows that sexual education in these countries experiences pros and cons in its application despite the increasing premarital sex cases in Indonesia over the years (Berliana *et al.*, 2018). To find a solution to this problem, a social, cultural and religious approach is needed to provide sexual education to adolescents. The behavior of the Indonesian people is very much influenced by customs and religion (Rozikan and Zakiy, 2019), so that sexual education can be carried out through the family and social environment. In addition, the role of educational institutions is considered to have a major influence on increasing premarital sex because many teenagers spend their time in schools and universities. Furthermore, many rural people who go to cities to pursue higher education at universities are very vulnerable to abusive sexual behavior because of the low supervision of their parents (Boyer *et al.*, 2019).

In addition to the role of educational institutions, the authors also identify the role of religious families in minimizing the occurrence of premarital sex behavior among adolescents in Indonesia. Discussing sexual matters in Islam is considered taboo (Akhu-Zaheya and Masadeh, 2015). This causes sexual problems experienced by adolescents, even being reluctant to discuss with others having premarital sex. Lack of information about sexual education by adolescents due to the absence of sex education makes many adolescents engage in premarital sex. It takes informal communication, such as a family environment, to overcome this problem (Mbachu *et al.*, 2020). A study by Park and Lee (2020) explained that family plays a critical role in determining smoking behavior, drinking alcohol, internet use, physical activity, and sexual experiences, as well as mental health problems such as depression, suicidal thoughts, and stress. The study proves that family is an essential factor in minimizing the occurrence of premarital sex in adolescents. Creating a religious family climate is an alternative to fortify adolescents from premarital sex behavior.

Apart from family factors, the social environment is also influential in shaping a person's attitudes and behavior (Noermawati *et al.*, 2018; Zakiy, 2021a).

Social Learning Theory explains that the social environment is very influential on one's learning behavior through observation and the behavior of others (Decker, 1986; Li *et al.*, 2017; Jadmiko, 2021). Premarital sex behavior is very likely influenced by the social environment the adolescent is in. Dating behavior, the association of men and women without any restrictions and a free lifestyle are some of the risk factors for premarital sex in adolescents. The view that premarital sex based on consensual reasons is common is the beginning of the occurrence of premarital sex. Several studies have shown that sexual violence and assaults on adolescents are done by those around the adolescents (Baron *et al.*, 2020). The temptation to have premarital sex is one of the things that is difficult to resist, especially when it comes from someone close to them. Creating a social environment that upholds religious and moral values helps to minimize premarital sexual behavior in adolescents.

Previous studies have not identified much of the role of religion in overcoming adolescent sexual behavior, which is a vital thing in Muslim societies such as in Indonesia. More recent studies have looked at adolescent sexual behavior and ways of coping with it through the role of sexual education programs (Faludi and Rada, 2019; Faisal-Cury *et al.*, 2020), the role of the family (Mbachu *et al.*, 2020). and social community support (Baron *et al.*, 2020). This paper tries to reveal the problems related to premarital sex experienced by adolescents, especially in Indonesia and generally in Muslim countries, in terms of demographics that significantly affect adolescent sexual behavior. In addition, the authors also recommend several propositions that can be used in further research to emphasize the role of educational institutions, family, religion and the social environment in overcoming the problems of premarital sex in adolescents. Several relevant previous studies are used as a reference in developing propositions in this paper. This paper tries to look at adolescent sexual behavior and ways of overcoming it other than through sexual education programs, the role of the family and the social community, as well as through the role of

religion, which is an essential factor in Muslim society.

Parents are increasingly aware of the dangers of premarital sex that can be experienced by their children. This phenomenon is even seen as very frightening for the majority of the Muslim community because premarital sex (adultery) is a serious violation in Islam. The occurrence of premarital sex is driven by several factors that cannot be controlled by parents. The first factor is globalization that cannot be avoided because it allows for cultural exchange (Nederveen Pieterse, 2020), in which the culture and negative habits of other countries can be adopted by the Indonesian people. One of the negative impacts of globalization related to premarital sex is the Western customs of promiscuity between men and women. Vasilenko and Lefkowitz (2018) explained that having premarital sex is something students usually do at universities in America. The second factor is a teenager's curiosity; trying new things is one of the natural traits of a teenager in the process of finding his identity (Bromberg and O'Donohue, 2013). Apart from having a positive impact on knowledge and new experiences, this trait also has a negative impact if the consequences are harmful to themselves and their environment. The negative consequences of this curious behavior include involvement in alcohol, drugs, premarital sex and other negative behaviors (Tao *et al.*, 2019).

Both of these factors are subordinate factors that are natural and must be passed, and cannot be avoided by a person. However, a person's learning environment can play a big role in determining that person's behavior (van Leeuwen *et al.*, 2018). Daffa *et al.* (2022) explained that a person's learning behavior in their environment is fundamental in predicting that person's behavior. Adolescents who live in a bad social environment can impact a high risk of premarital sex and even sexual harassment (Talboys *et al.*, 2017). The learning process through social interaction and observation of the learning environment can make a teenager imitate what is seen in his environment. In addition, Ajzen (1991) and Jacob and Dwipayanti (2022) stated that a person's subjective norms to conduct behavior are influenced by their social environment so

that the bad social environment that supports adolescents to have premarital sex is one of the factors for the high rate of premarital sex in adolescents. Both of these theories emphasize that the social environment greatly determines a person's behavior.

## METHODS

### Propositions

#### *Globalization and premarital sex*

Modern life cannot be separated from the role of technology which provides many conveniences in carrying out daily activities. This development is followed by the absence of restrictions in the exchange of culture, thoughts, products and services as well as the views of individuals or groups, which is called globalization. Globalization has changed many perspectives and habits of a person or group of people to think globally (Shuaib and Badmus, 2022). One of the negative impacts of globalization on social life is the practice of imitating bad habits by people in developed countries, one of which is teenagers' promiscuity. The advancement of transportation modes and internet access makes it easier for people to access and apply the lifestyle of people in other countries. As a result, free sex and access to pornography are increasingly accessible and widespread by teenagers in Indonesia, both of which are bad habits from other countries. For the above reason, we propose the following:

*Proposition 1: Globalization increases premarital sexual behavior in adolescents.*

#### *Role of educational institutions*

Educational institutions are one of the factors that can minimize the occurrence of premarital sex in adolescents. Apart from being a place for academic knowledge development, schools are also a place for teenagers to find their identity through associating with peers (Zakiy, 2021b). From the support of educational institutions for sexual behavior by making rules and education about adolescent sexual behavior through counseling, it can minimize premarital sexual behavior in adolescents. Several previous studies have shown that sex education programs can minimize adolescent involvement in premarital sex (Mbachu *et al.*, 2020).

This educational program can provide views for adolescents about their sexual life. However, in Indonesia and several other Muslim countries, sex education for adolescents has not been officially implemented due to various reasons such as religious restrictions (Tsuda *et al.*, 2017) taboo things (Hastuti, 2016), and not receiving recognition and support (Utomo and McDonald, 2009). This is a dilemma for adolescents in getting safe sex education. Thus, studies from several countries can be used as a reference in formulating methods of sex education in Indonesia. For this reason, we formulate the following second proposition:

*Proposition 2: Educational institutions that are concerned about adolescent sex behavior weaken the relationship between globalization and an increase in adolescent premarital sexual behavior. After that, a high number of educational institutions are expected to reduce adolescent premarital sexual behavior.*

#### *The role of the religious family*

Every parent does not expect their child to have premarital sex. Of course, parents always take preventive action so that their children avoid premarital sex behavior. Providing advice, paying attention to and caring about children's needs and being involved in children's relationships such as being close to children's friends and knowing where children spend time are preventive steps that parents can take in preventing adolescent premarital sex. A family is also a place for children to tell the life they are experiencing outside the home so that it is possible for parents to know the problems experienced by these teenagers. Through a family approach, children are more open to tell about various problems they are experiencing. Several previous studies have explained that family plays a crucial role in providing sexual education to adolescents (Faludi and Rada, 2019). However, in this paper, the author tries to provide a different perspective by looking at religiosity in the family to minimize premarital sexual behavior in adolescents. Hence, below is the third proposition:

*Proposition 3: A religious family situation weakens the relationship between globalization and an increase in adolescent premarital sexual behavior. If well-given and well-received, it helps*

*to lower adolescent premarital sexual behavior.*

#### *The role of the social environment*

The social environment is very influential on the character formation of adolescents because, in adolescence, many new things are learned in shaping their attitudes, character and personality. Social Learning Theory explains that individuals will carry out the learning process from observations and experiences of the surrounding environment (Li *et al.*, 2017). Due to the collectivist culture, the level of social interaction among adolescents in Indonesia is very high (Sewanyana *et al.*, 2018). Thus, the role of the social environment is very significant in shaping adolescent sexual behavior. Adolescents will see the behavior of other individuals in the surrounding environment, such as the style of interaction between adolescents, social rules and social sanctions given if the adolescent violates the laws and habits that apply in society. Eastern culture upholds the values of decency, ethnicity and religious values which prohibit premarital sex can minimize adolescent premarital sex behavior amid global challenges. The influence of the social environment like this will direct the behavior of adolescents to behave well in accordance with the will of their social environment. Thus, the fourth proposition is as follows:

*Proposition 4: A social environment that is concerned with adolescent sex behavior weakens the relationship between globalization and an increase in adolescent premarital sex behavior.*

## **RESULTS AND DISCUSSION**

### *Theoretical Contribution*

In this paper, we focus on the role of the social environment in Indonesian society that adopts a culture of collectivism in their lives to overcome the negative influence of globalization on adolescent premarital sexual behavior. In addition to having a positive (Zukhrufani and Zakiy, 2019; Amin, Hadisiwi and Suminar, 2022), recent research also shows the negative impact of the development of information technology on adolescent health and growth, such as virtual games and social media that can disturb the psychological state of adolescents (Zhai *et al.*, 2020), depression (Revathi, Nair and



Achuthan, 2020), headaches (Augner and Hacker, 2012) to increased behavior of premarital sex and sexual violence (Fairbairn, 2020). The unstoppable pace of globalization has a profound effect on social life. A study by Gentilviso and Aikat (2019) explained that there are changes in the behavior of teenagers from the Baby Boomer generation and the X generation (those who were born in 1946-1980) with the Millennial generation and the Z generation (the generation of 1981-present), in that millennial and Z generation prefer practical things, entertainment and interaction, as well as viral media. Teenagers now also tend to look for shortcuts to achieve success by becoming the center of attention (Gentilviso and Aikat, 2019). As a result, adolescents tend to be more materialistic (Geng *et al.*, 2020). Hence the old taboo behaviors are common occurrences nowadays.

Our main contribution in making this paper is to find solutions to social problems in Indonesia, especially in the problem of adolescent premarital sexual behavior. Our first contribution is to elaborate on the role of educational institutions in educating students to behave ethically by creating a curriculum that is concerned with adolescent premarital sexual behavior. A teacher not only provides knowledge for his students but must pay attention to the moral and moral aspects of his students. A teacher's personal attention to his students by providing counseling needs to be done so that students feel they are getting attention so that they can tell about personal problems they are experiencing. Teachers who pay special attention to the ethical and moral development of students will reduce student problems in school (Liang, Dai and Matthews, 2020; Zakiy, 2021b). Teens are more open to telling their personal problems to people they trust (Amorim Neto *et al.*, 2020; Jauzi and Zakiy, 2021). Thus the role of teachers in minimizing the occurrence of premarital sex behavior is crucial.

In addition to the role of a teacher in paying attention to students, curriculum formation is also thought to influence adolescent premarital sexual behavior. Several previous studies have shown that a curriculum devoted to tackling sexual behavior can prevent sexual problems in adolescents (Kuykendall *et al.*, 2020). The

existence of a special curriculum to deal with sexual behavior proves the seriousness of the institution in tackling sexual problems in adolescents. The adolescent sexual learning curriculum program provides sexual knowledge to adolescents from an early age in order to understand the boundaries of social relationships and understand the consequences of unhealthy sexual behavior (Krebbekx, 2019). Miedema *et al.* (2020) argued that the sex education curriculum is an important means of informing adolescents about their sexual rights and health, as well as generating public health and contributing to sustainable development. However, the implementation of this program needs to be properly monitored and regulated so that it is in line with the expected objectives. The formation of the CSE curriculum program is an alternative program that can be applied because it comprehensively studies knowledge, attitudes, skills, and values so that students can talk about sex openly, know scientific facts and have social skills to act in order to fight peer pressure (Krebbekx, 2019). This program is important to avoid sexual violence and assaults and educate adolescents about the risks of having premarital sex (Fedina *et al.*, 2018).

The second contribution is to look at the role of the religious family environment concerned with adolescent sexual behavior. For people who live in Islamic countries, the interaction between teenagers is of great concern. Parental protection against adolescent premarital sex behavior is very intensive because premarital sex behavior is a severe violation in Islam. The Qur'an has emphasized the prohibition of premarital sex, which is called "zina" as stated in Surah Al-Isra verse 32, "And do not approach unlawful sexual intercourse. Indeed, it is ever an immorality and is evil as a way." However, the protection seems excessive because talking about sex is taboo in Muslim countries (Akhu-Zaheya and Masadeh, 2015). As a result, the knowledge of adolescents about sex is never obtained in the family, while these adolescents must face a global environment that requires them to know the negative impact of risky sexual behavior. Families who equip their children with religious knowledge must also be open-minded by having knowledge of the limitations that can and cannot be done.

Family concern for adolescent sexual behavior, apart from a religious perspective, can also be done by providing knowledge of sex to adolescents from an early age. The combination of religious teachings with the provision of knowledge about sexual behavior can provide more comprehensive knowledge to adolescents. Family is the first bastion to protect adolescents from premarital sex behavior (Somefun, 2019) due to the negative impact of globalization since teenagers spend a lot of time with family during their early growth (Gomez-Baya *et al.*, 2018). Today, a child needs to be instilled with religious values, which are the foundation of a child's attitude (George Dalmida *et al.*, 2018) and try to imitate the behavior of the surrounding environment (Lu *et al.*, 2019). After a child experiences puberty and begins to understand his social environment, sexual education can be given so that he has the knowledge and can act in case of peer pressure or sexual threats (Krebbekx, 2019). To get the most out of this method, family commitment and sacrifice are needed so that the child can understand the goals expected by the family.

The final contribution is the role of the social environment in shaping adolescent sexual behavior refers to the Social Learning Theory that the social environment can influence a person's behavior (Decker, 1986; Li *et al.*, 2017). Adolescents who interact with the environment that support them to stay away from premarital sex behavior will tend to avoid it. Ssewanyana *et al.* (2018) found that environmental factors have the most significant influence in determining the risk of sexual behavior in adolescents. The social environment of adolescents in the technological era is not only related to one's social interactions in the real world, but interaction through cyberspace is also essential in determining the behavior of adolescents in their daily lives (Abdullahi and Abdulquadri, 2018; K Hedo and Katmini, 2022) Some students often stalk and share sexual content through technology assistance (DeKeseredy *et al.*, 2019). Related to the very high level of internet users among teenagers, preventive action to oversee the use of the internet is necessary. Ajayi and Ezegebe (2020) explained that teenage girls and young women (15-24 years old) are greatly

at risk of experiencing unwanted pregnancies.

#### **Future research agenda**

Some further study to empirically test the propositions we offer in the provided conceptual model.

#### **Conceptualization of the religious environment**

Previous studies had no consensus on the measurement of the religious environment in both the family and society. We suggest that as a first step, further research conducts qualitative studies to explore the meaning, definition, dimensions and indicators of the religious environment. One way to do this is to conduct in-depth interviews with religious leaders, anthropologists, sociologists and community leaders (as people who consider society's problems). The second way is to conduct participant observation by conducting ethnographic research in order to reveal the criteria for the religious environment in the family and society. A qualitative approach as a first step allows researchers to explore the concept of a religious environment in depth from experts to find definitions that can be used in future studies. In addition to clarifying the conceptualization of measuring the religious environment, a qualitative approach with ethnographic methods allows researchers to determine what kind of culture can implement a religious environment to overcome adolescent premarital sexual behavior. After formulating a definition of the religious environment, the researcher can then ascertain the dimensions of the religious environment.

#### **Testing propositions in empirical research**

There are several main concerns for testing propositions empirically from the papers we offer. First, researchers need to ensure that people in the countries studied are countries that have been affected by globalization, not countries that have had the impact of globalization. This is because the proposition that is built is specifically for countries whose traditional cultures are eroded by the influence of the cultures of other countries as a result of globalization. In addition, the religious environment referred to in this paper is that the majority adopt Islamic teachings because they strongly oppose premarital sex behavior. For this reason, in testing our proposition, researchers need

to pay attention to the context of the country, culture and religion adopted by the society in which the research takes place. The design of selecting research objects in countries affected by globalization is not in countries that have an impact on globalization because the direction of globalization has changed the habits of people in various countries to follow the habits of developed countries (Anderson, 2017). The object was selected so that data retrieval is in accordance with the conditions of the people affected by the negative effects of globalization.

Second, the topic of adolescent premarital sex behavior is a sensitive matter for most people, especially in countries that consider it taboo and unethical to talk about this. As in Indonesia and other Muslim countries, talking about premarital sex behavior is very rarely done, especially by teenagers, so this problem is very sensitive and falls into a person's privacy zone. Researchers needed to convince the respondent in the study to be able to tell the actual situation they are experiencing by keeping the identity of the respondent a secret, taking a psychological approach so that adolescents want to tell the events they have experienced (Amorim Neto *et al.*, 2020). Researchers can also expand the research location so as not to justify certain areas by collaborating with the government that has data on this matter. For this reason, the research respondents' trust in the researcher is the key to the success of the validity of the data in further research.

Third, to see the support of educational institutions for adolescent sexual behavior, a special in-depth study is needed in order to create a sexual education curriculum. So far, the sex education curriculum in Indonesia has experienced many conflicts and debates (Tsuda *et al.*, 2017), so that there has been no final decision on this issue. So far, the concern of educational institutions on adolescent sexual behavior in Indonesia has only been limited to making school regulations that must be obeyed by all students, not being comprehensively included in a school program. Researchers need to make instruments to measure the role of educational institutions in paying attention to adolescent sexual behavior in the school environment. In addition, researchers can also trace the extent to which the regulations issued by schools can

bind their students because there are differences in regulations in each school, such as public schools, private schools and religion-based schools.

## CONCLUSION

Globalization is very influential and we feel it in everyday life. Conditions such as promiscuity, negative internet, premarital sex, etc., can be found in social life. This condition cannot be avoided, which is something that should happen and needs to be addressed wisely by the whole community, especially parents who have teenage children. Several alternatives are offered to overcome this problem, among others, through educational institutions, the role of the family and the social environment. These three factors are an alternative to preventing adolescent associations that lead to premarital sex. The author formulates several propositions that are expected to be empirically tested in further research in order to provide solutions to the problem of premarital sex in Indonesia and other Muslim countries.

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## Health Services Strategy of Adolescent Sexual Reproductive Health in Developing Countries

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### ABSTRACT

**Background:** In the developing country 1 in 5 women give birth before the age of 18 years old. The problem of pregnancy as part of the main causes of death in youth between 15 to 19 years old, especially because of abortion complications and unsafe childbirth. **Aims:** To determine the strategy of health services for adolescent reproduction in developing countries. **Method:** using the design of scoping review with PRISMA-ScR checklist. Using Arksey and O'Malley in the form of (1) identified research questions, (2) identified relevant articles, (3) chosen articles, (4) data mapping and (5) presented data/result, discussion, and conclusion. Finding articles using 4 databases Ebsco, ScienceDirect, Pubmed, and Wiley Online Library. **Results:** The strategy of health service for adolescent reproduction in developing countries that can be done is health education/comprehensive sexuality education (CSE), youth-friendly service, and model of sexuality education enhancement (SEE). **Conclusion:** all of the three strategies the most applied is youth-friendly service followed by health education in the form of CSE. For the next research, it is expected to be able to analyze and evaluate a more dominant strategy also more effective in handling sexual health and adolescent reproduction both in developed country and developing countries.

**Keywords:** Adolescents, Sexual reproductive health, Developing country.

### INTRODUCTION

According to WHO, Adolescents are citizens in the age range of 10-19 years. Adolescents are individuals who experience a gradual transition to maturity, face psychological changes from childhood to adulthood, and begin to change their economic status from being independent to being more independent. In developing countries, 1 of 5 women give birth before the age of 18 years. this figure increases to 1 from 2 in some countries. Problems regarding pregnancy which is the main cause of death among adolescents aged 15 to 19 years, mainly due to complications of abortion and unsafe childbirth (WHO, 2022). Data showed that adolescents in Sub-Saharan Africa bear the highest burden of adverse sexual and reproductive health when compared with adolescents in other parts of the world. Gender equality is an important aspect of adolescent sexual and reproductive health. Providing adolescents and young people with equal access to contraceptive information and quality services and enabling them to make decisions about their fertility is key

to promoting their health and human rights (WHO, 2021).

One of the strategies for reproductive health services for youth is known by the earliest research that showed that a pocketbook is more effective than a leaflet towards respondent knowledge of marriage age (Murtiyarini et al., 2019). Giving education about knowledge showed that student's knowledge about reproductive health has increased (Amalia et al., 2022). Therefore, sex scale and teen reproduction and young adults can be used for scaling sexual health and teen reproduction (Upadhyay et al., 2021)

Reproductive health is integrated with physical health, emotional, mental, and social health that correlate with sexuality. To reach and keep sexual health, every human sexual right has to be respected and kept (WHO, 2022). In some individuals, anxiety, scared, lack of knowledge, information, stigma, anxiety for insurance, and the lack of financial independence can increase the risk of teen reproductive health. How minimum the method of telling about issues like sex before marriage, abortion, sexual

harassment or sexual force is a challenge on making facilities of reproductive health for teen (WHO, 2018).

Strategy in the form of communication with parents about sexual health and reproduction is lacking a satisfying feel. Therefore, school-based education is important to increase education of family life that comprehends for teens and parents (Toru et al., 2022). Problems in building and doing reproductive health programs in various countries especially in developing countries, there are three factors that affect teen understanding about reproductive health that is sex, information source and parent role (Ernawati Hery, 2018). Indonesia has a amount of teen citizens that is risky if not anticipated because of the long-term cause of the lack of knowledge about sexual and reproductive health (Noor, 2020).

This review is done with the purpose to determine the strategy of reproductive health service for youth in developing countries, and as one of the ways of Health Technology Assessment (HTA) that can be an example in service of nursery for teens comprehensively.

**METHODS**

This research applied a review scoping method, where that thing is connected with a process to identify a kind of integrated knowledge that followed a systematic approach to mapping evidence in a topic and identify concept, theory, source, and main on knowledge (Tricco et al., (2018). Steps doing scoping review to steps (Arksey & O’Malley, 2005).

Step 1: Identify Scoping Review Questions. In this is Population, Exposure, Outcomes (PEO), to help find articles, inclusion criteria, and exclusions, and identify articles. Review question on this review is “What is the newest scientific nursery about strategy of reproductive health service in developing country”

Step 2: Identifying Articles Inclusion and Exclusion Criteria. Author identifies the inclusion criteria is published since 2018-2022, published International and National, research Articles of qualitative and quantitative, article using Indonesian and English, original research article, article with developing country. The

criteria of exclusion is article that are not published in scientific journal, review, opinion article, book, skripsi, paper, thesis, dissertation.

Article search implemented some strategies that are using keyword medical subject headings (MeSH), truncation, boolean operator (OR, AND, and NOT). This scoping review uses 4 databases that are Ebsco, ScienceDirect, Pubmed and Wiley Online Library and supporting sites. The implementation of keywords in research article search that is suitable is necessary to avoid errors in database and reference list search (Levac et al., 2012).

Step 3: Article Selection. The article selection is done by checking article duplication, filtering title and abstract, then reading research articles completely to rate research article compatibility by doing scoping review (Arksey & O’Malley, 2005). Then, the article section where the process is explained by PRISMA Flowchart.

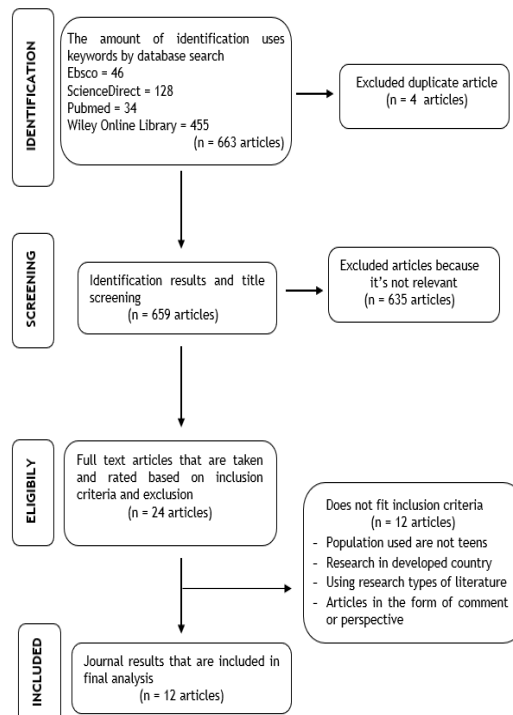


Figure 1. PRISMA Flow Chart.

Step 4: Charting data. The Article data was merged by implementing data charting that was adopted from Joanna Briggs Institute in the form of article writer data, article title, year, country, data collection method, research type, participants/sample, and research results (Aromataris E, 2021). Data mapping is done by discussing with the second author.



**Table 1.** Data mapping of the research.

No	Title /Author (s)/ Year	Country	Research Type Participants/ Sample Size, Data Analysis	Results
1.	Toward an Understanding of Optimal Grade for Starting Sexuality Education Programme for In-School Children and Adolescents: Insights from Ghana. Amo-Adjei (2021)	Ghana, West Africa	Research type: qualitative Population and sample: 2.990 teens of Senior High School 2 and 3 taken from 82 samples of high school randomly Instrument: questionnaire about CSE content based on the operational guide for Comprehensive Sexuality Education that are developed by UNFPA 2014	Students who learn the topic of sexuality before Elementary School have better opportunities for sexuality education content coverage
2.	Knowledge On Sexual and Reproductive Health Education Among School Going Adolescent Boys In Rural Area. Thulasi & Malleswaramma (2021)	Tiruchan oor in Tirupati, India	Research type: interventional study including pre-test, intervention session, and post-test. Population and sample: 100 teen boys in ZPH School Instruments: - Questionnaire - didactic type using PowerPoint presentation and video show using laptop	A health education program that are suitable for age and gender to facilitate the growth of reproduction and sexual behavior patterns that are healthy for teen boys through knowledge enhancement and the development of the right attitude
3.	Committing to Comprehensive Sexuality Education for Young People in Eastern and Southern Africa. Bruce (2018)	Zambia, East and South Africa	Research type: study case qualitative Population and sample: teen the aged of 14 or younger Instrument: CSE curriculum	Although ESA commitment itself is not binding, but normality mean has the power to change and influence thought about CSE meaning where the education system is decentralized and schools have the institution to choose subjects that are covered in study results of the overall national curriculum framework
4.	Assessment of adolescent and youth-friendly services in primary healthcare facilities in two provinces in South Africa. James et al (2018)	South Africa	Research type: cross-sectional quantitative Population and sample: teens in the age of 10-24 and 14 health facilities in sub-district Gauteng Province Instrument: an interview with the health service provider, non-clinical staff, and document reviews	Service evaluation that specifically handles sexual health, reproduction, and mental showed that almost all of these services get scores above 50%
5.	Youth-friendly sexual and reproductive health service utilization among high and preparatory school students in Debre Tabor town, Northwest Ethiopia	Debre Tabor, Northwest Ethiopia	Research type: institution-based cross-sectional quantitative Population and sample: 696 students in the age of 15 to 24 years old Instrument: structural closed self-administered questionnaires	Male youth, who discussed before about reproductive health with health employees, family, teachers, friends of the same age, and sexual partners as well as doing penetrative heterosexual relationships in the past year it is found a significant

No	Title /Author (s)/ Year	Country	Research Type Participants/ Sample Size, Data Analysis	Results
	Ethiopia: A cross-sectional study. Simegn et al (2020)			correlation towards reproductive health service utilization
6.	Advancing sexual and reproductive health outcomes in rural schools with the use of a sexuality education enhancement model: learners' perspectives. Adekola & Mavhandu-Mudzusi (2022)	Kwazulu-Natal, South Africa	Research type: phenomenology qualitative Population and sample: 84 teens aged 14-19 years old, 49 female students and 35 male students Instrument: focus group interviews, using study pilot perfecting guidance for directed group interviews that developed to be used for mediation process interview	Information, motivation, and accurate attitude skills scientifically affect the ability of students to start and maintain SRH and welfare
7.	Associations Between Agency and Sexual and Reproductive Health Communication in Early Adolescence: A Cross-cultural, Cross-sectional Study. Koenig et al (2020)	Kinshasa, Cuenca, and Shanghai	Research type: cross-sectional quantitative Population and sample: 1.367 teens in Kinshasa, 697 in Cuenca, and 1.424 in Shanghai in the age of 10-14 years old, using sampling probability Instrument: face-to-face interview and independent interview with the help of a computer	Some characteristics and developments correlate with communication towards SRH in teen circles in two contexts. Results showed that agency perhaps plays a role in forming understanding, such as communication, and sexual behavior
8.	Ethical considerations for conducting sexual and reproductive health research with female adolescents engaged in high-risk behaviors in China. Zhang et al (2019)	Tiongkok, China	Research type: qualitative Population and sample: 517 female teens between the age of 15-19 years old Instruments: research protocol, deep interview guide, ethics application form, clinical care information sheets, pre-test questionnaire notes, research procedure checklist, risk assessment protocol, and report of implementation and monitoring	The balance between protection and inclusion can be reached by considering the capacity of decision-making that develops from teens also risk level. A participative approach based on community promising to develop involvement and teen empowerment
9.	Priority Indicators for Adolescent Health Measurement e Recommendations From the Global Action for Measurement of Adolescent Health (GAMA) Advisory Group. Marsh et al (2022)	Kongo, Ivory Coast, Nigeria, and Zimbabwe, African region	Research type: structural approach qualitative Population and sample: 261 participants from 67 Member Countries in all regions of WHO with a proportion of teens between 10-19 years old Instrument: online survey published in the WHO website	36 main indicators are considered the most important thing in measuring adolescent health recommended by GAMA AG giving a measurement framework of adolescent health that the scope reflects the most important problems
10.	Girls' access to adolescent-friendly sexual and reproductive health services in	Kaski, Nepal	Research type: qualitative Population and sample: 27 female teens in the age of 15-19 years old Instrument: semi-structural	Outreach program for school to make sure that health teacher is trained well, using suitable facility for their work and teach in

No	Title /Author (s)/ Year	Country	Research Type Participants/ Sample Size, Data Analysis	Results
	Kaski, Nepal. Shrestha & Wærdahl (2020)		individual interview and guided group interview	group divided by gender reach female teens through traditional and digital platforms is one of the strategies that can be done for implementing national ASRH program,
11.	Chinese adolescents' sexual and reproductive health education: A quasi-experimental study. Ma et al (2022)	China	Research type: quasi- experimental quantitative Population and sample: graded cluster sample of 469 students from high school Instruments: sociodemographic information sheets, Sexual Knowledge Scale, Sex Attitude Questionnaire, and Sexual Self Efficacy Scale	After being given education program on sexual and reproductive health based in school teens knowledge of sexual and reproductive health is improving, sexual a more positive sexual attitude, and stronger sexual self-efficacy during the study period
12.	A "Plus" Model for Safe Transitions to Adulthood: Impacts of an Integrated Intervention Layered onto A National Social Protection Program on Sexual Behavior and Health Seeking among Tanzania's Youth Waidler et al (2022)	Tanzania	Research type: quantitative, randomized control trial (RCT) cluster Population and sample: Randomization of 130 villages for the study group (half of the group treatment and half of the control group) with 1.993 teens between the ages of 14 and 19 years old Instrument: interview	The Strategy of the Productive Social Safety Net (PSSN) program increases the search for health and HIV tests in boys' circles but slightly reduces the age when sexual debuts in female circles. There is no effect on contraception uses, the amount of sexual partners, or pregnancy

## RESULTS AND DISCUSSION

### Strategy of Adolescent Reproductive Health Service

#### 1. Comprehensive Sexuality Education (CSE)

Children and teens have the age and comprehensive sexuality education (CSE) which is through the successful development of safe sexual practices and living a productive life. They are more ready to face HIV and AIDS, sexually transmitted infections, unwanted pregnancy, and gender-based violence (Amo-Adjei, 2021). Themes to be studied in sexuality topic and CSE scope concept in the form of sexual physiology and reproduction, prevention of HIV/sexually transmitted infection, values, and interpersonal skills, gender and sexual and reproductive health, as

well as contraception and unwanted pregnancy (UNESCO, 2019).

In research done by Amo-Adjei (2021), students tend to learn all modules about sexual physiology and reproduction while values and interpersonal skills are the least topics to be discussed. Students who learn about sexuality topics before Elementary School have better chances for the content scope of sexuality education. Based on Namukonda research (2021), in sexual and reproductive health services the existence of knowledge, attitude, and SRH values is appropriate for the purposes that already exist on the CSE curriculum, but those factors can be not enough to develop the uptake on sexual and reproductive health service. While in the Bruce's research (2018), that CSE has the power to change and influence thoughts about decentralized education systems and

schools has the institution to choose subjects that are covered in study results of the overall national curriculum framework.

## 2. Youth-Friendly Service

All youth, especially those who use public health services need intervention to overcome risk behavior, including effects on sexual and reproductive health (SRH). This case requires further understanding of factors that explain physical environment health, social background, availability and access to social services and health (James et al., 2018).

James' research results (2018) explained that evaluation of services that specifically discuss sexual, reproductive, and mental health showed that almost all of these services score over 50%. Reviews of service about psychosocial and psychic reveal the differences in how youth complaints are handled in overall health care and management settings, including psychosocial status and risk profile. While on Simegn's research results (2020) explained that men were found to be more likely than women to use reproductive health services. Adolescents who have previously discussed reproductive health services with health service providers, family members, teachers, friends of the same age, and sexual partners.

Information services for youth-friendly must cover more general topics about puberty problems, such as changes in genital hygiene and menstruation, relationships, nutrition, birth control, life skill suggestions, smoking and alcohol suggestions. Physical infrastructure must have the quality of youth-friendly, with convenient location and adequate service hours. Service requires a friendly environment and a separate consultation room to ensure privacy. Health employees have to treat young people with respect and without prejudice, and also youth involvement in school or youth clubs is the important thing (Shrestha & Wærdahl, 2020).

## 3. Sexuality Education Enhancement Model / Sexuality Education Enhancement (SEE)

According to the Sex Information and Education Council of Canada (SIECCAN) (2019), SEE models have the skills of Information Motivation Behavioral (IMB) that can be generalized in health behavior programs and have successfully been implemented in various places. To understand, predict, and promote the prevention behavior of HIV the IMB competence model is not only implemented widely on various populations but also supported in research of effective sexual health and responsive intervention programs that are used all over the world. Three basic concepts can be the center of the IMB skill model, that is information, motivation, and behavior skills.

Based on Adekola's research (2022), Information, motivation, and behavior skills that are scientifically accurate will affect the ability of students to start and keep SRH and welfare. Information Motivation Behavioral (IMB) processes based on competence in this model can be used as input power sources to improve the result of sexual education, which leads to the improvement of SRH and youth welfare in education in research background. The component of feedback of the SEE model gathers information about model performance and modification model method to improve the effectiveness.

From the three strategies above it has been analyzed that youth-friendly service is the more effective and dominant strategy. The strategy is directly related to the environment, social culture, health employees, family members, and even the consultant party. Therefore youth-friendly service strategy can be implemented in schools or integrated with the education curriculum, so the knowledge and youth awareness of the importance of sexual and reproductive health has been fulfilled.

## Obstacles factor of youth sexual and reproductive health strategy

### 1. Social Culture Environment

Based on research done by Adekola (2022) showed that there are environmental factors such as poverty, culture and religious norms, parents' descendants, and social attitudes that affect the casual path of competency model construction of Information Motivation behavior (IMB) that underlying the process of SEE model in research environment. Data analysis research showed that students from poor families were less prepared to act based on the knowledge they got in class during sexual education class because they were involved in transactional sexual activity for financial or material profit. The presence of culture in society that judges that adolescents who are pregnant outside of marriage are not accepted and elected by local culture so that Adolescents who experience pregnancy often experience stigma, discrimination, and rejection of other women and the community because it is considered to bring bad influence to other friends. This is one of the inhibitors in sexual and reproductive health services for Adolescents so as long as pregnancy exams, Adolescents often lack privacy in health facilities (Fatimah & Astuti, 2022).

### 2. Communication and Decision Making

The willingness to communicate, adequate knowledge, positive perceptions, and parental involvement of children are important in the development of reproductive health in Adolescents to reproductive and sexual health problems to prevent Adolescents from sexual behavior deviations (Aprillia & Astuti, 2022). To connect youth with knowledgeable sexual partners, ready, and aware of the risks and prevention of HIV and pregnancy, and able to negotiate needs, limits, and desires is required SRH communication that is associated with behavior and positive results, including service use. This pattern reflects the proof of previous research about SRH communication between parents to children, where

this conversation tends to focus on the risk of pregnancy and taboo and tends to discuss contraception (Koenig et al., 2020)

Based on the research of Zhang (2019), the balance between protection and inclusion can be reached by considering the capacity of decision-making that develops in youth and also the risk they have. Youth empowerment and effective communication during ethics analysis can help to inform the process of the Institutional Review Board (IRB) by characterizing risks and benefits in the used method validation. Therefore, experience with decision-making in real situations improves the youth's capacity to approve participating in the activity of sexual and reproductive health.

### 3. Policy and Government Program

The health care provider and policy of the government is an external factor that can be an obstacle to the provision of sexual education and reproduction in Adolescents (Machfudloh & Astuti, 2022). Based on the research of Marsh (2022), the Global Action for Measurement of Adolescent Health (GAMA) Advisory Group, is committed to coordinating, aligning, and sharing evidence to measure adolescent health communication between the Advisory Group (AG) and the other stakeholders to work towards special purposes. The 36 core indicators that are considered the most important in measuring adolescent health recommended by GAMA AG gave the framework of adolescent health measurement that scope reflects the most important problem.

Based on the research of Wadler (2022), showed that a multicomponent intervention targeted at adolescents living in cash transfer households increases knowledge related to HIV prevention, contraception, and health-seeking, and increases health-seeking and HIV testing behavior among boys. Using the power of social protection platforms offers excellent opportunities to reach and involve youth from poor and marginalized households with SRH and HIV skills

education and training, and as such is an important complementary platform for schools when trying to reach youth.

#### 4. Sex Knowledge, Attitude, and Self-Efficacy

Internal factors that include attitude, confidence, education, and knowledge obstacles to the provision of sexual education and reproduction in Adolescents (Machfudloh & Astuti, 2022). Health education for youth should be an integral part of the school curriculum and delivered by trained teachers, counselors, or health professionals. Age and sex-appropriate health education programs can facilitate the development of healthy reproductive and sexual behavior patterns in adolescent boys through increasing knowledge and developing the right attitudes (Thulasi & Malleswaramma, 2021).

The effectiveness of SRH-related knowledge among adolescents is influenced by educational materials and participatory strategies (such as quiz games, group discussions, and audiovisual tools) that can serve the youth's tendency for more dynamic learning stimulation. In social psychological factors, attitudes are a person's intrinsic psychological tendencies toward people and objects. Therefore, SRH educational interventions must be implemented over a longer period to bring about and sustain positive changes in adolescent sexual attitudes. It is also known that students who receive SRH education have higher self-efficacy in managing risky situations.

#### CONCLUSION

From all the articles that have been analyzed, it is stated that adolescence has a high impact on various social problems and problems related to reproductive health which are influenced by several factors. 3 strategies have been analyzed the three strategies the most dominant is school-based youth-friendly services. The matter that needs to be addressed in the execution of school-based interventions is management System Support for the effective provision of adolescent and youth-friendly health

services. Policies and processes that support the rights of adolescents. Appropriate adolescent health services are available and accessible. Provision of relevant information, education, and communication (IEC) promoting behavior change and consistency. Systems are in place to train and develop staff to provide effective adolescent-friendly health services.

The limitation of this research is that the data collection was not done directly because it analyzed other research articles. For the next research, it is expected to be able to analyze and evaluate in handling adolescent sexual and reproductive health in both developed and developing countries. It is necessary to include Governments and NGOs in developing countries to consider the improvement of consultative assistance for adolescents, strengthening human resources particularly in schools to improve their awareness about SRH among adolescents, and providing training for the teachers through intensive training and assistance programs. Reinforcement and assistance related to the implementation of technology consisting of technology for literacy, competent development platform, teacher profile, teacher empowerment platform, school resource platform, and educational reporting platform.

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## Information Needs among Parents of Cancer Children: A Systematic Review

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### ABSTRACT

**Background:** When a child is diagnosed with cancer, parents are affected, especially if they are unprepared and do not understand the illness. Parents' informational needs are frequently expressed and vary, so identifying parent needs is critical before providing health or nursing interventions. **Aims:** This review aimed to identify the information needs of parents of children with cancer. **Method:** PubMed, Medline, and CINAHL were applied to conduct electronic searches. The terms "information needs", "parent", "cancer", and "child" were combined using Boolean expressions "OR" and "AND". The inclusion criteria were non-experimental studies published in English within the last 10 years (2011-2021). Risk of bias assessment was conducted for each included study using the Joanna Bridge Institute critical appraisal tools. After identification and screening, the articles were filtered according to the criteria with a total of 15 articles included in this study. Furthermore, data extraction and synthesis were carried out. Narrative synthesis is used by collecting information on the findings of the article to be grouped into themes of finding problems. **Results:** Four themes emerged based on the results of the analysis: types of information needed; information formats; provision of information; and sources of information. **Conclusion:** This study concluded that parents require accurate information that addresses their specific information needs and is appropriate for their child's cancer stage. The provision of balanced written and verbal information, as well as information that is complete, accurate, and reliable, makes it easier for parents to increase their knowledge about caring for their children.

**Keywords:** Cancer, Children, Information needs, Parents.

### INTRODUCTION

Almost every organ or tissue in the body can develop cancer, which is a group of diseases where abnormal cells grow out of control, attack nearby organs, and spread throughout the body (WHO, 2018). Cancer also attacks various age groups including infants, children, men, and adolescents. According to the World Health Organization (2021), it is estimated that 400,000 children and adolescents aged 0-19 years are diagnosed with cancer each year.

There is a need for psychosocial services for parents and caregivers because studies show that families are impacted by the illnesses that children suffer from (Kearney, Salley and Muriel,

2015; Brand, Wolfe and Samsel, 2017). Depending on how serious the condition is, different families of children with cancer have different needs. Families worry that their children won't be able to get well. Parents talk about how their child's diagnosis and treatment have caused stress in their lives (Kerr *et al.*, 2007). As a result, providing the right kind of supportive care to parents is critical in helping them cope with the stresses associated with their children's cancer diagnosis and treatment (Kerr *et al.*, 2007).

Supportive care is defined as the provision of health care needs for patients in seven need domains, which include information needs, practical, spiritual, psychological, social, emotional, and

physical needs during the prediagnostic period, diagnostic period, treatment period, and follow-up period, which includes survivorship, palliative, and bereavement care (Pelentsov, Laws and Esterman, 2015). Information needs have been identified as a generally unmet need for supportive care for patients living with cancer including pediatric cancer patients, friends, and family (Thiessen *et al.*, 2020).

Parents of cancer children have a fundamental need for knowledge to manage the psychosocial effects of their child's illness, to be aware of condition progression, and to comprehend the care provided to their children (Brand, Wolfe and Samsel, 2017). Child care and knowledge are essential in facilitating child care (Motlagh, Mirzaei-Alavijeh and Hosseini, 2019). Knowing the diagnosis, course of treatment, and potential complications can help parents feel more at ease, less anxious, and possess self-control (Motlagh, Mirzaei-Alavijeh and Hosseini, 2019).

Parents or other family members may have different preferences about the amount of information they want to hear. Most parents want a clear and simple explanation of the diagnosis and prediction of the child's future; as well as some advice on what to do next. Parents also want the opportunity to ask questions and nurses are expected to be warm and sympathetic listeners (Hockenberry, Wilson & Rodgers, 2017). While still paying attention to the psychosocial needs of the parents, it can be difficult for nurses and other health care professionals to continue to enrich references and adjust information needs for each parent at every phase and stage of the disease. Therefore, healthcare providers must be aware of the information needs of parents. The purpose of this study is to determine the informational needs of parents of cancer patients.

## METHODS

This systematic review used narrative analysis. Narrative synthesis examined various issues on a specific topic by identifying, analyzing, and interpreting the body of knowledge into particular themes (Coughlan & Cronin, 2017). This approach is used to identify

the information need of childhood cancer parents. Coughlan and Cronin's (2017) steps are adapted for the review. The primary objective of this review was to answer the research question: how is parents' informational need related to cancer children?

The electronic search strategy was carried out by the first and third authors. An extensive search was conducted using index terms and keywords across three databases: PubMed, Medline, and Cumulative Index to Nursing and Allied Health (CINAHL). Multiple databases were chosen to reduce bias in study results and to broaden the scope of article searches. These three databases were chosen to expand search coverage of articles related to information needs in health settings, particularly those related to pediatric oncology. PubMed was chosen because it is a platform with over 34 million references, whereas MedLine is the largest biomedical literature database and CINAHL is a database with articles about nursing and allied health. This is also in line with the recommendations of Bramer *et al.*, 2017 dan Gusenbauer & Haddaway (2020) who stated that several databases, including PubMed, Medline, and CINAHL, are recommended for conducting systematic reviews in the field of health and nursing. An initial search on PubMed combined the main concepts from the research aims: ("child" OR "p\*ediatric") AND ("parent") AND ("cancer") AND ("information\* needs"). Each database's keyword truncation was done individually. The search was conducted for three months, between March to June 2021. The initial search for articles published in English with no year limit to obtain a thorough study.

The articles that met the study's inclusion criteria were written in English and related to the aims of this study, non-experimental studies (quantitative, qualitative, and mix-methods approach) were chosen. Types of childhood cancer and children's age are not limited. Only literature published between 2010 and 2021 was considered. Articles that did not have a full-text, secondary study, an experimental study, and did not explain the parents' perspective were eliminated. Importing articles and deleting duplicates were done with the

reference manager. The title and abstract were then independently reviewed by the first three authors. The complete text of the shortlisted articles was then checked against the inclusion and exclusion criteria. The Joanna Bridge Institute (JBI) appraisal tools for cross-sectional and qualitative studies were used in the quality appraisal. Any discrepancies in judgment are settled through discussion until an agreement is reached. The data extraction included the author, year of publication, country, aims, study design, sample size, instrument, and findings. Then narrative synthesis is used to analyze the findings into groups of themes.

## RESULTS AND DISCUSSION

The search and screening process for studies is shown in Figure 1. Three databases provided articles from the year 2010 to 2021. After excluding duplicates 1.119 articles remained. Following the application of inclusion and exclusion criteria, 15 articles remained for quality assessment (4 articles were obtained from PubMed, 5 articles from Medline, and 6 articles from the CINAHL). The selected articles received a quality score above seven, so the study quality was acceptable.

Table 1 provided information about the characteristics of the included studies. Studies were conducted in Iran, Jordan, Indonesia, Turkey, Swedia, Switzerland, Ireland, Norway, South Africa, New Zealand, and the United States. By region, there was one study

from Southeast Asia, four studies from the Middle East, one study from Africa, one study from Oceania, five studies from Europe, and three studies from America. Seven studies employed quantitative design (cross-sectional), while eight used qualitative design. Eleven articles categorize the child's age based on the World Health Organization (WHO) age range (0-19 years), with several periods of the child's age beginning with newborns (0-1 years), children (2-10 years), and teenagers (11-19 years). Eleven studies included parent participants who had children with both solid tumors and hematological cancer, two studies involved parents of children with hematological cancer, one study involved parents of children with solid tumors, and one study did not provide information about the type of childhood cancer. Thirteen studies discussed information needs about childhood cancer in general, one study discussed nutrition information needs, and one study discussed parents' information needs about Complementary and Alternative Medicine (CAM).

Table 2 summarized the findings of the narrative synthesis from each study. Because it involved both qualitative and quantitative studies, the findings were written in narrative form. Based on the findings, there were four themes obtained related to the research question. The main theme that emerged from the findings were: 1) the types of information needs; 2) the format of information; 3) the provision of information; and 4) the source of information.

**Table 1.** The Information Needs of Parent.

Authors and Year	Findings
Motlagh et al., (2019)	Parents of leukemia children have the greatest need for information about medical care (60,06%) and physical care, specifically how to care for their child in pain (60,46%).
Vetsch et al., (2015)	Parents receive more types of verbal information than written information, even though written information is very important for parents to receive because verbal information is sometimes forgotten by parents. Health workers still do not fully provide complete information to parents regarding follow-up care and long-term effects (late effects). The type of information received by parents regarding information related to disease, treatment, and long-term effects is as follows: <ul style="list-style-type: none"><li>Verbal information: disease (91%), treatment (88%), follow-up (85%), long-term effect (74.6%);</li><li>Written information: disease (39.6%), treatment (45.5%), follow-up (27%), long-term effects (19%);</li><li>No information: disease (2.6%), treatment (15%), follow-up (5.8%), long-term effects (16.9%).</li></ul>

Authors and Year	Findings
(Aziza, Wang and Huang, 2019).	Parents reported information needs are related to their child's condition, including the fear that their child's condition will deteriorate, unexpected recovery, a lack of support services, a poor prognosis, and the desire to receive the best medical care possible.
Arabiati & Altamimi (2013)	The most frequently reported information needs are the need to know when a side effect occurred (93.9%), what type of treatment the child received (93.9%), and the possible outcome of the child's disease (92.8%). The lowest level of need is for how to provide information to children (14%), followed by how to regulate children's emotions (24%).
Arpaci et al., (2018)	Parents' information needs regarding children's nutrition, including food-drug interactions (58%), food-disease interactions (52.2%), neutropenic diet (46.4%), food preparation (21.7%), and timing (when should a neutropenic diet be started) (25%). Parents report a lack of information and demand comprehensive and consistent information.
(Hovén et al., 2018)	Parents' information needs for long-term effects (late effects), access to psychological assistance, and follow-up care have not been met. Parents who received written information were more satisfied with ( $x^2 = 33.81, p < .001$ ), it is found the information to be more useful than parents who did not receive written information ( $x^2 = 23.69, p < .001$ ).
Kessel et al., (2013)	The three most important information needs of parents of children with cancer are discussing short-term side effects (98.4%), the first steps of treatment (96.8%), and the importance of the doctor explaining that parents do not cause the child's illness (90.3%). Parents also prefer a written information format (84%).
Maree et al., (2016)	Parents of children with cancer want to learn more about the disease and its causes and any information specific to their child's cancer.
Rodgers, et al. (2016)	Parents' ability to process information is influenced by their perceptions of how much and how quickly information is provided. Because of the large and rapid flow of information from health workers, parents find it difficult to process information during their child's diagnosis and discharge. Parents prefer information that is consistent and provided by the same information provider, or information that is uniformly provided.
Smith et al (2019)	Parents prefer a balance of verbal and written information formats. Parents prefer to receive information from health professionals gradually; they want to hear information about their child's diagnosis apart from their child; and they want their children to understand the information they communicate.
Stub et al., (2021)	A total of 46% of parents used Complementary and Alternative Medicine (CAM), although they stated that they did not receive information about CAM at the hospital and would appreciate it if a health professional worker did. The majority of parents (95%) want to know about the most recent evidence-based information on vitamins and supplements, as well as techniques to reduce chemotherapy side effects, boost the immune system, and fight cancer. Furthermore, parents want advice on how to help their families, cope with life, and reduce anxiety in their children and themselves.
Kastel et al., (2011)	According to the family's experience, there are many barriers to getting information from health professionals, including families believing that the time provided by health professionals for providing the information is sometimes insufficient; families must sometimes wait until the time of the next treatment/therapy to get answers to questions; it is difficult for the family to meet with the doctor; and sometimes the family believes that too much information is provided, causing the family to become confused.
Kilicarlan-toruner & Akgun-citak, (2013)	Parents seek information regarding their child's illness, prognosis, treatment, side effects, and challenges with care delivery.

Authors and Year	Findings
Coyne et al., (2016)	Parents expect open and honest communication when it comes to sharing information. When presenting information to families, healthcare workers must keep an open mind, be attentive to the information required, and take a flexible approach.
Aburn & Gott, (2014)	When their child is first diagnosed, some parents experience a lack of understanding regarding diagnosis and therapy because they are unable to assimilate the information resulting from a diagnosis that surprises and confuses them. Parents believe that the health education provided by health workers meets their needs to a large extent; they feel supported by staff and have the opportunity to ask questions at any time; however, there are some gaps in information regarding food safety and infection.

### *The Types of Information*

According to the study's findings, there were two types of information needs (based on dimensions and the stage of children's cancer). Cognitive needs, affective needs, situational needs, social integration, personal integration, and hope are all characteristics of information needs among parents of cancer children, according to the dimension (Katz, Gurevitch & Haas; Tan, 1981; Miranda dan Tarapanoff, 2008; Yusup dan Subekti, 2010; Christina & Nuraeni, 2018). Parents must receive health education to address cognitive needs such as answering previously unknown questions, understanding their child's condition, and making the best decisions for their children. The findings of the included studies described a wide range of cognitive needs, such as the need for diagnosis, prognosis, treatment for pain, infection, long-term and short-term effects, follow-up care, nutritional needs, Complementary and Alternative Medicine (CAM) needs, and needs for mental problems in children and parents.

Parents also require information about affective needs. A qualitative study conducted by Stub et al. (2021) describes how parents require information to support their children and families, and specific strategies to reduce anxiety in children. Another study conducted in Indonesia by Aziza et al. (2019) depicts the need for situational needs. According to the study, parents believe in destiny and the power of God as a coping mechanism for anxiety and stress caused by a lack of information and their child's poor condition.

Aziza et al. (2019) described the need for information about social integration. That study concluded that parents need friends, relatives, and religion to cope with anxiety and

depression caused by a lack of information or education. Furthermore,

because Indonesia is a community-oriented country, parents require support and assistance from those around them (Aziza et al., 2019). All health workers must pay attention to meeting the social integration needs of parents by assisting them in remaining connected to their social environment. A qualitative study conducted by Stub et al. (2021) also demonstrates the need for hope. Some parents report that they require quality-of-life information to help their children. Parents express their hopes and expectations for their children's health. In this case, health professionals must provide full support to parents to remain optimistic about their child's condition's progress.

The information needs of parents of children with cancer vary depending on the child's stage of disease, which includes the diagnostic, treatment, and survival phases. During the diagnostic phase, parents are frequently taken aback by their child's diagnosis, necessitating detailed information on diagnosis, therapy, and side effects (Kilicarslan-toruner and Akgun-citak, 2013). They require information on how to manage the child's anxiety, how to care for the child's physical and nutritional needs, treatment complications, coping abilities, new treatment methods, and the child's prognosis during the treatment phase (Kilicarslan-toruner and Akgun-citak, 2013). Meanwhile, during the survivorship phase, parents need information on how to manage late effects, continuing education for their children, rehabilitation services, access to psychological services, and the need for follow-up (Hovén et al., 2018; Vetsch et al., 2015).

### *The Information Format*

The majority of parents reported a lack of written information provided by health workers in four studies (Hovén et al., 2018; Kästel et al., 2011; Rodgers et al., 2016; Vetsch et al., 2015). According to Vetsch et al. (2015), parents primarily received verbal information from health practitioners and desired additional written information formats such as booklets. This is consistent with the findings of Rodgers et al., (2016), who discovered that parents prefer written information to ensure the consistency of information provided by multiple informants (health providers), particularly when it comes to providing drugs to their children. Aburn & Gott (2014) also explain parents' desire for a balance of verbal and written information formats. Health workers can provide more written material in the future because the written format can help parents recall the information provided by health workers. Written information is expected to strengthen the delivery of information verbally. Individual long-term follow-up plans, including a treatment summary, should be provided to each patient, preferably in written format, according to parents, who expect written information in the form of a simple booklet that can be carried anywhere (Hovén et al., 2018; Vetsch et al., 2015).

#### *The Provision of Information*

The method of providing information to parents must be tailored to their specific requirements. According to Coyne et al. (2016), parents expect health workers (informants) to be sensitive to what parents want and provide information openly and honestly based on family needs. Customized information using lay language and terminology can help parent process information more easily (Kilicarşlan-toruner and Akguncitak, 2013). Providing information tailored to the culture and beliefs of the family can also benefit parents (Aburn and Gott, 2014). Information should also be provided in a flexible manner, such as by adjusting the condition and time of parent and child (Coyne *et al.*, 2016). Several studies have found that some parents prefer to receive diagnosis or prognosis information separately from their children because their children are too young to understand the diagnosis or prognosis (Arabiat and Altamimi, 2013; Smith *et al.*, 2019). When providing

information, health workers must pay attention to the situation and location to respect parents' decisions about transferring information from health workers to their children.

When providing information to parents of children with cancer, health workers must pay more attention to the issue of time. Aziza et al., (2019); Kästel et al., (2011); Smith et al., (2019) believe that health workers spend too little time providing information. Parents prefer that information be provided gradually from the diagnosis phase to the survivorship period because they cannot process large amounts of information in a short period (Rodgers et al., 2016). Parents will be more likely to receive and retain information if it is delivered gradually, consistently, and uniformly to other health professionals (Rodgers *et al.*, 2016; Smith *et al.*, 2019). Nurses, like all other health professionals, must manage the timing and consistency of information. This is intended to ensure that information is only provided to parents when necessary, and that information provided to parents is not excessive or confusing.

#### *The Source of Information*

Health professionals (doctors, nurses, oncologists), relatives, friends, and the internet are all sources of information for parents of children with cancer. Despite rapid technological advancement, some parents rarely use the internet to obtain information about their child's condition. Parents, according to Vetsch et al. (2015), view the internet as a less trustworthy source of information. Moreover, Aburn and Gott (2014) discovered that parents are hesitant to use the internet as a source of information because they believe it is frightening and contains inaccurate information about children's cancer. The government and stakeholders must establish a credible online source that provides accurate and reliable information to parents.

## CONCLUSION

The information needs of parents of cancer children will vary depending on their child's condition. The provision of information needs that parents desire refers to cognitive needs (knowledge about diagnosis, prognosis, care and

treatment, long-term effects, follow-up care, nutrition, complementary and alternative medicine, and mental health of parents and children); affective needs (how parents deal with anxiety, fear, and anger in their children); situational needs (information based on parents' beliefs about what is best for their children); personal and social integration needs (regarding self-esteem and reduce feelings of guilt) and hope. To meet the needs and preferences of cancer parents and children, information delivery must be able to adjust several aspects (how to provide information, sources of information, and information format). Nurses and other health workers must assist and facilitate parents in obtaining information based on their children's needs and conditions. Also, educators, nurses, and other health professionals must assess parents' information needs related to their condition.

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## The Impact of Self-Management on the Quality of Life of Patient with Diabetes Mellitus: A Systematic Review

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### ABSTRACT

**Background:** Diabetes mellitus is a hereditary and degenerative disease that requires management throughout the patient's life to maintain blood sugar stability and psychosocial factors. **Aims:** This systematic review aims to determine the effect of self-management on the quality of life of patients with Type 2 DM. **Methods:** The selection of the studies refers to Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines and JBI's checklist was used to assess the quality of the study. The study selection came from 7 databases Scopus, ScienceDirect, Sage Journals, ProQuest, Emerald Insight, Pubmed dan Taylor & Francis. The number of studies included in the review was 7 articles, 5 articles used an RCT design, and 2 articles were quasi-experimental. **Results:** The finding showed 2 articles that provide interventions in the form of DSME, 1 article emphasizes self-management interventions based on self-efficacy theory that is oriented towards active family involvement, 1 article specifies interprofessional-based DSM through telemonitoring media, 1 article focuses on community-based self-management interventions, 1 article specializes in the use of weblogs in conducting self-management. Special 2 articles emphasize nurse leadership in managing interventions during the study. Five articles showed a significant effect of self-management on quality of life and 2 articles had no effect. **Conclusion:** The finding can be used to optimize self-management intervention in DM patients to improve the quality of life.

**Keywords:** Diabetes mellitus, Self-management, Quality of life.

### INTRODUCTION

Diabetes Mellitus belongs to the category of chronic illness that occurs when the pancreas does not produce sufficient insulin or the body cannot effectively use the insulin. (WHO, 2021). On the whole, type 2 diabetes mellitus (T2DM) has become one of the most complicated chronic public health problems. T2DM is the cause of disability and untimely death, particularly cardiovascular and other chronic complications.

It is estimated that the number of DM patients will increase to 366 million in 2030 and 90% are type II. (American Diabetes Association, 2012). Epidemiological studies show an increase in the prevalence and incidence of T2DM

in the world. The World Health Organization (WHO) estimates that more than 346 million people in the world will suffer from diabetes and in ASEAN countries there were 19.4 million in 2010. The number of patients is expected to more than double by 2030 if management is not carried out properly. According to the figures above, 80% of diabetes patient deaths occur in countries with low and middle economic levels (Wicaturatmashudi, 2020).

DM is a chronic disease that has a broad impact on the individual, family, social, financial, disability, and risk of death problems. The negative impact of T2DM disease on the patient's life is the difficulty of controlling blood glucose, avoiding foods that have a risk of increasing blood sugar and physical activity that has the potential to increase

complications. Complications as a result of low patient compliance are musculoskeletal disorders, disability, sexual dysfunction and vascular disorders as well as psychosocial impacts. In addition, lost jobs, repeated treatments, costs to be borne by patients during hospitalization and daily care, disruption of family and social interactions and worsening of quality of life are some of the major problems affecting the patient's family, social and economy. (Abedini *et al.*, 2020). Diabetes causes a universal problem.

The impact of diabetes is growing rapidly in populations of developing countries and middle-income countries. Without action, death and disability from diabetes will continue to increase substantially (Fradkin and Rodgers, 2013). Management of Diabetes Mellitus patients requires a long time, costs a lot and this condition directly or indirectly affects the physiological and psychological aspects of the patient. This condition is further exacerbated if the patient has both microvascular and macrovascular complications. The level of dependence on other people and family is a separate stressor for patients. DM patients who have passed the critical period and are being treated at the hospital will continue treatment at home to keep their blood sugar levels under control so that complications that may arise can be prevented. Aspects that also require attention are the physiological and psychological aspects of the patient. Physiological aspects can be in the form of hemodynamics and blood sugar levels of the patient. While the psychological aspects can be in the form of quality of life, stress, depression. Although the treatment is often complex, patients are expected to bear many consequences to make alternative assurances that can affect their health status while living with diabetes.

Quality of life is the ultimate goal of meaningful health outcomes and a major issue in the care of patients with chronic diseases, especially diabetes. Quality of life is one of the main complications of patients with diabetes that affects other aspects of life. Based on the WHO statement the recommendations for quality of life refer to the individual's personal perception of his life situation about the culture and

value system of society and its relationship to their goals, expectations, standards and needs. ((Rasoul *et al.*, 2019).

Self-management is an important aspect in the ongoing care of DM patients. Self-management is defined as the patient's active participation in their treatment. According to Corbin and Strauss, self-management consists of three different activities which include management of medical (taking medication and adhere to the recommended diet), management of behavioral (adopting new behaviors) and management of emotional (frustration, fear and hopelessness) associated with chronic illness. T2DM patients need the ability to manage and control it while living with DM (Van Smoorenburg *et al.*, 2019).

## METHODS

At the review stage, the researcher referred to the Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) guidelines and the JBI checklist used to assess the quality of the review (critical appraisal).

### Search Strategy

A systematic literature search was carried out by searching 7 Scopus electronic databases which included ProQuest, PubMed, Science Direct, Taylor and Francis, Emerald Insight and sage journals published between 2013-2022 with a combination of 3 groups of keywords in English. An article search was conducted on April 3, 2022. This database comprises biomedical sciences, life and physical sciences, behavioral and social sciences, arts and humanities and information sciences. Keywords and Medical subject headings (MeSH) terms used are 'diabetes mellitus', "self management", "quality of life". These keywords are combined using the 'AND' Boolean system to find relevant studies. The studies searched were published studies. In the next stage, the reference list of the identified articles is reviewed to consider additional articles.

### Criteria of Inclusion and Exclusion

The criteria of inclusion determined to ensure that the search for data is more focused and in accordance with the objectives of the systematic review are articles in a RCT or design of quasi-experimental, population are Type

2 Diabetes Mellitus patients, full text articles in English, publications from 2013 to 2022, search literature will use Scopus, ScienceDirect, Sage Journals, ProQuest, Emerald Insight, Pubmed and Taylor & Francis databases. The exclusion criteria determined to limit searches in order to get more data and articles that are in accordance with the purpose of the review are articles other than English and articles that are not open access.

#### **Selection of Study**

Based on the PRISMA guidelines, potential articles were first obtained from electronic databases. Potential articles were screened to assess feasibility after duplication, title and abstract selection. From each selected article, it was then selected which had the complete text that met the inclusion criteria for further review. A secondary search was performed from the study reference list to identify additional articles. At the final stage of selection, eligible studies that met the inclusion criteria were included in a systematic review. The search and selection process was carried out by two independent reviewers. Any disagreements were resolved by a third reviewer.

#### **Biased Risk**

Assessment of the quality of the methodology of the articles that will be carried out systematic review using the JBI checklist critical assessment list. In this systematic review, there are 7 articles that are eligible to be reviewed. Of the 7 articles, 5 articles used an RCT design and 2 articles used a quasi-experimental design. Risk of bias based on JBI protocol for RCT design using 13 assessment items (Institute, 2017). While the quasi-experimental design uses 9 assessment items (JBI, 2017). Based on the assessment results, all articles showed a small risk of bias.

#### **Data Extraction**

Data extraction was done manually using a format in Microsoft Excel to extract all information from the included articles which will be presented in the study characteristics and review results. The process of extracting information from the articles reviewed includes the author, year, country, design, sample, objectives, interventions, instruments used and the results of the articles used to evaluate

the impact of self-management interventions on quality of life in T2DM patients.

## **RESULTS AND DISCUSSION**

### **Selection of Study**

Researchers have identified 19547 articles. After removing duplicates, title and abstract, there were 1141 articles. After further selection of 1141 articles, 7 full articles were retrieved and were eligible for review (Table 1).

### **Biased Risk**

There are 7 articles assessed to identify the risk of bias using the JBI critical assessment items. From 5 articles with RCT design the results of the assessment are as follows score 100% (n = 1) ((Balcha Hailu, Hjortdahl and Moen, 2021)), score 85% (n = 2) (Wichit *et al.*, 2017)(Azami *et al.*, 2018) and a score of 92% (n = 2)(Lee *et al.*, 2020)(Sugiyama *et al.*, 2015). Articles with a quasi-experimental design score 100% (n = 1)(Nooseisai *et al.*, 2021) and score 85% (n = 1) (Rasoul *et al.*, 2019).

### **Characteristics Of Study**

The total number of respondents in this systematic review was 1317 with a distribution of 685 respondents in the intervention group and 670 in the control group.

Of the 7 articles reviewed, all discussed how self-management impacts the quality of life of T2DM patients. Although each article has specificities in achieving its research objectives. Based on the research design used, there were 5 articles using RCTs with pragmatic cluster and single blinded variations and 2 articles using quasi experiments. The various designs in this review are to get an overview of self-management interventions through various research methods conducted to answer the hypothesis.

Judging from the duration of the research, the results of the review show that research to determine the impact of self-management on quality of life and the various variables studied requires quite a long time. The results of the review of 7 articles provide an illustration, the shortest time for research, in a design that provides self management interventions is 3 months (Nooseisai *et al.*, 2021) and the longest time is 1 year (Sugiyama *et al.*, 2015). The length of time needed to research will have an impact on costs, participant compliance and the risk of bias that arises during the course of the study.

In the population and sample, all 7 articles were type II DM patients with variations in the inclusion and exclusion criteria set by the researchers. Some articles have female gender sample specifications (Nooseisai *et al.*, 2021).

In the aspect of the intervention given, there are variations that give novelty meaning to research. Most of the interventions are given in the form of DSM (diabetic self-management). There are 2 articles providing interventions in the form of DSME (Hailu, Moen and Hjortdahl, 2019)(Nooseisai *et al.*, 2021). The article (Wichit *et al.*, 2017) emphasizes self-management interventions based on self-efficacy theory that is oriented toward

active family involvement. The article (Lee *et al.*, 2020) specifies cross-professional-based DSM interventions through telemonitoring. Meanwhile, the article (Sugiyama *et al.*, 2015) focuses more on community-based self-management interventions. In the article (Rasoul *et al.*, 2019), specializing in the use of weblogs in conducting self-management interventions. Specifically the articles (Hailu, Moen and Hjortdahl, 2019) and (Azami *et al.*, 2018) emphasize nurse leadership in managing interventions during research.

Table 1. Characteristics Of Study.

Title	Authors	Country	Design	Variables	Instruments
Effect of locally-contextualized nurse-led diabetes self-management education on psychosocial health and quality of life: A controlled before-after study	(Balcha Hailu, Hjortdahl and Moen, 2021)	Ethiopia	Controlled before-after study a single-blinded randomized controlled trial	Health-related quality of life	Generic HowRU tool (Benson <i>et al.</i> , 2013, 2010; Hendriks <i>et al.</i> , 2015)
Randomized controlled trial of a family-oriented self-management program to improve self-efficacy, glycemic control and quality of life among Thai individuals with Type 2 diabetes	(Wichit <i>et al.</i> , 2017)	Thailand	a single-blinded randomized controlled trial	self-efficacy, self management, glycemic control and quality of life	The Thai version of 12-item Short-Form Health Survey (SF-12)
Telemonitoring and Team-Based Management of Glycemic Control on People with Type 2 Diabetes: a Cluster-Randomized Controlled Trial	(Lee <i>et al.</i> , 2020)	Malaysia	pragmatic 52-week cluster-randomized controlled study	HbA1c levels, fasting plasma glucose, blood pressure and lipid levels at each time point and Health related quality of life	The EuroQol-5D questionnaire
Effect of a community-based diabetes self-management empowerment program on mental health-related quality of life: A causal mediation analysis from a randomized controlled trial	(Sugiyama <i>et al.</i> , 2015)	USA	Randomized controlled trial	Mental health related quality of life (HRQoL) and glycemic control.	Health Related Quality of Life (HRQoL)
Effects of diabetes self-management	(Nooseisai <i>et al.</i> ,	Thailand	quasi-experimental	Blood glucose levels, stress,	World Health

education program on lowering blood glucose level, stress, and quality of life among females with type 2 diabetes mellitus in Thailand	2021)			and quality of life (QoL)	Organization Quality of Life-BREF (WHOQOL-BREF)
The effect of self-management education through weblogs on the quality of life of diabetic patients	(Rasoul <i>et al.</i> , 2019)	Iran	quasi-experimental	patient's quality of life	Diabetes quality of life (DQOL), Persia version
Effect of a Nurse-Led Diabetes Self-Management Education Program on Glycosylated Hemoglobin among Adults with Type 2 Diabetes	(Azami <i>et al.</i> , 2018)	Iran	A two-arm parallel-group randomized controlled trial with the blinded outcome assessors was designed	HbA1C Blood pressure, body weight, lipid profile, self-efficacy (efficacy expectations and outcome expectations), self-management behavior, quality of life, social support, and depression	The World Health Organization Quality of Life Scale WHOQOL-BREF

In terms of results and conclusions, the results of the review illustrate that the articles (Hailu, Moen and Hjortdahl, 2019) and (Wichit *et al.*, 2017) show no significant differences between interventions on quality of life and quality of life related to health in the intervention and control groups. While the 5 articles all showed that there were significant differences and also a significant relationship between self-management interventions with a variety of methods on quality of life and health-related quality of life.

Based on the results and conclusions, almost all articles provide recommendations and only 1 article does not include recommendations. The recommendations essentially emphasize the importance of further research with culture-based specific instruments (Hailu, Moen and Hjortdahl, 2019), increasing active participant involvement (Lee *et al.*, 2020), as well as DSME interventions in the context of improving the quality of life of Type II DM patients as part of health promotion (Rasoul *et al.*, 2019).

The use of instruments used to measure the quality of life is quite diverse. Of the 7 articles reviewed, 2 articles used the WHOQoL-BREF instrument (Azami *et*

*al.*, 2018) (Nooseisai *et al.*, 2021), Generic HowRU tool (Hailu, Moen and Hjortdahl, 2019), 1 article used The Thai version of 12-item Short-Form Health Survey (SF-12) (Wichit *et al.*, 2017), 1 article using the Persian version of DQoL (Rasoul *et al.*, 2019) and Health Related Quality of Life (HRQoL) (Sugiyama *et al.*, 2015). These instruments are valid and reliable enough to measure quality of life in research although there are still opportunities for confounding variables that interfere with the accuracy of the measurement results. Several articles have made instrument adjustments to the language and culture of the country where the research is conducted so that it is expected to be able to measure the quality of life variable more validly.

Basically no research is perfect, so all the articles reviewed include the limitations of the research as a basis for recommendations for further research. Research on self-management requires a long time and good cooperation with participants because the risk of dropping out is quite high until the end of the study. Opportunities are quite large in subsequent research to integrate self-management interventions with other interventions to

obtain a synergistic effect on quality of life and other relevant variables.

The author has conducted a systematic review and filtered using the PRISMA method as many as 19547 articles and found 7 articles containing information about self-management interventions integrated with other interventions. The 7 articles obtained have gone through the process of data extraction and assessment of the quality of the articles.

The articles obtained were in accordance with the PIO formulation, in which the author used the PIO formulation in his search by ignoring the criteria for the type of comparison or control. The article has also answered the clinical question about whether self-management can improve quality of life. Although there are 3 articles that do not show any significant influence or relationship. The article has also answered the second clinical question, namely the types of self-management that can be integrated. This systematic review will provide a broad description of self-management in T2DM patients, especially on the patient's quality of life. Self-management is an activity that refers to tasks related to the long-term management of patient health. Support for patients in self-management is a key component for the successful management of all T2DM patients. (Hanlon *et al.*, 2021).

Self management of chronic disease, especially DM, refers to the patient's daily activities to control the disease and minimize its impact on physical and psychological health status. Diabetes self-management education (DSME) is an important program for patients to control glycemia regularly and has been scientifically proven and evidence-based support to be an effective approach (Chrvala, Sherr and Lipman, 2016). DSME is a comprehensive and multidisciplinary professional program that is beneficial for patients to prevent complications and achieve a better quality of life.

In T2DM patients, psychosocial problems are associated as a result of the development of complications, longer hospital stays, increased health care costs both while in hospital and daily care. This condition has a significant influence on the worsening of the patient's quality of life. The patient's ability to carry out self-management and emotional ineffectiveness and adaptation indirectly triggers unstable

blood sugar levels so that the signs and symptoms are more obvious and the risk of complications increases. (Hailu, Moen and Hjortdahl, 2019). Diabetes mellitus (DM) is considered a major public health problem that has a negative impact on the quality of life (QoL) of patients. The high prevalence of DM greatly affects patient health and results in several complications with poor quality of life (Abedini *et al.*, 2020).

QoL is the most important conditions as the most expected end result of the self-management process. The patient's QoL is strongly influenced by the patient's expectations, attitude and knowledge of the patient towards the disease (Borg *et al.*, 2019). Self-management interventions can be carried out in various ways by actively involving patients as well as involving families, communities and health workers. Of the 7 articles reviewed, 5 articles used an RCT design and 2 were quasi-experimental which allowed for the given intervention. RCT design is the best research design because it is accompanied by an allocation randomization process so that it is possible to avoid research bias, control confounding variables and ensure the validity and reliability of research results.

Self-management in Type 2 DM patients provides a wide enough space to be developed in various aspects whose ultimate goal is how patients are able to control their blood sugar levels and improve their psychosocial conditions, especially to improve their quality of life. Each additional intervention and integrated into self-management has advantages and disadvantages. Self-management articles identified in the literature are gender influences.

Several researchers have explored self-management activities specifically in female patients and discussed gender and cultural differences. For female respondents, diabetes management is considered as their own responsibility which must be discussed in the family context. In Pakistani and Saudi cultures, women often subordinate their own needs to those of family members. Women especially play an important role in the diet and overall health of family members so that self-management in female diabetes patients will be more beneficial. Therefore, the social and historical position of women as mothers and wives

has an impact on how diabetes management is understood and implemented by the whole family. (Ansari *et al.*, 2017). The use of weblogs, on the one hand, is good enough to reach a wider population, but on the other hand, it creates obstacles because it is stated in the article that not all respondents understand the use of weblogs or the limitations in accessing weblogs.

Another study showed that the implementation of online self-management had a small beneficial effect on the control of HbA1c levels. Online self-management interventions are recommended because they represent patient-centered, effective, efficient and quality care. Further research is recommended to identify online self-management with digital consultation as effective in improving patient well-being and quality of life. (Celik, Forde and Sturt, 2020).

Other articles provide family-based self-management interventions. Management of DM patients is an effort to prevent both short and long-term complications and improve the quality of life of T2DM patients. The American Diabetes Association (ADA) has developed Diabetes self-management education (DSME) guidelines as a reference for standardized diabetes patient care. DSME is very important in the management of T2DM patients because the problem is very complex and requires a long time span even throughout the patient's age. Patients are burdened with many tasks including regular consultations, adhering to recommended treatment regimens and engaging in self-care behaviors including self-monitoring of blood glucose at home.

Other aspects of self-management behavior activities are changing healthy eating patterns and increasing physical activity. However, patients often find it difficult to consistently perform good health behaviors for good glycemic control. Common obstacles come from oneself and the surrounding environment such as the demands of daily life, feelings of frustration, unstable emotions and low patient commitment. Poor self-management can be caused by many things, such as lack of patient knowledge, inadequate self-efficacy for carrying out activities and less strong social and family support. Research reports that family support has a positive effect on patient self-management behavior (Pamungkas,

Chamroonsawasdi and Vatanasomboon, 2017).

The larger family and social environment contributes to the patient's diabetes care. Family members are the main source of instrumental and emotional support. Instrumental support is done by helping patients complete tasks such as consulting with health care workers or assisting with insulin injections. Emotional support is provided by providing comfort and encouragement when patients are coping with difficulties or frustrations during diabetes treatment. Be aware of the impact. Families can use diabetes self-management guidelines including providing education to family members or integrating family support as part of patient care planning. Thus, educational programs can be elaborated with the active involvement of the family. (Pamungkas, Chamroonsawasdi and Vatanasomboon, 2017).

The results of the review are also supported by research which states that the resulting a model which states that social demographic, behavioral and psychological characteristics, social support, barriers to self-management, and cultural characteristics have an effect on the self-management of T2DM patients. These factors can predict health outcomes in patients. In culture of Pakistani, strong family ties are important and highly valued. Treatment processes and action of medical decisions should be discussed within the family and not by individual wishes. So, the resulting model also assumes that self-management of T2DM patient mainly occurs in the family context, and both individuals and members of family are influenced by Pakistani culture (Ansari *et al.*, 2017).

Judging from the duration of study follow-up, the shortest study time was 2 months and the longest was 1 year. This review illustrates that it takes quite a long time to conduct research to see the effect of self-management on quality of life and the dependent variables that contribute to quality of life. A sufficiently long time will certainly have a significant impact on the follow-up process of the study. The biggest risk is that respondents do not have the consistency to follow a given series of self-management interventions. The results of the review are in line with the systematic review conducted (Pal *et al.*, 2013) which

stated that the intervention period is also between 2 and 12 months.

In the aspect of significance of the results of the study, out of 7 articles, 5 articles showed a significant effect of self-management with various variations of its implementation on quality of life and 2 articles showed no significant effect/relationship between self-management on quality of life of Type 2 DM patients. Articles presenting the results The absence of influence or relationship between self-management and quality of life is certainly a concern for subsequent studies to identify the factors that cause it. This is because quality of life and resilience are the main outcomes for DM patients, especially Type 2. The results of the review are in line with what was done (Mikhael, Hassali and Hussain, 2020) which states that there is a significant relationship between self-management and quality of life.

## CONCLUSION

Self-management interventions can be carried out with various variations in implementation. Most of the implementation is carried out in an integrated manner with the educational process. Apart from being integrated with education, self-management interventions can be carried out through weblogs and telemonitoring methods. Self-management in Type 2 DM patients can also be implemented based on self-efficacy, team, family and community. Good glycemic control and quality of life are hopes for Type 2 DM patients, considering that patients need a long time in the treatment process and even have to live with their DM disease for the rest of their lives. In the implementation of self-management, of course, the patient is the key to success. Although the key to success of self-management requires cooperation and collaboration from various health professions so that implementation can be carried out in a comprehensive manner.

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## Determinants of Cesarean Section Decision in Indonesia: A Systematic Review

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### ABSTRACT

**Background:** Cesarean section delivery should be chosen if there are certain medical indications. However, the trend of childbirth by cesarean section shows a high increase in Indonesia. Complications of childbirth after cesarean section are higher compared to normal childbirth, this condition can endanger the health and safety of the mother and baby. **Aims:** to determine the determinants of cesarean section decisions in Indonesia. **Method:** this study is a systematic review using PRISMA, a database search via Google Scholar, PubMed, and ScienceDirect, keywords are adjusted to the topic discussed. **Results:** 13 articles were reviewed that were relevant to the research topic. Determinants of cesarean section decision are medical indication including age, parity, pregnancy complications (hypertension and pre-eclampsia), history of delivery (cesarean section history), and labor complications (premature rupture of membranes and fetal distress) and by choice (own request) including residence in urban areas and employment. **Conclusion:** Interventions such as education, counseling, and others using appropriate communication, information, and education media, cooperation, and collaboration with academics and non-government organizations are needed in carrying out interventions.

**Keywords:** Cesarean section, Delivery, Determinant.

### INTRODUCTION

Childbirth is a physiological or medical process in which the fetus developing in a woman's womb is expelled from the mother's body after a certain period of pregnancy. This process involves uterine contractions and other changes in the body to allow the baby to exit through the birth canal (Cunningham et al., 2018). Labor or the birth process carries potential risks for the mother and newborn baby (American College of Obstetricians and Gynecologists, 2019). Two methods can be used: natural or delivery via cesarean section. The Cesarean section method involves surgery to remove the baby from the uterus by making an incision in the abdominal wall and uterus (Pratiwi et al., 2019). Cesarean section is carried out based on medical considerations, such as the presence of conditions such as placenta previa, abnormal position of the fetus at birth, and other factors that have the potential to threaten the lives of both

mother and fetus (Cunningham et al., 2018).

The incidence of cesarean section in the birth process continues to increase. Globally, 1 in 5 children (21%) is born by cesarean section (World Health Organization, 2021). Based on data from 121 countries, globally from 1990 to 2014, the average cesarean section rate increased by 12.4%. The highest number of deliveries by cesarean section occurred in Latin America and the Caribbean (40.5%), followed by North America (32.3%), Europe (25%), Asia (19.2%), and Africa (7.3%) (Betrán et al., 2016). According to data compiled by the World Health Organization, the rate of cesarean section in 1990 was 7%, now it has increased to 21%, It is estimated that this number will continue to increase during this decade (World Health Organization, 2021).

Cesarean section shows a high trend in numbers in Indonesia. Based on the 2017 Indonesian Demographic and Health Survey, the percentage of births by cesarean section in Indonesia was 17.2%.

Of the 8,255 births by mothers without pregnancy complications, 13.8% delivered by cesarean section (Yogatama & Budiarti, 2020). The results of the 2018 Indonesian Basic Health Research show that the number of mothers who gave birth by cesarean section was 17.6% (Ministry of Health of the Republic of Indonesia, 2018). The number of mothers who gave birth by cesarean section in Indonesia, based on BPJS Health data, was 21,608 cases. This number is much higher compared to mothers who gave normal birth, 14,112 cases (Ariawan et al., 2022). This fact reflects the increasing popularity of the cesarean section delivery method. This fact reflects the growing popularity of the caesarean section delivery method.

Based on the 2018 Indonesian Basic Health Research data, several common reasons that encourage indications for delivery by cesarean section include transverse or breech fetal position, bleeding problems, convulsions, premature rupture of membranes, prolonged labor, pinched umbilical cord, placenta previa, retained placenta, hypertension, and various other complications (Ministry of Health of the Republic of Indonesia, 2018). There is no medical evidence that definitively supports one method of delivery as the best overall. The choice of delivery method should be based on a case-by-case evaluation or individual condition. Unless there is a clear medical indication requiring delivery by cesarean section, this decision should involve family counselling and consider both the medical indications and family preferences. In this context, a cesarean section will only be taken as an option if there is a medical basis that justifies this (Singh et al., 2018).

Mothers without medical indication for planned cesarean section, the risks of short-term maternal complications were higher with planned cesarean section than with planned vaginal

delivery (Dahlquist et al., 2022). Cesarean section is often associated with the incidence of placenta accrete, this condition can increase the risk of bleeding during pregnancy and childbirth which has the potential to be fatal for the mother, as well as increase the chances of premature or preterm birth for the baby (Morlando & Collins, 2020) (Nieto-Calvache et al., 2021).

The decision to choose the right delivery will have a positive impact and can save mother and her baby. However, inappropriate decisions can have a negative impact and endanger mother. Therefore, it is necessary to analyse the determinants of cesarean section decision in Indonesia. The existence of this determinant analysis is expected to be used as a consideration or reference to determine the right intervention.

## METHODS

This research is a literature review using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Database was searched via Google Scholar, PubMed, and ScienceDirect, articles published during the last ten years (2013-2023). Keywords used include "cesarean section", childbirth, influence or relationship, determinants or factors, and Indonesia. The inclusion criteria set include full text article, research conducted in Indonesia, and published by a reputable journal with at least national accreditation, Sinta 5. Exclusion criteria in this research include systematic review articles, literature reviews, and meta-analyses. After the screening, researching, and reading, thirteen articles obtained that were appropriate to the topic to be discussed, regarding the determinants that contributed to the mother's decision to have a cesarean section in Indonesia.

## RESULTS AND DISCUSSION

Table 1. Databases of the Articles.

No.	Authors	Title	Objectives	Method	Finding
1.	(Asta et al., 2023)	Analysis of factors related to childbirth. cesarean section	To analyse Factors related to cesarean section deliveries at Mother and Child	Quantitative Using an analytical survey with cross-sectional	Severe Preeclampsia, fetal distress, premature rupture of membranes will

			Hospital Muhaya Pangkalpinang in 2020	approach	be at greater risk of giving birth by cesarean section
2.	(Suparmi & Maisya, 2017)	Socio-economic disparities and factors related to cesarean delivery in Indonesia	To determine socio-economic disparities and factors associated with cesarean section deliveries in Indonesia.	Quantitative Using an analytical survey with cross-sectional approach	Maternal age over 35 years and living in urban areas has a greater possibility of having a caesarean section
3.	(Sihombing et al., 2017)	Determinants of cesarean section delivery in Indonesia (Further analysis of 2013 Riskesdas data)	To find out the characteristics of mothers who deliver by cesarean section and the risk factors that accompany the mother during pregnancy and or childbirth	Quantitative Using an analytical survey with cross-sectional approach	Labor complications, parity, maternal age over 35 years, living in urban areas, and pregnancy complications have a greater chance of having a caesarean section
4.	(Suciawati et al., 2023)	Factors related to the decision to cesarean section in pregnant women	To find out the factors related to the decision to have a cesarean section for mothers giving birth at Bhayangkara Hospital, Bogor in 2022	Quantitative Using an analytical survey with cross-sectional approach	Maternal age and parity are related to the decision to have a caesarean section on the mother giving birth
5.	(Ikhlasia & Riska, 2017)	The relationship between pregnancy complications and birth history with procedures cesarean section at Fatimah Hospital Serang	To determine the relationship between pregnancy complications and history of childbirth with events Sectio Caesarea at Fatimah Hospital in Serang in 2017	Quantitative Using an analytical survey with cross-sectional approach	Pregnancy complications and labor history are related to caesarean section
6.	(Yanti et al., 2022)	Analysis of factors related to decision-making for cesarean section delivery	Knowing the factors of mother's education, mother's occupation, mother's husband's support, medical indications, mother's psychology of labor pain, intimate organ beauty, birth myths, mother's age, and parity with the incidence of	Quantitative using an analytical survey with a cross-sectional approach	Maternal employment is related to the incidence of caesarean section

			cesarean section delivery in Banda Aceh City in 2018		
7.	(Fristika, 2023)	1. Analysis of factors related to cesarean section delivery at Bhayangkara Hospital (Moh. Hasan) Palembang in 2022	Analysing factors related to cesarean section delivery	Quantitative Using an analytical survey with cross-sectional approach	Severe pre-eclampsia, history of caesarean section delivery, and premature rupture of membranes are associated with caesarean section
8.	(Emma et al., 2020)	Analysis of factors related to cesarean section at the Regional General Hospital "Dr. H. Moch. Ansari Saleh" Banjarmasin in 2019	Analysed the relationship between maternal age, parity, pregnancy complications, birth complications, and health insurance with cesarean section	Observational analytics with a retrospective case-control approach	Maternal age has the most dominant relationship with cesarean section
9.	(Sudarsih et al., 2023)	The relationship between pregnancy complications and childbirth history on cesarean section procedures	To determine the relationship between pregnancy complications and birth history with cesarean section procedures at Medika Stannia Sungailiat Hospital in 2023	Quantitative Using an analytical survey with cross-sectional approach	Pregnancy complications and birth history related to cesarean section
10.	(Dila et al., 2022)	Factors associated with cesarean section delivery in the period 1 January-December 2019 at Bandung Medan General Hospital	to find out (age, parity, birth history, non-progressing labor, premature rupture of membranes) related to cesarean section delivery at the Bandung Medan General Hospital for the period 1 January - December 2019	Mix Methods	Birth history, maternal age, and parity are related to cesarean section
11.	(Yuhana et al., 2022)	The relationship between premature rupture of membranes, prolonged labor, and fetal distress with caesarean section delivery at Dr. Noesmir Baturaja	To determine the relationship between premature rupture of membranes, prolonged labor, and fetal distress with caesarean section delivery at Dr. Noesmir Baturaja	Quantitative using an analytical survey with cross-sectional approach	Premature rupture of membranes and fetal distress are related to cesarean section

		Hospital TK. IV in 2020	Hospital TK. IV in 2020		
12.	(Permatasari et al., 2022)	Factors associated with the incidence of caesarean section	To determine the relationship between premature rupture of membranes, cesarean section history, and pre-eclampsia with the incidence of caesarean section at the Muhammadiyah Hospital in Palembang in 2021	Quantitative using an analytical survey with cross-sectional approach	Premature rupture of membranes, cesarean section history, and pre-eclampsia are related to cesarean section incidence
13.	(Helmi & Rasyid, 2020)	Determinant of cesarean section delivery on birth mother in a hospital in Pekanbaru City	To know the determinants associated with cesarean section delivery	Quantitative using an analytical survey with cross-sectional approach	There is a relationship between premature rupture of membranes and hypertension with cesarean section delivery

Based on the thirteen articles found, there are various determinants related to the cesarean section decision in Indonesia. The most frequent determinants are due to medical indications including age, parity, pregnancy complications (pre-eclampsia), and birth history (cesarean section history), and labor complications (premature rupture of membranes and fetal distress). The other most common determining factor, cesarean section by choice (own request), includes residence in urban areas. Then there are several other determining factors based on medical indications, pregnancy complications (hypertension) and by choice (own request), employment.

**Determinants based on medical indication**

**1. Age**

Maternal age is related to the mother's decision to choose to give birth by cesarean section (Dunn et al., 2017) (Ashar & Kusriani, 2020). Mothers aged <20 years tend to have reproductive organs that do not yet function perfectly, so if pregnancy occurs it will be easier for them to experience complications. The strength of the perineum and abdominal muscles are not

functioning optimally, this is the cause of prolonged or obstructed labor, requiring cesarean section during delivery. Meanwhile, mothers aged >35 years will be at risk of experiencing congenital abnormalities and complications during childbirth because the muscle tissue of the uterus is not able to accept pregnancy well, thus requiring a cesarean section during delivery. Mothers aged <20 years and >35 years are 3 times more likely to experience a difficult birth than mothers aged 20-35 years (Murray & Huelsmann, 2013).

**2. Parity**

Parity is related to the mother's decision to choose to give birth by cesarean section (Amir & Yulianti, 2020). The study conducted by Tebeu et al. (2011) showed that grand multiparas in Cameroon are at high risk of undergoing cesarean section during delivery. First parity and Grande multipara have a higher risk of maternal mortality. This is related to the level of maturity and decreased function of the organs involved in the birthing process. In general, having a history of more than one pregnancy (multigravida) is a condition that is safer for a mother during childbirth and tends to be included in the category of low-risk pregnancy.

However, it should be noted that there are still risk factors that can increase the likelihood of complications in the delivery process which can result in danger to the health and safety of the mother and baby. For example, mothers who are grand multigravidas and have had unsuccessful pregnancies, delivered with the help of a vacuum device, required blood transfusions, experienced retained placenta, or had a history of cesarean section in previous births (Prawirohardjo, 2016).

### 3. Pregnancy complications

Mothers who experience complications during pregnancy tend to choose delivery via cesarean section than mothers who do not face pregnancy problems (Sudarsih & Agustin, 2023) (Gonzales et al., 2013).

#### a. Hypertension

Hypertension is one of the indicative symptoms of pre-eclampsia. According to The American College of Obstetrician and Gynecologists (2019), hypertension usually appears after 20 weeks of gestation or in the third trimester of pregnancy, especially at around 37 week of gestation. Signs of hypertension in pregnant woman include swelling of the feet, hands, and face, as well as an increase in blood pressure to reach or exceed 140/90 mmHg. Pre-eclampsia can progress from mild to severe, and in more severe cases, can progress to eclampsia. Hypertension associated with pre-eclampsia and eclampsia often requires the selection of delivery by caesarean section as the recommended medical procedure.

#### b. Pre-eclampsia

Mothers who experience pre-eclampsia have a higher chance of having a cesarean delivery than giving birth normally (Gonzales et al., 2013). Severe pre-eclampsia and eclampsia have the potential to cause problems for the mother and fetus. To prevent this, the action taken is to terminate the pregnancy as soon as possible. Induction of labor or even a cesarean section can be a

prophylactic step to end a pregnancy to ensure the safety of the mother and fetus (Manuaba et al., 2010).

### 4. Birth history (Cesarean section history)

A history of giving birth by cesarean section influences the decision to give birth by cesarean section in a government hospital (Qudrotunanda & Chamid, 2023). Mothers who have experience giving birth by cesarean section will have the opportunity to give birth by cesarean section in their next pregnancy because the vertical incision of the stomach and uterus risks causing tearing of the uterus (Fajrini, 2016). A history of delivery by cesarean section is known to be associated with the incidence of premature rupture of membranes (Assefa et al., 2018).

### 5. Labor complications

#### a. Fetal distress

Fetal distress is related to the choice of cesarean section (Rosyati, 2022). An emergency in the fetus is the reason for carrying out a cesarean section to save the baby's life (Oxorn & Forte, 2010) (Gangwar & Chaudhary, 2016). Fetal distress refers to disturbances in the condition of the fetus that produce pathological levels of stress, and with the potential to carry a risk of death for the fetus (Lockhart & Saputra, 2014).

#### b. Premature rupture of membranes (PROM)

Premature rupture of membranes (PROM) can pose a risk of harm to the mother, fetus, and baby being born. The impact is that it causes complications, and the worst impact is that maternal and fetal death can occur. Mothers with premature rupture of membranes will have a higher chance of giving birth by cesarean section (Gibbs et al., 2010) (Gabbe et al., 2007). Conditions Mothers who experience premature rupture of membranes will have a 19.194 times chance of delivering by cesarean section compared to mothers who do not experience premature rupture of membranes (Ameliah et al., 2022). Premature

rupture of membranes during labor is associated with an increased risk of selecting a cesarean section.

#### **Determinants based on choice (own request)**

##### **1. Place of residence**

The living environment (urban or rural) also has an impact on the decision to give birth by cesarean section. The trend of giving birth by cesarean section for mothers living in urban areas is higher than for mothers living in rural areas (Zahroh et al., 2020). Based on the 2018 Riskesdas (Basic Health Research) data analysis, mothers who have the potential to undergo cesarean section are those who live in urban areas, have a higher level of education such as diploma 3 or tertiary graduates, have high economic status (in the highest category), and work in the formal sector as a private employee (Ministry of Health of the Republic of Indonesia, 2018).

##### **2. Employment**

Mothers who work and have higher education prefer to give birth by cesarean section (Suparmi & Maisya, 2017). This factor is likely because employment status is often related to socioeconomic status, which can have a significant impact on preferences for health services. Women who have careers tend to have economic independence because they have personal income. In addition, mothers who have a higher educational background tend to have broader knowledge, so they can make their own decisions regarding the birth process (Suparmi & Maisya, 2017). Such conditions can encourage mothers to choose cesarean section as an option, especially if they have a deadline to follow giving birth, such as having to return to work within a certain time. Situations like this significantly increase the chances of delivery via cesarean section, especially in working mothers.

#### **Analysis of the determinants of the cesarean section decision based on behavioral theory**

A decision or action to behave can affect the health status of an individual or society. According to Dahlgren and

Whitehead, the existence of social determinants of health can influence behavior (Dahlgren & Whitehead, 2021). Social determinants of health are non-medical factors that influence the health status or outcomes of individuals and communities (World Health Organization, 2011). Based on the articles found, age, parity, and employment are several factors that influence the decision to choose a cesarean section. A cesarean section has the potential to be performed if the mother's age is at risk (35 years and above), the higher the mother's age, the higher the risk of cesarean section (Faisal-Curyl et al., 2017) (Rydahl et al., 2019). Obstetric factors such as age and parity can increase the risk of choosing a cesarean section (Elnakib et al., 2019). Working mothers are known to give birth more often by cesarean section (Khojasteh et al., 2016). Working mothers have the potential to experience work stress and this will be at risk of causing pregnancy complications, pre-eclampsia. So, this condition will be an indication for a cesarean section. Pre-eclampsia cases are one of the biggest reasons for cesarean section (Sukmawati et al., 2020). In other conditions, working mothers will choose to give birth by cesarean section for several reasons, for example, work schedules, access to leave and prenatal care, and so on. So according to some women, caesarean section is considered the right solution.

According to social learning theory, a person's behavior is the result of observation, imitation, and interaction with their social environment (Bandura, 1977). Based on the articles found, the factor of residence in urban areas is a determinant in choosing a cesarean section delivery. Delivery by cesarean section has become a trend in urban areas (Giang et al., 2022). The results of basic Indonesian health research in 2018 show that mothers who live in urban environments are more likely to give birth by cesarean section (22.1%) than mothers who live in rural areas (12.4%) (Ministry of Health of the Republic of Indonesia, 2018). If it is related to social learning theory, the living environment plays an important role in influencing the decision to give birth by cesarean section. Mother saw that in the surrounding environment, there were many who gave birth by cesarean section, apart from that the factors of ease of



access and economic level also supported this. Mothers who live in urban areas tend to have more cesarean section deliveries than mothers who live in rural areas (Islam et al., 2022).

## CONCLUSION

Based on the results of a literature study conducted, it can be concluded that the determinants of cesarean section decision in Indonesia are due to medical indication including age, parity, pregnancy complications (hypertension and pre-eclampsia), history of delivery (caesarean section history), and labor complications (premature rupture of membranes and fetal distress) and by choice (own request) including residence in urban areas and employment. It is recommended for health workers to provide interventions such as education, counselling, etc. to mothers and their husbands and families regarding childbirth, including conditions that require mothers to choose to give birth by cesarean section using appropriate communication, information, and education media. Health workers should partner and with other parties such as academics or non-government organizations (NGOs) to help provide the intervention.

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