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Maternal Predisposing Factors with The Incidence of Low Birth Weight in Central Java

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Article Info

Abstract

In Central Java, the prevalence of LBW (Low Birth Weight) has increased from 4.3 (2018) to 4.7 (2019) and is the highest cause of neonatal mortality (46.4%) and infant mortality (40.5%). This research aims to analyze the relationship between the quality of ANC (Antenatal Care), iron supplementation, pregnancy complications, and maternal smoking status with LBW in Central Java. It was an analytical study that used secondary data from the 2017 IDHS (Indonesian Demographic and Health Survey). The sampling design used purposive sampling. The population study was 1205 babies born in Central Java. The sample comprised 952 babies. Independent variables were the quality of ANC, iron supplementation, pregnancy complications, and maternal smoking status, with the incidence of LBW as the dependent variable. Data analysis was performed by chi-square continuity correction and logistic regression. Pregnancy complications have been associated with incidences of LBW in Central Java (p-value = 0.0001). Iron supplementation (OR = 2.474) and pregnancy complications (OR = 4.869) affected the incidence of LBW in Central Java. Iron supplementation and pregnancy complications influenced the incidence of LBW in Central Java.

Introduction

In 2015, 14.6% of the incidences of LBW were found in the world, and the highest prevalence occurred in Asia (17.3%) (WHO and UNICEF, 2019). The incidence of LBW in developing countries in the Asia Pacific region experienced an increase of ≤2 babies per 100 live births in 2014 compared to 2000, while a 0.8% increase occurred in Indonesia (BKKBN et al., 2017). The 2018 Riskesdas (Basic Health Research) showed that 6.2% of babies born with LBW in Indonesia and 6.1% were found in Central Java (BKKBN et al., 2017). The Central Java Health Profile in 2019 showed an increase in the incidence of LBW from 4.3 (2018) to 4.7 (2019) (Central Java Provincial Health Office, 2019). A total of 5.9% of LBW events were found in single (Kujariningrum et al., 2021).

More than 37% of toddlers were stunted in 2013 (Bappenas and UNICEF, 2017). It was related to a history of LBW (p-value = 0.037; OR = 5.294) (Miranti et al., 2020). A study in South Asia showed that 17% of children with a history of LBW had a total IQ of less than 85 (Upadhyay et al., 2019). In Central Java, LBW is the biggest cause of neonatal mortality (46.4%) and infant mortality (40.5%) in 2019 (Central Java Provincial Health Office, 2019).

Visits and completeness of ANC services affect the incidence of LBW (Paul et al., 2019) The incidence of LBW was also related to maternal anemia status (OR = 1.23) (Figueiredo et al., 2018). As much as 50% of the 73.3% of pregnant women at Pejeruk Health Center had adherence to consuming low Fe tablets (Sarah and Irianto, 2018). The incidence of LBW was associated with pregnancy complications (Bener et al., 2012). The entry of nicotine into the body's mechanism of pregnant women has an impact on fetal growth and development

(Nemoto et al., 2021). The incidence of LBW in Taiwan was associated with maternal smoking status (OR = 3.46) (Ko et al., 2014).

The incidence of LBW was related to many factors. There were differences in the causes of LBW in each region. A study to determine the risk factor of LBW in an area is urgently needed. There has been a lot of previously research about LBW, but for research with the scope of research in Central Java used the 2017 IDHS secondary data analysis with sample weighting has never been done. Based on the facts described above, this study aims to analyze the relationship between the quality of ANC, iron supplementation, pregnancy complications, and maternal smoking status with the incidence of LBW in Central Java.

Method

This study used a cross-sectional design and 2017 IDHS data. The study population consisted of 1205 babies born to WUS (Women of Childbearing Age) in 2012-2017 in Central Java. The research sample was taken using purposive sampling based on inclusion and exclusion criteria for the total population, so that a sample of 952 babies was obtained. The inclusion criteria included babies who were weighed at birth, babies who were last born by respondents in the range of 2012-2017, single births, and received ANC while in the womb. Infants with mothers who did not know the number of ANC visits, history of blood draws, history of consultations, and history of receiving Fe tablets were excluded from the study sample list as exclusion criteria.

The research variables consisted of the quality of ANC, iron supplementation, pregnancy complications, and maternal smoking status as independent variables, with the incidence of LBW as the dependent variable. This study used the weighting of the sample according to the ethics of using the 2017 IDHS raw data and referring to a tutorial published by the youtube account The DHS Program on August 25, 2015, entitled " Part IV: Demonstration of How to Weight DHS Data in SPSS & SAS ". The bivariate analysis used was a statistical analysis of chi-square continuity correction. The independent variables included in the multivariate logistic regression method enter are the independent variables with p-value ≤ 0.25. The analysis used a significance level of 0.05 and a confidence level of 95%. The likelihood of LBW occurrences can be seen from the calculation of the predicted value using the following formula:

$$f(Z)= \frac{1}{(1+ e^{\wedge}(-(b0+b1x1+b2x2+...bixi)))}$$

Formula description:
f(Z)   = probability
b0   = constant
b1, b2, …bi   = partial regression coefficient
x1, x2, …xi   = independent variable
e   = exponent function with constant value 2.72

This study has passed the ethical clearance number: 12 / EA / KEPK-FKM / 2020 issued by the Health Research Ethics Committee, Faculty of Public Health, Diponegoro University on January 26, 2021.

Results and Discussion

Most (94.8%) babies born in Central Java in 2012-2017 had an NBW (Normal Birth Weight). As many as 68.9 % of babies were born to mothers who received poor-quality of ANC. Most (94.3%) babies were born to mothers who received iron supplementation during pregnancy. As many as 81.3% of babies were born to mothers who did not experience complications during pregnancy. Most (99.1%) babies were born to mothers who had never smoked. Based on chi-square continuity correction, pregnancy complications were related to the incidences of LBW in Central Java (p-value = 0.0001). There were no relationships between the quality of ANC, iron supplementation, and maternal smoking status with the incidence of LBW in Central Java (Table 1).

Table 1. Correlation of Quality of Antenatal Care, Iron Supplementation, Pregnancy Complications, and Mother's Smoking Status with LBW incidence (N=952)

Independent Variable	LBW				Total		p-value
	Not		Yes		f	%	
	n	%	n	%			
Quality of *Antenatal Care*							0.460
Good	278	94.2	17	5.8	295	100	
Poor	624	95.1	33	4.9	657	100	
Iron Supplementation							0.059
Yes	854	95.1	45	4.9	899	100	
Not	48	90.6	5	9.4	53	100	
Pregnancy Complications							0.0001
Not	749	96.8	26	3.2	775	100	
Yes	153	86.5	24	13.5	177	100	
Mother's Smoking Status							0.712
Not	893	94.8	50	5.2	943	100	
Yes	9	100	0	0	9	100	

Multivariate analysis using logistic regression with enter method resulting in iron supplementation and pregnancy complications affecting the incidence of LBW in Central Java. Mothers who did not receive iron supplementation during their pregnancy had a 2.474 times higher risk of giving birth to LBW babies than mothers who received iron supplementation (OR = 2.474). Mothers who experienced pregnancy complications had a 4.869 times higher risk of giving birth to LBW babies than mothers who did not experience complications (OR = 4.869) (Table 2). Based on the calculation above, f(Z) = 0.27 can be concluded that mothers who didn't receive iron supplementation and had pregnancy complications history have a chance of 27% given the incidence of LBW.

Table 2. Results of Multivariate Analysis The Effect of Iron Supplementation and Pregnancy Complications on the Incidence of LBW in Central Java 2012-2017 (N=952)

Variables		B	SE	Wald	Sig	Exp (B)
Model 1	Iron Supplementation	0.906	0.366	6.125	0.013	2.474
	Pregnancy Complications	1.583	0.218	52.670	0.0001	4.869
	Constant	-3.484	0.155	506.665	0.0001	0.031

The quality of ANC is a risk factor for LBW incidence (Owa et al., 2017). Most (93.27%) mothers access ANC services with low quality and this condition is related to the incidence of LBW in Indonesia (Darwis et al., 2020). In contrast to the conditions found in Central Java. The Chi-square result showed no relationship between the quality of ANC and the incidences of LBW in Central Java (p-value = 0.488). It is in line with Meiriza (2018), which concluded that there was no relationship between the quality of ANC at the level I health facilities and the incidence of LBW in Padang City (Meiriza et al., 2018). This study found as many as 68.9 % of infants born to mothers who received ANC with poor quality. The incidence of LBW was more found in the group of infants with mothers who received ANC with good quality (5.8%) compared to poor quality (4.9). It showed that pregnant women who receive good quality antenatal care can also deliver babies with LBW. This condition is possible because of the limited variables found in the secondary data of the 2017 IDHS and the information needed to assess the quality of ANC is not enough just by questionnaires result, but requires in-depth interviews. Owa (2019) conducted in-depth interviews and found that pregnant women who received less ANC quality had a 3.5 times higher risk of having a baby with LBW (OR = 3.5) (Owa, 2019).

Iron supplementation is an effort to respond to the high rates of iron deficiency anemia in pregnant women (Seu et al., 2019). The Chi-square test showed no relationship between iron supplementation and the incidences of LBW (p-value = 0.076). Different from the multivariate analysis result, which showed the effect of iron supplementation on the incidence of LBW (p-value = 0.013). Mothers who didn't receive iron supplementation during their pregnancy had a 2.474 times higher risk of having a baby with LBW than mothers who received iron supplementation (OR = 2.474). In line with Restu et al (2014), who found that iron supplementation affects the incidences of

LBW (OR = 3.82) (Restu et al., 2014). It shows that mothers who get iron supplementation can avoid anemia. Iron deficiency anemia causes an increase in serum norepinephrine concentration which results in maternal and fetal stress, stimulates the synthesis of CRH (Corticotrophin-Releasing Hormone) which will increase fetal cortisol production thus impacting IUGR (Intrauterine Growth Restriction) and resulted in LBW (Chhabra and Chopra, 2016). Iron supplementation can reduce the prevalence of iron deficiency anemia (Long et al., 2012). Each tablet contains FeSO4 mg (iron 30 mg), which is useful as a reserve of iron, red blood cell synthesis, and muscle blood synthesis during pregnancy (Seu et al., 2019).

Pregnancy complications are a collection of symptoms of health problems during pregnancy that can affect the health conditions of the baby and mother (BKKBN et al., 2017; Neiger, 2017). Some symptoms of pregnancy complications, such as prolonged nausea and vomiting, hypotension, and hypertension, are associated with a lack of nutritional intake for the fetus and LBW (Marshall et al., 2022). The results of this study found that the incidences of LBW were more in the group of infants with mothers who had complications during their pregnancy (13.5%) than in the group of infants with mothers who had no complications during their pregnancy (3.2%).The Chi-square result showed a significant relationship between pregnancy complications and the incidence of LBW (p-value = 0.0001). Mothers who experienced pregnancy complications had a 4,869 times higher risk of having a baby with LBW than mothers who did not experience pregnancy complications (OR = 4.869). Siramaneerat (2018) mentions the same finding that pregnancy complications are associated with the incidences of LBW (p-value = 0.0001; OR = 1.731) (Siramaneerat et al., 2018). The most common complication found in this study was bleeding (5.5%). Antepartum hemorrhage is associated with incidences of LBW (Bener et al., 2012). Antepartum hemorrhage can increase the likelihood of preterm birth which is a risk of LBW (Sharami et al., 2013). Pregnant women who experience antepartum hemorrhage have a 1.6 times higher risk of giving birth to LBW babies than mothers who don't experience

antepartum hemorrhage (Bener et al., 2012). There was a difference in birth weight in the group of mothers with and without antepartum hemorrhage. The antepartum hemorrhage causes blood flow that distributes oxygen and nutrients to the placenta from the mother to the fetus to be disturbed. Impaired delivery of oxygen and nutrients will cause fetal anemia, a shock to fetal death. Fetuses that survive until birth will experience various disorders, including LBW (Kuribayashi et al., 2021). Pregnancy complications accompanied by anemia can worsen the condition of the fetus. Pregnant women with anemia had 3.59 times higher premature rupture of membranes than non-anemic mothers (OR = 3.59). This condition requires immediate delivery so that premature birth occurs if the gestational age is less than 37 weeks and increases LBW risk (Pratiwi et al., 2018).

Receptors in the placental blood vessels that mix with nicotine cause a decrease in blood flow in the placenta and fetal vasoconstriction which results in impaired delivery of oxygen and nutrients to the fetus so that the fetus experiences malnutrition which results in impaired fetal growth (Nemoto et al., 2021). The entry of nicotine into the body's mechanism is proven to have an impact on the low production of the hormone Insulin-Like Growth Factor-1 in pregnant women who smoke, affect fetal growth and development (Fang et al., 2015). Pregnant women who smoke will give birth to babies with birth weights 320-435 grams lower than pregnant women who do not smoke (Kataoka et al., 2018). The outcome of this study shows that the incidences of LBW are more common in the group of infants whose mothers didn't smoke (5.2%), while NBW is more common in the group of infants with mothers who smoked (100%). The Chi-square result showed no relationship between the mother's smoking status and the incidences of LBW (p-value = 0.706). In line with Phowira et al (2020) stating that the mother's smoking status was not related to the incidence of LBW in DKI Jakarta (p-value = 0.448) (Phowira et al., 2020). There was no relationship between the frequency of smoking per day and the incidences of LBW in Lampung Province (Sulistiyani et al., 2019). It can be said that pregnant women who do not smoke can

give birth to babies with LBW. This mechanism shows that the impact of nicotine entering the body cannot be described only by the status of a pregnant woman as an active smoker or not, as information is available in the 2017 IDHS data. LBW was found in mothers with high levels of nicotine > 143 μg/g keratinize. This condition is not only found in pregnant women who smoke actively. Pregnant women who don't smoke have an average nicotine level of 153.2 ± 96.0 μg/g keratinize (>143 μg/g keratinize) as a result of exposure to cigarette smoke from the environment (passive smoking) (Huang et al., 2017). There was a relationship between passive smoking mothers and the incidences of LBW (OR = 3.04) (Ardelia et al., 2019).

Conclusion

Most babies are born at a standard weight. There was a relationship between pregnancy complications and the incidences of LBW in Central Java. The quality of antenatal care, iron supplementation, and maternal smoking status were not related to the incidences of LBW. A pregnant woman who doesn't get iron supplementation (OR = 2.474) and complications of pregnancy (OR = 4.869) had a chance of 0.84 for having a baby with LBW. The pregnant women who experience signs of complications immediately take action and visit health facilities for further assistance. Pregnant women are also advised to take Fe tablets regularly at least 90 tablets during their pregnancy.

Acknowledgments

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Level of Knowledge and Self Efficacy Improve Breast Self-Examination (BSE) Behaviors

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Abstract

The incidence of breast cancer is 40 per 100.000 women. BSE is a screening to detect breast cancer. The research objective is to determine the correlation between knowledge and self-efficacy with BSE behavior. This cross-sectional descriptive-analytic study utilized a sample of 20-65 women aged 100 years. Multistage random sampling was used as the sampling technique—univariate and bivariate analysis with a significance level of ρ <0.05 and CI of 95%. The analysis results showed a correlation between the level of knowledge and self-efficacy with BSE behavior (p-value = 0.026; 0.021) and PR values of 2.5 and 2.6 (CI 95%: 1.074-5.641; 1.100- 6.293). In conclusion, women who have a high level of knowledge and self-efficacy are three times more likely to do BSE compared to women with low levels of knowledge and self-efficacy.

Introduction

Breast cancer is the most commonly diagnosed cancer and the second leading cause of cancer death for women in the US; in 2016, an estimated 246,660 women were diagnosed with breast cancer, and 40,450 of them were estimated to have died (Anastasi & Lusher, 2019). Based on primary health research data in 2013, the prevalence of cancer in Indonesia is 1.4 per 1000 population or about 330,000 people. The highest cancer prevalence was in Yogyakarta (4.1%), followed by Central Java (2.1%), Bali (2%), Bengkulu, and DKI Jakarta with 1.9%, respectively. The incidence of breast cancer is 40 per 100,000 women (Thelma et al., 2014). The incidence of breast cancer will increase if there are one or more risk factors for breast cancer. Risk factors associated with an increased incidence of breast cancer include; female gender, age >50 years, family history, and genetics. In addition, a history of early menstruation (<12 years) or late menopause (>55 years; history of hormonal disease; alcohol consumption; history of chest wall radiation,

and environmental factors (KPKN, 2015). Breast cancer is the most frequently diagnosed cancer in women worldwide. Its incidence tends to increase in developed countries, partly due to changes in reproductive practices and lifestyle and early detection of cancer through screening (Wardle et al., 2015).

Based on data from the Yogyakarta City Health Office in 2012, the incidence of breast cancer was 58 people; in 2013, it increased to 127 people, and in 2014 it was 155 people. The death rate due to breast cancer in 2015 was 13 cases, and from 2016 to August, there were four cases (KPKN, 2015). Preliminary study data obtained at the Yogyakarta City Health Office in August 2016 obtained data on the incidence of breast cancer in as many as 418 cases. The highest cases were in Tegalrejo District, with 51 cases or 12.2%. Handling cancer faces various obstacles that cause almost 70% of patients in an advanced stage. Early detection and improved breast cancer treatment have contributed to a 3.3 percent reduction in the death rate since 1990 in women younger than 50 years. The

screening model consists of mammography, a biopsy of suspicious lumps, magnetic resonance imaging, clinical breast examination, and breast self-examination (Anastasi & Lusher, 2019). Breast self-examination (BSE) is a critical screening to detect breast cancer. There is evidence that women who correctly practice monthly BSE are more likely to detect lumps in the early stages of their development, and early diagnosis has been reported to influence early treatment and result in better survival rates. The study stated the effectiveness of international screening programs for breast cancer with BSE in Scandinavian countries found that the mortality rate had fallen by 31% after seven years for women aged 40-74 years (Elmore et al., 2005). Several women feel the benefits of BSE; most women do not know how to do BSE (Umeh & Jones, 2010).

Breast cancer screening is highly recommended for early detection of breast cancer for all women regardless of their background characteristics such as socioeconomic status, race or ethnicity, family history, and others (Abolfotouh et al., 2015). The American Cancer Society recommends that young women after the age of 20 undergo screenings such as a clinical breast exam (Clinical Breast Examination) every three years and breast self-examination (Breast Self Examination) or BSE every month. BSE screening can diagnose up to 40% of women (Abolfotouh et al., 2015). Research by Abolfotouh et al. (2015) shows that the majority of women do not agree to do BSE because, according to them, it will not change the fact that suffering from breast cancer is destiny (77.6%), will be embarrassing (71.6%) and BSE is something that is not. Profitable (63.7%). The health belief model (HBM) is widely used as a framework for behavioral intervention in health examinations, especially breast cancer. Studies reveal that behavior-based interventions can help women overcome barriers and encourage them to do BSE regularly (Abolfotouh et al., 2015).

Self-efficacy is one component of the Health Belief Model (Glanz et al., 2008). Research conducted on Iranian women regarding the application of HBM in predicting BSE behavior stated that of the existing HBM components, only self-efficacy showed a strong relationship. Women who are more confident in their ability to perform BSE with a self-efficacy score are more likely to perform BSE (Bashirian et al., 2021). Research on students in Malaysia found that self-efficacy and perceived barriers to BSE are psychosocial factors that significantly influence BSE behavior (Kratzke et al., 2014).

Women's beliefs related to self-efficacy using HBM are essential factors influencing health behavior (Taylor et al., 2007). Research conducted showed self-efficacy as a strong predictor of accepting the mother's advice and doing BSE; female students with high self-efficacy were more likely to accept their mother's suggestion to do BSE (Kratzke et al., 2013). The application of HBM in psychological factors such as emotion, efficacy, and anxiety to get the risk of breast cancer with female research subjects who have a family history of breast cancer. The most influential factor in doing BSE is the self-inhibition factor. Self-barriers must be balanced with feelings of confidence to do BSE (Rezaeian et al., 2014).

Government policy on cancer prevention is regulated by the Minister of Health of the Republic of Indonesia No. 34 of 2015. Management of Breast Cancer and Cervical Cancer in the form of public health services include promotive and preventive activities that can be carried out by doctors and trained midwives in first-level health facilities or public facilities adequate. Minister of Health Regulation No. 69 of 2013 concerning implementing the health insurance program ensures that the Health Social Security Administration Agency guarantees early detection and treatment of cancer. Health insurance from health care facilities to hospitals (KPKN, 2015). Prevention efforts carried out by the Yogyakarta City Health Office are in the form of screening for specific targets, namely women of childbearing age (30-50 years) who have married only 2.24%. The achievement of non-communicable disease control program indicators in DIY is 80% (KPKN, 2015). The community can do many things, starting from cancer prevention and control, and everyone has the right to cancel services. This study aimed to determine the relationship between knowledge and self-efficacy with BSE behavior.

Method

This research is quantitative research with an observational research design. The approach applied is cross-sectional or cross-sectional with independent and dependent variables measured simultaneously in a certain period to determine the relationship between knowledge level and self-efficacy with BSE behavior in women. The sampling method was carried out using multistage random sampling. Tegalrejo sub-district has four villages. The secondary sampling unit was randomly selected from 10 villages from four villages with a computerized population of 637 people.

The number of samples in this study was 100 women. The research sample was taken based on the inclusion criteria: women willing to be studied, aged 20 to 65 years, and domiciled in Tegalrejo District, Yogyakarta City, Indonesia. Exclusion criteria in this study were women who were or had been diagnosed with breast cancer. The data collection instrument in this study used a questionnaire. The questionnaire contains questions regarding the research variables. The instrument to measure this assessment variable was redeveloped based on previous research by (Noroozi, Jomand, &

Tahmasebi, 2010) dan (Khatun, Jittanoon, & Boonyasopun, 2010). This questionnaire was tested for validity and reliability before the study.

Analysis of the data used using univariate analysis. This analysis describes the frequency distribution of respondent characteristic data such as age, marital status, education level, level of knowledge, self-efficacy, and BSE behavior. Bivariate analysis was used to see the relationship between the level of knowledge and self-efficacy variables with BSE behavior variables. In addition, statistical tests using the chi-square test will be carried out to determine the statistical significance of the relationship. If the p-value <0.05, it means that there is a statistically significant relationship with a 95% CI value.

Results and Discussion

Table 1 shows that most of the respondents in this study were 30 out of 82 respondents (82%) and 83 respondents (83%). The education level of the respondents is mainly the higher education level of 73 respondents (73%), and those who are unemployed are 55 respondents (55%).

Table 1. Frequency Distribution Based on the Characteristics of the Respondents

Characteristics	n	%
Age		
<30 years old	18	18
≥30 years old	82	82
Marital Status		
Not married	17	17
Married	83	83
Level of education		
Low	27	27
High	73	73
Employment Status		
Unemployed	45	45
Work		
Total	100	100

Source: Primary Data, 2022

It is by the Yogyakarta City Health Office policy, where women of childbearing age are specifically targeted for breast cancer screening with an age range of 30-50 years and are

married. Most of the respondents have a formal education, including high school, Diploma, and Bachelor's degree. Most of them do not work, namely as housewives.

Table 2. Distribution of Respondents' Knowledge Level, Self-efficacy and BSE Behaviour

Varible	n	%
Level of Knowledge		
Low	43	43
High	57	57
Self Efficacy		
Low	47	47
High	53	53
BSE behaviour		
Never	20	20
Experienced	80	80
Total	**100**	**100**

Source: Primary Data, 2022

The results show that most respondents have a high level of knowledge about breast cancer and BSE, with as many as 57 respondents (57%). Myths that occur in society, including knowledge about breast cancer caused by witchcraft and the perception that holding breasts is taboo, were the types of questions asked by respondents. Research in Turkey found that out of 76.6% of women who had heard of breast cancer, only 31.7 had performed BSE. Little information is disseminated to the public about breast cancer (Tavafian et al., 2009).

Most of the respondents, as many as 53% respondents, have a high level of self-efficacy.

Self-efficacy is formed through a social learning process that can last a lifetime. It is a belief in one's ability to do something. Someone will do something if they feel able to do it. If a person believes a new behavior is helpful because of its benefits but thinks he or she cannot do so because of perceived resistance, likely, it will not be done. The best self-efficacy becomes a predictor to influence breast cancer detection behavior, one of which is BSE (Tavafian et al., 2009). Based on table 2, most of the respondents who have already done BSE are as many as 80 respondents (80%).

Table 3 The Results of the Correlation between the Level of Knowledge and Self-efficacy with BSE Behaviour

Variable	BSE Behaviour				PR	(CI95%)	p-value
	Never		**Experienced**				
	n	%	n	%			
Level of Knowledge							
Low	13	30.2	30	69.8	2.5	1.074-5.641	0.026
High	7	12.3	50	87.7			
Self Efficacy							
Low	14	29.8	33	70.2	2.6	1.000-6.293	0.021
High	6	11.3	47	88.7			

Source: Primary Data, 2022

Table 3 shows that the external variable tested is the knowledge level variable. The results obtained a p-value of 0.026 (<0.05), which means a significant correlation between the level of knowledge and BSE behavior. The analysis results showed that the PR value was 2,5 (95 CI: 1.074-5.641), which means that women who had a high level of knowledge were 2.5

times more likely to do BSE than respondents with a low level of knowledge.

The results showed a p-value of 0.021 (<0.05) based on the self-efficacy variable, which means a significant correlation between self-efficacy and BSE behavior. The results of the analysis showed that the PR value (relative prevalence) was 2.6 (95% CI: 1.100- 6.293),

which means that women who have high self-efficacy are three times more likely to perform BSE compared to respondents who have low self-efficacy (Frankenfield, 2009). The results of previous studies where a higher self-efficacy score is possible to do BSE (Mousa & Moussa, 2014). It is consistent with research that women with high levels of self-efficacy are about four times more likely to do BSE regularly than women with low levels of self-efficacy. Self-efficacy and perceived obstacles to doing BSE are psychosocial factors that significantly influence BSE behavior (Thelma et al., 2014). These results suggest that health promotion interventions that help increase self-efficacy and reduce perceived obstacles have the potential to increase Malaysian women's intention to practice BSE, which can promote early detection of breast cancer (El Seifi et al., 2018). Campaigns on breast cancer screening such as mammography among British women impact breast cancer awareness and breast self-examination behavior. Increased BSE behavior will reduce breast cancer mortality rates (Anastasi & Lusher, 2019).

Breast cancer is a significant public health problem among women. However, the uptake of breast cancer screening is deficient among Nigerian women. The results of a study on the age of women in Nigeria on the relationship of the network to breast cancer and perceptions of self-efficacy with breast cancer screening with clinical breast examination and mammography A small proportion of women undergo clinical breast examination or mammography. Women have a high level of fear of breast cancer and a moderate level of self-efficacy for breast cancer screening. These findings emphasize the need for health education and psychosocial interventions that can increase self-efficacy and promote breast cancer screening in general among middle-aged women (Ezema et al., 2021). While in Iran, breast cancer is the most common malignancy in the world. Screening is the basis for early detection. However, the mortality rate is still high in Iranian women due to not screening and screening on time—a theory-based intervention program to improve breast cancer screening behavior in women.

An intervention study conducted in Iran found a significant difference between the average knowledge scores and theoretical constructs before and after the intervention. Our results also showed that both intervention methods had the same effect and a significant difference in breast self-examination performance between the intervention and control groups after the intervention. Given the cost-effectiveness and feasibility of implementing E-learning programs, we would recommend that healthcare planners assist in designing and implementing this effective form of intervention to encourage more women to self-examine to assist with breast cancer screening (Bashirian et al., 2021).

In Lebanon, the same epidemiological profile holds where breast cancer is the leading cancer among Lebanese women, representing 38.2% of all cancer cases. According to the Centers for Disease Control, there was a decrease in BC mortality from 2003 to 2012, reflecting the adoption of national screening mammography as the gold standard for breast cancer detection by Western countries. Despite the considerable debate about whether screening mammograms do more harm than good, screening awareness should be emphasized because the benefits far outweigh the risks. Most breast cancer deaths in Western countries cannot be prevented using screening mammograms alone. Lebanon is adopting a public focus on education and awareness campaigns that encourage early screening for breast cancer. Several studies have demonstrated the impact of early detection as reflected in an increase in early-stage disease and a reduction in more aggressive stages. Further studies should elucidate the effects of awareness campaigns on early breast cancer diagnosis and clinical staging on a national scale; therefore, having available data on screening campaigns before and after the adoption is essential to analyze trends in breast cancer mortality and reductions in advanced disease (Sbaity et al., 2021).

Breast cancer is the most common cancer in women. Early detection of breast cancer plays a significant role in reducing mortality and improving patient prognosis. Despite the benefits of breast self-examination, few women do it, and many do not know how to do it. This study aims to determine the effect of a health education intervention program on breast self-

examination on female students who know 2000, Tanta University, Egypt. Educational program developed and implemented to improve students' knowledge and practice of BSE. Program evaluation was carried out by comparing the findings before and before three months of follow-up. The results show shallow knowledge and practice of students before the intervention, with a significant increase after program implementation. The study concluded that BSE student training had a positive effect on knowledge and practice (Gamelen et al., 2020)

Conclusion

In conclusion, this study found that if a woman aged 20-65 years has high self-knowledge and self-efficacy, she will perform BSE. Women with a high level of knowledge will be 2.5 times more likely to do BSE compared to those with a low level of knowledge and women who have high self-efficacy are three times more likely to do BSE compared to respondents who have low self-efficacy.

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The Utilization of Voluntary Counseling and Testing by Women of Reproductive Age in West Papua

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Article Info

Abstract

Women of reproductive age living with the human immunodeficiency virus (WRAL-HIV) have many complex problems regarding their disease and status. They have to access Voluntary counseling and testing (VCT) as one of the health services where they would receive antiretroviral treatment to optimize their health and improve their quality of life. The study aims to analyze the factors which determine the utilization of VCT for accessing antiretroviral treatment by WRALHIV in West Papua. It was an observational, cross-sectional study. The subject was women of reproductive age (WRA) aged 15-49 years old, receiving antiretroviral treatment at VCT of Hospitals in Manokwari, Sorong, and Fakfak. The total was 140 respondents. Data collection was carried out by interviews using a questionnaire. The data were analyzed statistically using the chi-square and logistic regression tests. Most respondents with high intensity in the utilization of VCT services were aged 15-35 years, graduated from senior high school - university, unemployed, and married. Demographic and predisposing variables were not significantly associated, but there were significant associations between enabling factors (distance) with p value=0.00 and reinforcing factor (social support) with p value=0.03 in the utilization of VCT services by WRALHIV in West Papua, in which the distance was more significant than social support in the utilization of VCT services. The easily accessible distance increases their visitation to VCT. In addition, social support had an impact on increasing the utilization of VCT services, and finally, these may improve WRALHIV quality of life.

Introduction

Human immunodeficiency virus (HIV) is an infectious disease that attacks the immune system. The HIV viruses are found in the body fluids of infected people, especially in the blood (Scott & Wu, 2019), semen, vaginal fluids (S. P. S. Id et al., 2019), and breast milk (Myburgh et al., 2020). Recently, the number of HIV-infected people has been increasing, not only in big cities but also in remote villages. The cumulative number of HIV cases in Indonesia until 2020 was 409,857 people, and 127,823 people had been suffering from Acquired Immune Deficiency Syndrome (AIDS). 1987, the first time HIV was found in Bali, until December 2020, the HIV and AIDS cases have spread to 484 (90.07%) of 514 regencies and cities from all over provinces in Indonesia. The highest case percentage of AIDS is reported among a group of productive ages 25-49 years old at 69%. Besides, the high HIV risk factors are unsafely heterosexual activities (48.8%), unsterile syringes usage (0.4%), homosexual and transgender activities (26.5%), unknown (17.3%), and others (7.5%) (Kementerian Kesehatan RI, 2020). The Indonesian Ministry

of Health in 2020, reports 2,286 people suffered from AIDS. Most of them spread in five provinces with the highest number of AIDS. They are Papua, Bali, Central Java, West Java, and South Sumatra. The cumulative number of HIV and AIDS in West Papua is 4,434 and 1,405 people, respectively. So far, based on recorded data as 838 people living with HIV/ AIDS (PLWHA) are already passed away (Dinas Kesehatan Provinsi Papua Barat, 2016).

The HIV case reported based on gender are men at 67% and women at 33%, with the ratio of men to women being 2:1. Although the case of men is higher than in women, the infection case in women always increase annually. Especially the cases within the group of housewives are higher than among women sex workers. Some possible reasons might be caused by the viral transmission from their husbands (Fuspita et al., 2019), the lack of awareness of gender equality(Ran Van der Wal et al, 2021), and the socially weak position of women as part of their community (Ndubani et al., 2017).

The women of reproductive age are women in the range of 15-49 years old, married, widowed, and single (B. K. Id et al., 2021). Women within this group have a high risk of HIV transmission due to their sexual activity. In addition, the women would be pregnant during their reproductive age period. Unfortunately, pregnant women suffering from HIV without ARV medication will possibly transmit the virus to their children (Care et al., 2020). HIV transmission from mother to child is still a vital issue in the HIV prevention program.

Harm reduction is a program for HIV/ AIDS prevention by United Nations Program on HIV and AIDS (UNAIDS) (UNAIDS, 2017). One of the harm reduction agendas is to prevent and control HIV through Voluntary counseling and testing (VCT) services (Armstrong-mensah et al., 2022). However, a few PLWHA already accessed the VCT services in Indonesia i.e. group of injecting drugs users (18%), women sex workers (15%), customers of women sex workers (3%), and the man who have sex with a man (15%). Thus, the true knowledge about HIV and AIDS among those vulnerable groups has already increased but still not enough yet. Commonly, the only man who

has sex with a man, women sex workers, the customers of women sex workers, and injecting drugs users who can identify HIV prevention correctly (Herdanindita et al., 2020).

Generally, the care, support, and treatment (CST) activities for PLWHA can be conducted in the hospital, public health centers, and places appointed by the government. So far, West Papua already has 58 counseling and testing for HIV and antiretroviral (ARV) services, 30 sexually transmitted infections services, 48 prevention of transmission from mother to child services, and 23 ARV services (Dinas Kesehatan Provinsi Papua Barat, 2016). The CST implementation will be easily conducted through VCT. VCT services are highly essential for PLWHA to prevent HIV transmission, access the ARV treatments, and also its case management services. Thus, this will lead to zero disease transmission and the enhancement of PLWHA life quality (Direktorat Jenderal Bina Kesehatan Ibu dan Anak Kementerian Kesehatan RI, 2015).

The utilization of health services such as VCT by PLWHA is an example of healthcare-seeking behavior (HSB). The utilization of health services can be affected by some factors, such as predisposing, enabling, and reinforcing factors. The predisposing factors are individual knowledge, attitudes, and stigma. The enabling factor includes the availability of health facilities, infrastructure, accessibility, and the easy way to reach health services in terms of distance, cost, and availability of transportation facilities. While, reinforcing factors such as attitudes and family behavior, health workers, and community leaders (Perdana et al., 2017; Chang et al., 2019; Wellay et al., 2018). Our study aimed to analyze the factors which determine the utilization of VCT by women of reproductive age living with HIV (WRALHIV) in West Papua.

Method

The study design was cross-sectional through an observational method. The study sites were VCTs at Manokwari hospital, Sele Be Solu Sorong Hospital, and Fak-fak Hospital, in West Papua Province, from May to July 2019. The total subjects were 140 respondents. The inclusion criteria were WRALHIV, aged

15-49 years old, and receiving ARV therapy. The dependent variable was the utilization of VCT. While, the independent variables were demographic factors (age, education, occupation, marital status), predisposing factors (attitude, stigma), enabling factors (distance, transportation), and reinforcing factors (social support, health guarantee).

Data collection was carried out through interviews and observation using a questionnaire which has been assessed for validity and reliability. The data were analyzed univariate to show the frequency and proportion of each variable, and bivariate to identify the association between dependent and independent variables. The data analysis used chi-square and logistic regression statistic tests with a significance of α=0.05. This study already received ethical clearance from the Ethics Commission of the National Institute of Health Research and Development, Indonesian Ministry of Health through decree No. LB.02.01/2/KE.008/2019.

Result and Discussion

The Women of reproductive age living with HIV (WRALHIV) who had higher intensity in the utilization of VCT services were aged 15-35 years old, graduated from senior high school-university, unemployed, and married. The women of reproductive age (WRA) who already accessed the VCT services without experiencing negative stigma were about 95.7%, while the rest still experienced negative stigma. The proportion of WRA with health guarantees was higher than those without health guarantee, and the number of women of reproductive age who use public transportation to reach the VCT was higher than those who use private transportation (Table 1).

This study found that age was not significantly associated with the utilization of VCT by WRALHIV in West Papua. The utilization of VCT by respondents aged 15-35 years old was almost similar to those aged 36-49 years old. Although statistically, age was not significantly associated with the utilization of VCT, another study found that age affects the utilization of health services (Mirmoghadam et al., 2019). Age determined the increase in disease incidence, the change in morbidity pattern (Wing, 2017; Rod, 2022), and the determinants of health service requirements (Seidu, 2020). Most of the respondents who utilized the VCT services in West Papua were women of reproductive age in the range

Table 1. Characterization of Women of Reproductive Age Living with HIV Accessing VCT Services May - July 2019 in West Papua

Variables	Category	Frequency (f)	Percentage (%)
Age	15-35 years old	71	50,7
	36-49 years old	69	49,3
Education	Elementary-Junior school	37	26,4
	Senior high school-University	103	73,6
Profession status	Unemployment	72	51,4
	Working	68	48,6
Marital Status	Single	69	49,3
	Married	71	50,7
Negative Stigma	Without negative stigma	126	90,0
	With negative stigma	14	10,0
Distance	Near	107	76,4
	Far	33	23,6
Health Guarantee	Yes, have	118	84,3
	No, have not	22	15,7
Transportation	Private transportation	63	45,0
	Public transportation	77	55,0
Social Support	No, have not	41	29,3
	Yes, have	99	70,7
Attitude	Positive	134	95,7
	Negative	6	4,3

Source: Primary Data, 2019

The variables of age, education, profession, and marital status (demographic factors) were not significantly associated with the utilization of VCT by women of reproductive age in West Papua. Statistically, the result showed all of its p-value > 0.05 (Table 2). The education of WRALHIV was not significantly associated with the utilization of VCT services. In this study, the utilization of VCT was higher among WRALHIV who graduated from senior high school - university than those who graduated from a low level of senior high school-university education. Generally, a person whose high education would tend to utilize health services as well as possible (Saracino et al., 2018). Education level was a significant factor in visiting health services continuously among PLHIV in China(Jin et al., 2021). A study in Africa found higher education levels increased the accessibility to following ARV therapy (Erena et al., 2019). AIDS education goals are to prevent new infections by giving people information about HIV and teaching them to act on it practically, to improve the PLHIVs quality of life, and also to reduce stigma and discrimination (Factlv. org, 2021).

The job status was not significantly associated with the utilization of VCT by WRALHIV in this study. Both the worker and unemployment WRALHIV already had utilized the VCT services in West Papua, although the count number of unemployment WRALHIV was slightly higher than the worker. Employment status among PLHIV is associated with not being late to test for HIV and medication adherence (Maulsby et al., 2020). There was inadequate antiretroviral therapy coverage among PLHIV in Africa, which affected productivity and working ability. Also, HIV-negative males or females living with an HIV-positive person lost the opportunities for paid jobs compared with those who have no family members with HIV (Cattaneo, 2019). A study in Toronto revealed that PLHIVs experienced many common barriers during their attempt to attain or maintain employment, including stigma in workplaces(Perri et al., 2021). Other studies found many PLWHA had to keep covering their HIV status to prevent losing jobs. Thus they still have income and can fulfill their financial needs and healthcare cost (Factlv.org, 2021).

Table 2. Association of Demographic Variables with VCT Utilization by Women of Reproductive Age Living with HIV Accessing VCT Services from May to July 2019 in West Papua

Variables	Category	Utilization of VCT services		p-value
		Low	High	
Age	15-35 years old	17	54	0,540
	36-49 years old	17	52	
Education	Elementary-Junior school	9	28	0,579
	Senior high school-University	25	78	
Profession status	Unemployment	17	55	0,502
	Working	17	51	
Marital Status	Single	16	53	0,845
	Married	18	53	

Significance Level p <0,05
Source: Primary Data, 2019

In this study, marital status was not significantly associated with the utilization of VCT by WRALHIV. Both married and single had utilized the VCT services well. It was different from a study in Africa that reported the association between marital status, health services accessibility and adherence to ARV

therapy. Married people suffering from HIV tend to have positive attitudes that could affect the accessibility, and adherence to ARV therapy (Heestermans et al., 2016). Thus marital status might affect a person's attitude during healthcare seeking. Generally, unmarried women or widows were less to seek healthcare

than married women. These could be affected by some factors, such as keeping secret their disease status, and economic factors, like having no income since being a widow or jobless (Shrestha et al., 2017). Although the PLWHA could access ARV drugs freely at VCT, they still require money to access another healthcare service.

The predisposing factors were not significantly associated with the utilization of VCT. However, the variable of distance (enabling factor) and social support (reinforcing factor) were significantly associated with the utilization of VCT (p-value <0.05). The tendency to utilize the VCT services was high among women of reproductive age whose residences were near VCT services and had social support (Table 3).

Table 3. Association of Predisposing, Enabling and Reinforcing Factor Variables with VCT Utilization by Women of Reproductive Age Accessing VCT Services from May to July 2019 in West Papua

Variables	Category	Utilization of VCT services		p-value
		Low	High	
Predisposing factor				
Attitude	Negative	28	5	0,549
	Positive	6	101	
Negative stigma	Without negative stigma	28	95	0,545
	With negative stigma	6	11	
Enabling factor				
Distance	Near	6	100	0,000*
	Far	28	6	
Transportation	Private transportation	12	51	0,236
	Public transportation	22	55	
Reinforcing factor				
Social support	No, have not	5	36	0,033*
	Yes, have	29	70	
Health guarantee	Yes, have	29	89	0,547
	No, have not	5	17	

*Significance Level p<0,05
Source: Primary Data, 2019

The attitudes and stigma were not significantly associated with VCT utilization by WRALHIV in this study. Most of them never experienced negative stigma during accessing VCT. The negative stigma existing inside the health services could destruct the PLWHA's trust in health facilities where they access the treatments. A study in Ethiopia reported that stigma reduces PLWHA's participation in the VCT program (Erena et al., 2019). The negative stigma potentially made the PLWHA be an objection to open about their HIV status, especially to their family and medical workers related to medication. Thus, the negative stigma must be eliminated. Stigma elimination could be carried out through health education

programs, such as education in school (Jacobi et al., 2020), advocacy campaigns, and government policies (Youssef et al., 2021). The negative stigma toward PLWHA during access to health services could obstruct the utilization of those services, affect the PLWHA's trust and their knowledge about HIV and AIDS, and might degrade their confidence (Raghupathi & Raghupathi, 2020; Rueda et al., 2016).

The logistic regression model showed the utilization of VCT services as a dependent variable associated with distance and social support as the independent variable. The association between the utilization of VCT services with distance was higher significant compared to social support.

Table 4. Factors Associated with Utilization of VCT Services Resulting from Logistic Regression Analysis

Variables	B	SE	wald	df	sig	Exp (B)
Distance	-8,096	1.429	32.095	1	0.000	0.000
Social Support	-.559	1.706	0.107	1	0.743	0,572

Source: Primary Data, 2019

The distance variable (enabling factor) was significantly associated with the utilization of VCT by WRALHIV, with a p-value <0.05. The house distance, which was near to VCT service, was very essential for WRALHIV in West Papua. This study took place in VCTs inside the capital of the regency or urban area. Therefore, the respondent's proportion whose residences were near VCT was about 71% of them. A study in Indonesia indicated that an adult who lived in an urban area has a probability to access health services 1.1% higher than those who lived in a rural area (Laksono et al., 2019). The health services, drug supplies, and drug distributions in urban areas were faster and more adequate than in rural areas.

Moreover, the regencies as sites in this study had enough smooth transportation. Besides, the VCTs locations were easy to reach using public transportation. In addition, the VCT's service waiting time was not too long. Thus, women of reproductive age always come to VCT for accessing ARV drugs at least once a month, even though they have to pay the extra cost for long-distance transport. A study in Malawi stated that VCT services were less utilized by the group of PLWHA who sexually active due to accessibility issues. Though the highest prevalence of HIV/AIDS was among the group aged 15-24 years old, they could not access the services. However, the inadequate infrastructure was still a problem (World Health Organization, 2019).

Based on a study in Romania, the high concentration of infrastructure and specialized medical personnel in particular regions or large cities limits the access of a large part of the population to reach quality health services because of longer travel times and distances. The rest of them could not access health services because of the geographical factor (Dumitrache et al., 2020).

Statistically, the social support (reinforcing factor) was significantly associated with the utilization of VCT by women of reproductive age in this study. Most women of reproductive age in West Papua receive social support, both from medical workers and the peer community. Social support from the peer community could upgrade the knowledge about HIV/AIDS among the community members. The peer community provided the possible place to communicate and learn updated information on HIV/AIDS among the members through discussion activities involving the health workers and seminar activities. The openness and comfort conditions made the information transfer easier among them (Wang et al., 2019). Another study found women suffering from HIV/AIDS receiving support from people around them had good self-conception and tend to utilize the health services well (Roberts et al., 2021).

The social support made PLWHA realize they are not alone, still be loved, have good knowledge and sharing information about HIV/AIDS, and comply with ARV therapy. Finally, these empower themselves and improve their quality of life (Li et al., 2018; Bhatta et al., 2017). The limitation of our study is all these study sites were located in the capital city of the regencies. Therefore the factors which determined the utilization of VCT services in the rural area are still not represented yet.

Conclusion

The distance accessibility and social support were significantly associated with increasing the utilization of VCT by women of reproductive age living with HIV in West Papua. The easily accessible distance increases their visitation to VCT. Also, the social support given to them affects increasing VCT utilization. Finally, these will improve their quality of life. We recommend the government of West Papua Province assists health services providers and patients using a proactive, comprehensive, and socio-cultural approach to increase coverage of utilization of VCT services and health promotion about the purpose and benefit of accessing VCT services.

Acknowledgments

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Communication, Information, and Education on Self-Awareness about Marriage Age Maturation among Adolescent Girls

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Article Info

Abstract

Indonesia has the highest rate of early marriage in the world, according to a UNICEF study, placing 15th out of 63 countries. Child marriage will make it much harder for Indonesia to obtain a high human development index and meet sustainable development goals. To determine whether Communication, Information, and Education (CIE) regarding maturing age at marriage through the Interprofessional Education (IPE) approach affected the students' self-awareness. An experimental study with one group pre-test and post-test design was conducted on 121 participants. They were selected using random sampling from 16-30th August 2021 in Hidayatul Mubtadiat Islamic boarding school, Puri sub-district, Mojokerto district, East Java province, Indonesia. The intervention group attended a workshop led by a religious leader, psychologist, and maternity nursing lecturer, completed by a follow-up program. The data was collected using the self-awareness questionnaire modified from the Situational Self-Awareness Scale (SSAS). IBM SPSS (v.28) was used to analyze the data, including statistical tests such as descriptive statistics and a paired t-test for comparing the mean scores. A 5% level of significance was considered. After interventions, there was a significant self-awareness score improvement (p-value 0.000 and T value = -15.9). The participants had self-awareness in the good category of 60.3 %. Up from 17.4 % before the intervention with a change in mean + standard deviation (SD) pre-post 57.8 + 7.2 to 66.2 + 7.0. Meanwhile, the number of participants who had less self-awareness before the intervention (42.1%) decreased to 5% after the intervention. The study's findings verified the effectiveness of the CIE strategy to enhance self-awareness among adolescent girls using the IPE method. The supply of CIE on the maturity of marriage age with an interprofessional education approach is the proper step to raise adolescents' self-awareness in the right decision-making process. So that they can avoid early marriage deliberately and independently.

Introduction

The amendment of Act Number 1 of 1974 to Act Number 16 of 2019 concerning Marriage stated that the age limit for marriage has changed from 16 to 19 years old. Child marriage is a marriage that occurs before the age of 19. Child marriage seems to be a sort of infringement on a child's right to grow and develop (Inayati, 2015). Child marriage creates situations that children's basic rights to refuge from discrimination and violence, human rights, health rights, social equality, and education privileges are violated (Lasode & Awote, 2014). Child marriage will be followed by pregnancy in children, which will disrupt the health of both mother and child (Djamilah

& Kartikawati, 2014). Pregnancy at a child's age has a risk of maternal death and infant mortality, premature birth, and Low Birth Weight (LBW) (Yulianti et al., 2021). The quality of children from child marriage will contribute significantly to the incidence of children with stunting (Nugraha et al., 2019; Nur et al., 2021; Setiawan, Diaz, et al., 2021).

Child marriage before the age of 18 is still very widespread, accounting for almost one in every four cases. East Java Province occupies the highest position in Indonesia, with 18.44% child marriage cases. Based on the Ministry of Religious Affairs data, the Puri sub-district was ranked three in the number of marriages in the Mojokerto district in 2020. Marriages under the age of 16-20 years were 253 people. This data shows that in the Mojokerto district, there are 2.62% of marriages or child marriages. The case of child marriage will make it difficult for Indonesia to achieve a high Human Development Index and Sustainable Development Goals (Utami & Afwa, 2020).

The nationwide rate for the number of females aged 20-24 who marry while they are under the age of 18 is 10.2%. This number shows a downward trend compared to 2018, which was 11.21%. However, proportionally, there are still 22 provinces in Indonesia that show a proportion that is above the national average. DIY is the province with the lowest proportion of 3.1%. The National Medium-Term Development Plan (RPJMN2020-2024) mandates a child marriage rate of 8.74 % (BPS, 2020).

One of the factors that cause child marriage is a religious point of view. Religion becomes the legitimacy of the practice of child marriage under the pretext of avoiding adultery, arranged marriages, and unwanted pregnancies (Illingworth, P., & Chelvanayagam, 2017). This phenomenon encourages the need for the involvement of religious leaders, health colleges, and psychologists in Indonesia to play an active role together in Marriage Age Maturation and follow up on the policies on child marriage issues (Grijns & Horii, 2018). The main target is the students in the Islamic boarding school as a representation of teenagers who are closely related to religious factors, as one of the factors that influence the occurrence of child marriage

(Wafiq & Santoso, 2017). Teenagers need to be provided with knowledge, understanding, and real examples of the impact of child marriage.

To achieve the aims of the National Medium-Term Development Plan, measures to prevent child marriage must be systematic, comprehensive, and integrative (RPJMN 2020-2024). A new perspective that is more progressive and siding with child protection is needed, especially in reducing the number of child marriages, to create good quality and competitive human resources in the future (Inayati, 2015). This effort can be achieved by making Islamic boarding schools, the center of Communication, Information, and Education (CIE) for Marriage Age Maturation with an Interprofessional Education (IPE) approach. IPE would be a method of learning used by two or even more professions to promote collaboration and learning quality. The learning, in this case, is CIE on adolescent psychology, religious teachings on social and marital procedures, and reproductive health. IPE has the potential as a medium for collaboration between professionals that can embed knowledge, attitudes and behavior in adolescents in Islamic boarding schools. Character attitudes, and behavior will be formed through the self-awareness of students. Self-awareness of Marriage Age Maturation will contribute to the formation of awareness in adolescents to consciously and independently carry out marriage age maturation (Pieterse et al., 2013). Self-awareness about the adverse effects of child marriage, both physically and psychologically, both in adolescent developmental tasks and future developmental tasks (Illingworth & Chelvanayagam, 2017).

A situation analysis on the importance of self-awareness in boarding school students became the basis for researchers to be interested in analyzing the effect of CIE on self-awareness about Marriage Age Maturation through the IPE approach to students at the Hidayatul Mubtadiat Islamic boarding school, Puri sub-district, Mojokerto district. Many students at the Hidayatul Mubtadiat Islamic boarding school are still unaware of the maturing age at marriage, and self-awareness of the potential consequences of early marriage is low. The provision of CIE through interprofessional

education collaboration in encouraging students as wellness clients to make decisions in maintaining their reproductive health through self-awareness efforts. Self-awareness encourages a person to consciously and independently change this behavior in line with Henderson's Nursing theory about the patient's ability to be independent in achieving health status (Peplau, 2021). CIE to adolescents with the IPE approach is expected to be able to increase self-awareness which can guide students in making the right decision, specifically avoiding child marriage. The objective of this paper is to determine whether CIE on marriage age maturation through the IPE approach affects student self-awareness in Hidayatul Mubtadiat Islamic boarding school, Puri sub-district, Mojokerto district.

Method

This research implemented an Experimental Design, specifically one group Pretest-Posttest Design. This study's population consisted entirely of students in Hidayatul Mubtadiat Islamic Boarding School, Puri District, Mojokerto Regency, with a total of 173 students. The inclusion criteria of the samples were female students recorded in the school database; never married; over the age of 16 years, and have had menarche. The exclusion criteria were: do not have a verbal and hearing impairment; be able to communicate well; have received premarital education. The sample amount after following by Kelly (Kelly et al., 2020) calculated 121 students selected by random sampling with an effect size of 0.5, an error rate of 5%, and a confidence level of 95% (Faul et al., 2007).

The instrument used in this study was a questionnaire that included the characteristics of the participants and their self-awareness level. The questionnaire was adopted from the Situational Self-Awareness Scale (SSAS) by Govern in 2001 with some modifications based on the study objective and translated into the Indonesian version. The reliability of the questionnaire was assessed using Cronbach's alpha (0.665) and a validity value of 0.85. The nine questions were presented in their original order, and participants were asked to respond on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree) (Govern & Marsch, 2001).

This research was approved by the ethics committee of Wahidin Sudiro Husodo General Hospital with no. 12/KEPK.RSWH/EA/2021. This study took time on 16-30th August 2021. Each participant completed an informed consent form as well as a self-questionnaire. On the same day, the pre-test was given at the time before the intervention began. The post-test was performed two weeks after the intervention. The researcher double-checked all questionnaire survey sheets to confirm that all questions were completely answered. Participants who dropped out of the research might withdraw their data at any time. Data analysis uses SPSS version 28 software. In this study, descriptive statistics and inferential statistics were utilized as statistical tests. The T-test compares the distinction between different means of two paired samples under the assumption of normal distribution.

The intervention was given three times in two weeks, with the duration of each being 90 minutes. The material presented at the first meeting was related to the marriage age maturation by religious leaders from the Ministry of Religious Affairs. In the second meeting, the material on adolescent psychology was delivered by psychologists from the Department of Population Control, Family Planning, and Women Empowerment (DP2KBP2) Mojokerto Regency. In the last one, the material on reproductive health was delivered by a reproductive health lecturer from a university. The data was collected through questionnaires to see students' self-awareness before and after CIE.

Table1. ....

Sessions	Topic	Summary of Educational Content	Educator	Time
1	Marriage age Maturation	Pre-Test The meaning of marriage age maturation The government policies and programs as an effort to organize family planning regulated by the law The explanation of the purpose of marriage The importance of physical, mental, spiritual, socio-cultural, and economic preparation to build a quality marriage Religious perspective on child marriage and premarital sex	Religious Leaders appointed by the Ministry of Religious Affairs	90 mins
2	Adolescent Psychology	Family Life Planning to build a quality family The role of the family in preparing adolescents to have a Family Life Planning The role of the family as an effort to prevent adolescents from child marriage and premarital sex The concept of the family and the 8 functions of the family Family participation in family planning The negative impact of child marriage on the career and future of adolescents	Psychologists from the Department of Population Control, Family Planning, and Women Empowerment (DP2KBP2) Mojokerto Regency	90 mins
3	Adolescent Reproductive Health	Explaining the adolescent reproductive health to avoid child marriage and premarital sex The effect of child marriage on adolescent reproductive health The government's policy in family planning aims to reduce births and deaths (maternal and child mortality rates), leading to a small, happy and prosperous family to create a quality Indonesian population regulated by the law Determining the age of marriage related to reproduction for a woman to create a healthy family The bad impact of child marriage on adolescent reproductive health: maternal mortality, child mortality, obstacles during childbirth, the potential to create intergenerational poverty, and stunting. Post Test	Lecturers on reproductive health from a university	90 mins

Source: Primary Data, 2021

Result and Discussion

Table 2 shows information about the characteristics of the participants. Most participants were 17 years old (76.9%), and all were female high school students (100%). Before the intervention, all participants had received information related to marriage age maturation.

Table 2. Participants' Characteristics

| Characteristics | F | % | Mean Score | | Change | P |
			Pre-test	Post-test		
Age						
16 years	24	19.8	58.8	66.6	7.8	0.000
17 years	93	76.9	57.5	66.2	8.7	0.000
18 years	4	3.3	57.5	65	7.5	0.057
Sex						
Female	121	100.0				
Education						
Senior High School	121	100.0				
Information on Marriage						
Age Maturation						
Never	0	0.0				
Ever	121	100.0				

Source: Primary Data, 2021

Table 3 shows data on the changes in dependent variable scores before and after the intervention. The participants' level of self-awareness increased considerably after the intervention; individuals had self-awareness in the good category of 60.3 %, up from 17.4 %, before the intervention, with a rise in mean + standard deviation (SD) pre-post 57.8 + 7.2 to 66.2 + 7.0. Meanwhile, the number of participants who had less self-awareness before the intervention (42.1%) decreased to 5% after the intervention. The changes in self-awareness before and after the intervention revealed that the intervention affected the outcome. The T-test was performed to estimate the impact (T) and significance (p) of the intervention's effect, and the results are provided in Table 3.

Table 3. Pre-post Score Difference

| Variable | Pre-test | | | Post-test | | | T | P |
	F	%	x ± SD	F	%	x ± SD		
Self-Awareness			57.8 ± 7.2			66.2 ± 7.0	-15.9	0.000
Less	51	42.1		6	5.0			
Fair	49	40.5		42	34.7			
Good	21	17.4		73	60.3			

Source: Primary Data, 2021

With a 95% confidence level, it indicated a difference in the level of self-awareness before and after the intervention. After administering the CIE, the participants' self-awareness levels showed a significant result, p = 0.000 and a T value = -15.9. It demonstrates that the CIE intervention on marital age maturation with an interprofessional education approach has a very powerful impact on participants' self-awareness, with a very high degree of significance.

The intervention results showed a significant change before and after being given CIE. Health information is a process that allows people to increase control and improve their health (Engelhardt, 2017; Setiawan, Setiawan, et al., 2021). The increasing value of participants' self-awareness is the effect of health information provided by multi-disciplines by carrying the material on Marriage Age Maturation. Marriage age maturation is an endeavor to raise the minimum age for the first married to 20 years for females and 25 years for males (Hardiani & Junaidi, 2018). This age is regarded to be mature enough in terms of physical and emotional development to confront family life (Gastón et al., 2019; Muawwanah, 2019)

Through the Ministry of Health program launched by the Indonesian government to control the population, the Marriage Age Maturation program aims to increase adolescent self-awareness to consider various aspects of family planning. These aspects include health, economic, psychological, and religious (Wilopo et al., 2017). Marriage Age Maturity has consequences for the requirement to raise the marriage age to a more mature age to reduce the number of children born to

a woman throughout her reproductive period or her overall fertility rate (Patoari, 2020). The increase in child marriage has direct implications for the prevalence of pregnancy and the fertility rate (Marphatia et al., 2017; Stover & Winfrey, 2017).

The marriage age maturation program in its implementation has been integrated with the program for preparing family life for teenagers. It is a part of the National Development's main programs in Indonesia(Wilopo et al., 2017). The policy direction of the family life preparation program to achieve a happy and prosperous small family is to build every Indonesian adolescent who is aware of delaying the age of marriage, having healthy behavior, avoiding the risk of drug abuse, premarital sex, and risk of being infected by HIV/AIDS and making adolescents as a role model for peers (Marliania et al., 2018).

The main feature of the demographic transition in any country is an increase in women's education, an increase in the age of marriage, and an increase in the age at which they have their first child. Education is an important component in influencing marriage age maturation significantly (Marphatia et al., 2017, 2020). A low level of education, low level of financial state, customs, and culture are the factors of child marriage (Kalamar et al., 2016; Wilonoyudho & Agus Salim, 2020). The efforts that can be taken care of by making Islamic boarding schools a center of communication, information, and education about marriage age maturation, making health promotion activities more persuasive as a form of communication in conveying health information and increasing the understanding and awareness of the importance of health (Ashcroft et al., 2018).

The main target of providing information and education related to Marriage Age Maturation is adolescents age less than 18 years, as recommended by National Family Planning Coordinating Agency (BKKBN) and UNICEF (United Nations Children's Fund) with the IPE approach (BPS, 2020). IPE is a type of collaborative learning in which two or more professionals work together to enhance the learning process. The learning mentioned before is CIE on adolescent psychology, religious teachings on social and marriage procedures,

and reproductive health. IPE is very potential as a medium for collaboration between professionals that can embed knowledge, attitudes, and behavior in adolescents in Islamic boarding schools (Muawwanah, 2019).

WHO defines IPE as a process conducted by involving a group of students or health professionals with different professional backgrounds and carrying out joint learning within a certain period. IPE entails instructors and learners representing multiple health professions and associated core disciplines working together to establish and promote a meaningful learning experience (Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013). IPE is an interactive, group-based learning method, which is carried out by creating a collaborative learning atmosphere to realize collaborative practices and convey an understanding of interpersonal, group, organizational, and inter-organizational relationships as a professionalization process. The existence of interaction is the main goal in IPE to collaborate with types of services, including promotive, preventive, curative, and rehabilitative (Orbayinah & Utami, 2015).

The establishment of the IPE learning system was motivated by the fact that health systems throughout the world are highly fragmented and, as a result, incapable of addressing health issues that affect many parts of life. The contribution of various disciplines is expected to have a positive effect on solving various health problems. IPE is very important to improve collaboration skills in health promotion and better health outcomes. Many international health organizations have promoted IPE as part of a redesign of health systems to provide the highest quality of care (Van Diggele et al., 2020).

It presupposes that interprofessional education enhances healthcare professionals' ability to collaborate, which may result in improved individual outcomes in comparison to single-profession education (Reeves et al., 2017). A collaborative practice-ready health worker has learned to work in an interprofessional team where the psychologist, religious leader, and maternity nursing lecturer collaborate to identify client goals(McMillan et al., 2021; WHO, 2010). Based on findings

from previous research, IPE was proven to be beneficial in clarifying the duties of different health professions (Earland et al., 2011; MacDonald et al., 2010), which has been demonstrated to be associated with successful interprofessional collaboration(Matziou et al., 2014; Müller et al., 2018).

Carrying out the role of IPE based on core competencies, one of which is communication in conveying health services (West et al., 2016). Health communication is a deliberate attempt to favorably affect public health-related behavior through the use of diverse communication concepts and strategies, including interpersonal and mass communication (Ketcherside et al., 2017). IPE is a systematic effort in communication, information, and health education conveying, with a professional collaborative approach to embed character attitudes of adolescents in Islamic boarding schools so that their self-awareness will be formed.

The self-awareness that develops in one person is directly related to the cognitive function and education of individuals who are actively processing, storing, and retrieving information (Fragkiadaki et al., 2016; Vago, 2014). The outcome of self-awareness affects individual psychology related to information about facts obtained, so individuals will form good self-awareness when planning and carrying out activities (Salvato et al., 2020). Self-awareness of marriage age maturation will contribute to the formation of awareness in adolescents to consciously and independently carry out maturation of marriage age (Pieterse et al., 2013). Self-awareness includes the understanding of the negative impacts of child marriage, both physically and psychologically, both in adolescent developmental tasks and future developmental tasks (Illingworth, P., & Chelvanayagam, 2017).

This study has implications for health education, an element of community-based nursing practice and health policy intended to prevent child marriage. This research is technically capable of utilizing a control group as a comparison. However, due to local authorities policy in the midst of a pandemic, this research is not permitted to undertake a study trial with more than one group.

Conclusion

The findings of this study confirmed the effectiveness of Communication, Information, and Education (CIE) about Marriage Age Maturation with an interprofessional education (IPE) approach to increase self-awareness in adolescents. CIE on Marriage Age Maturation contributes to the process of forming adolescent self-awareness to consciously and independently carry out marriage-age maturation. The provision of CIE with an interprofessional education approach is the right step to increase the level of self-awareness of children under 18 years old in the right decision-making process to avoid child marriage. For further research, using trials with more than one group as a comparison to determine the effectiveness of similar interventions before and after treatment.

Acknowledgement

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Decision Tree Prediction Model in Patient Mortality Rate based on Risk Factors

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Abstract

The Coronavirus disease (Covid-19) has become a global problem since WHO declared a pandemic in 2020. The number of deaths due to Covid-19 has increased significantly in many countries. This study aimed to implement decision tree modeling to represent the relationship between risk factors and the mortality rate of Covid-19 patients. This study analyzed secondary data of 83,024 Covid patients from January 2020 to June 2021. Data processing used data mining with the decision tree classification method. The results showed that comorbidity is the leading risk factor for death which is then influenced by age. The higher the age group with comorbidities, the higher the risk of death. Suggested that health services can utilize the results of this study to prevent the severity of Covid-19 infection. Such as the development of comorbid awareness programs and community-based education on managing patients with comorbidities.

Introduction

Coronavirus diseases (Covid-19) is an infectious disease caused by the SARS-CoV-2 virus (World Health Origanisation, 2022). Until February 25, 2022, the total number of cases globally reached 428,511,601 people infected with the death rate due to Covid-19 reaching 5,911,081 (World Health Origanisation, 2022). In Indonesia alone, deaths due to Covid-19 reached 147,342 people (World Health Origanisation, 2022). The high mortality rate in Indonesia is caused by the delay in responding to the health crisis (Olivia et al., 2020)

The number of Covid-19 in Indonesia has significantly increased; cases initially only concentrated on the island of Java quickly spread to other large islands with a high number of migrant populations, such as East Kalimantan, Papua, and South Sumatra (Olivia et al., 2020). Java island became Indonesia's highest area of Covid-19 distribution (Ilmi & Praptana, 2022). The quick increase in the cases significantly impacts hospital management, such as the lack of protective equipment and health support tools (Merlin & Vanchapo, 2021).

Various studies on risk factors have been carried out. People with hypertension and diabetes mellitus, male gender, and active smokers were more likely to be infected with Covid-19 (Gallo Marin et al., 2021; Susilo et al., 2020). In addition, it is also a risk factor for death due to Covid-19 infection (Nanda Nur Illah, 2021; Satria et al., 2020). A study found that 22.8% of hospitalized Covid-19 patients died. Most of the comorbid were found (Maryati et al., 2022). The most common comorbid in Covid-19 deaths is Diabetes Mellitus. Diabetes Mellitus increased by 2.78 times higher in Covid-19 patients, resulting in death (Corona et al., 2021; Govender et al., 2021; Nandy et al., 2020; Varikasuvu et al., 2021). It is caused by several factors that increase the risk of Covid-19 infection among diabetic patients (Ejaz et al., 2020).

In addition to comorbidities, age and gender had a significant relationship with

death from Covid-19. Where men aged 45-60 years are susceptible to Covid-19 and have the potential to increase mortality (Nanda Nur Illah, 2021). A model showed that men are more likely to be infected with Covid-19 with severe symptoms and require hospital treatment than women (Bienvenu et al., 2020; Clark et al., 2020; Mohamed et al., 2021).

Various studies have found an influence between comorbidities, gender, and age on the incidence of death in Covid-19 patients (Bertsimas et al., 2020; Dessie & Zewotir, 2021; Pung et al., 2021). However, no research has found a relationship between these factors and the mortality rate of Covid-19 patients. Therefore, this study aimed to implement decision tree modeling to represent the relationship between these factors and the mortality rate of Covid-19 patients.

Method

This study used secondary data on Covid-19 patients obtained from the Semarang City Health Service (DKK) from January 2020 to June 2021. The total data obtained were 83,437 and the cleaned data processed was 83,024. The data consisted of gender, age, comorbidities, symptoms, date of being tested positive for Covid-19, date of being declared cured/died, isolation status (self-isolation or hospital treatment), and final status (cured/death). Data processing uses data mining with the decision tree classification method. Decision tree classification methods are commonly used in data mining to form a classification system that uses multiple variables or develops predictive algorithms for the dependent variable (Song & Lu, 2015). The data processing process in this study shows in Fig.1
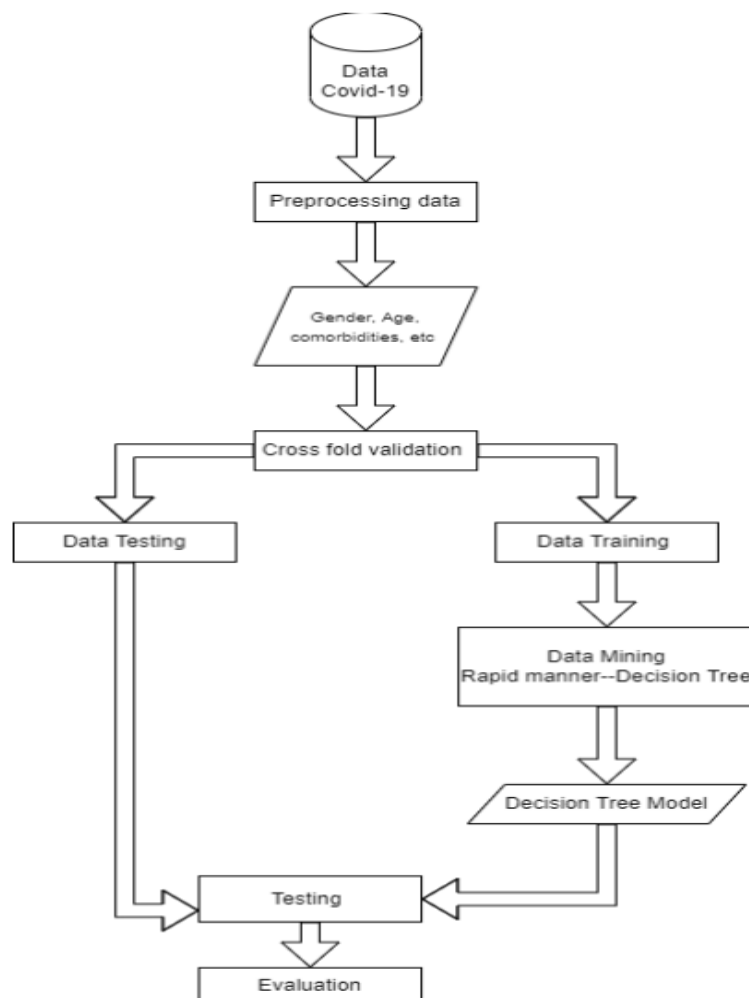

Figure 1. Data Processing

The secondary data for Covid-19 collected is carried out in the pre-processing process. In this stage, complete and incomplete data is sorted, checking data consistency. Meanwhile, in the pre-processing process, the data discretization process is carried out on the age variable with age grouping based on the risk of Covid-19 infection (World Health Organisation, 2022). The data results ready to be processed are then divided into training and test data using the cross-validation technique. This technique helps form a model that is resistant to unknown data. In this stage, the output obtained is a decision tree model trained using training data. Furthermore, the model obtained with the training data is compared with the test data, which produces test parameters in the form of the level of accuracy, precision, and recall of the model that has been generated.

The implementation process utilizes the Rapid Miner application, with the main class target being the patient status variable. The performance evaluation process is carried out using test parameters in the form of accuracy, precision, and recall. Each evaluation parameter shows how the decision tree model identifies patient status by looking at the variables of gender, age range, comorbidities, symptoms, and treatment status.

Results and Discussion

The results of the data mining experiment process obtained a decision tree model. From the tree rules obtained, the pattern of the interrelated variables in determining patient status can be seen. Overall, the decision tree model will evaluate the comorbid variables as the first node, wherein that variable has two branches, namely "yes" and "no." In the next stage, the variable of care status is observed, wherein this variable has two branches, namely "treated in health facilities" and "self-isolation." The following observed variable is the age range which has eight branch distributions. The age range varies with the criteria "85+" and has additional branches in the form of symptom variables which are distributed into "yes" and "no." Besides that, the symptom variable with a value of "yes" is derived again through the gender variable branch (See. Fig.2).
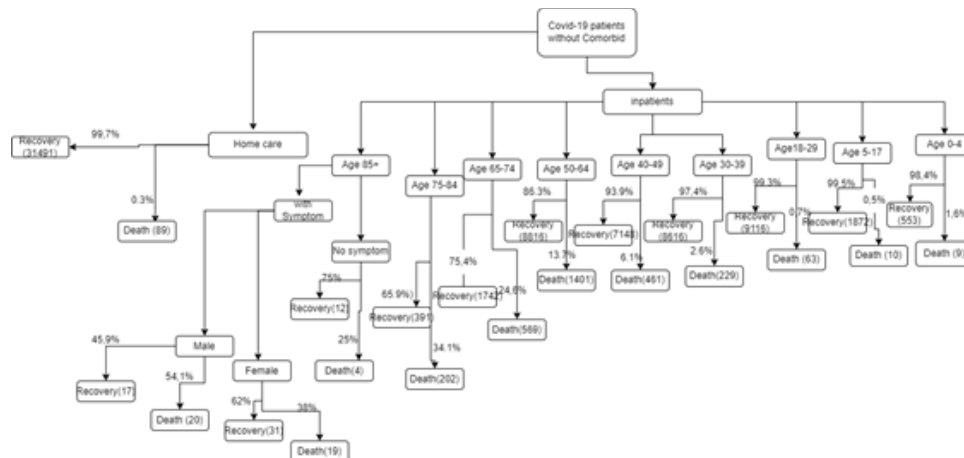
Figure 2. Patient Decision Tree without Comorbid

The decision tree model in patients without comorbidities who received treatment at the health facilities showed an increase in deaths due to Covid-19 in the elderly group. In the age group of 85 and over, the decision tree model showed the role of symptoms and gender that affect the output of patient care. Patients aged 85 and over who are symptomatic and male have a higher mortality percentage (54.1%) than females (38%) in the same age group.
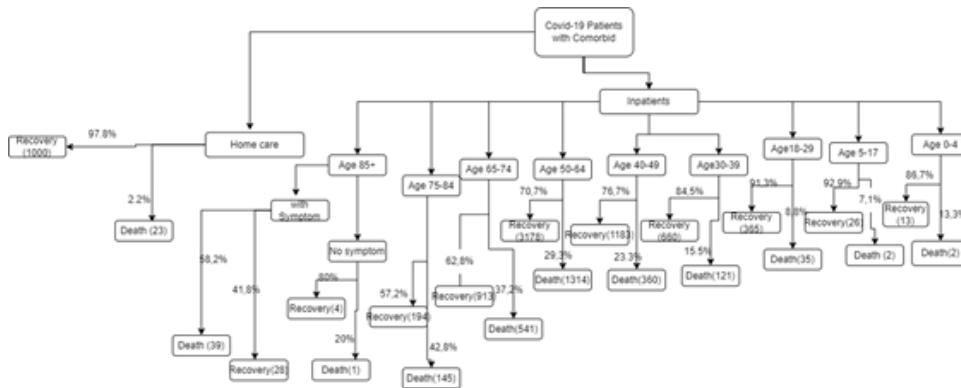
Figure 3. Decision Tree of Patients with Comorbid

Figure 3 shows that most patients with comorbidities require treatment at health facilities. The percentage of deaths increases with the increasing age group. In patients aged 85 and over, symptom factors affect treatment output. Most (58.2%) died in patients who showed early symptoms in this age group.
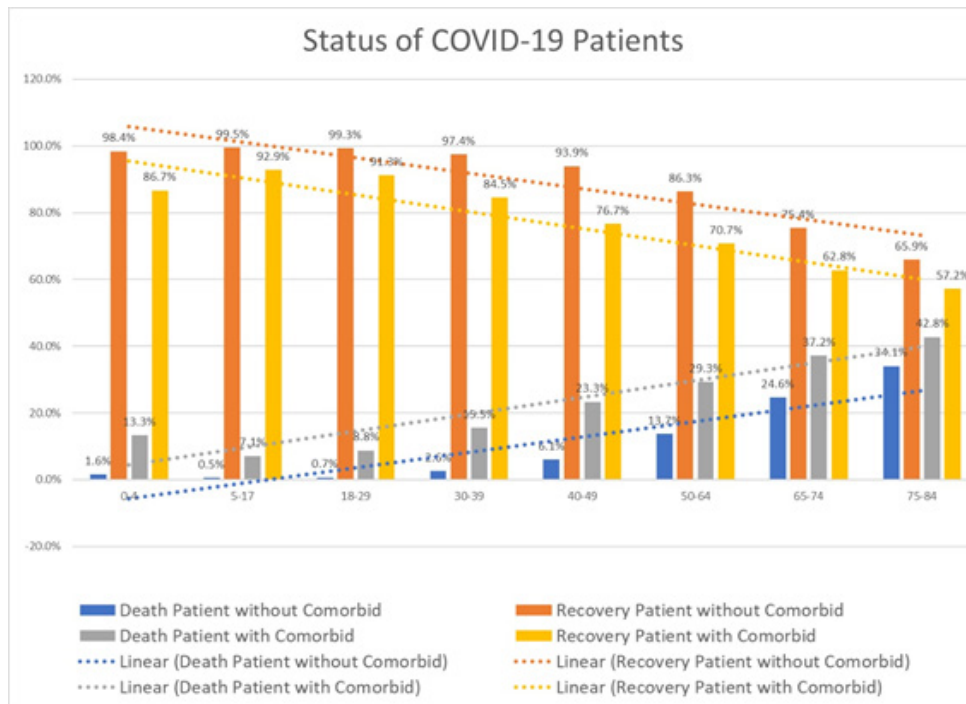
Figure 4. Status of COVID-19 Patients With and Without Comorbid

Based on comorbid variables and the distribution of age range variables, it can be seen that the older, the greater the death rate due to Covid-19. Figure 4 shows that the recovery status of patients without comorbidities has decreased with each increase in the age range, and the death rate has increased where the most significant spike is between 50 to 84 years. Meanwhile, compared with the status of patients with comorbidities shown in Figure 5, there was a significant decrease in the number of patients recovering. The opposite occurred in the number of deaths of patients with comorbidities, where mortality increased significantly, especially starting in the age range of 30 to 84.

From the evaluation results obtained, the value of each parameter (see Table 1). The accuracy value indicates the model's ability to predict the patient's status, either "dead" or "recovered." The decision tree model can produce an accuracy value of 93.18%,

which means that 93.18% of the test data generated from the cross-validation process can be predicted correctly. Then the precision parameter in the decision tree model that is formed can produce a value of 93.22%, which means the model can accurately predict 93.22% of data that has a "cured" class from all test data. Then the recall can reach 99.95%, which means the system can separate the "healed" class data with nearl

Table 1 Model Evaluation Results

Evaluation	Score (%)
Accuracy	93.18
Precision	93.22
Recall	99.95

y 100% accuracy.

The decision tree model showed that the risk grouping of patients in the first stage is the presence or absence of comorbidities. This case described that comorbidity gives different results for Covid-19 patients. A review study showed that chronic non-communicable diseases significantly affect the prognosis of Covid-19 (Anjorin et al., 2021). Patients with comorbidities are more susceptible to infection and have more severe symptoms (Huang et al., 2020; Madjid et al., 2020). The results also found that most patients with comorbidities require treatment in health services.

In this case, comorbidities are vital in preventing deaths from Covid-19. In Indonesia, comorbidities are one of the essential focuses in controlling Covid-19 as stated in the Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07/ MENKES/413/2020. In implementing education and community empowerment, it is essential to control comorbidities. In addition, health services are required to report the comorbid status of Covid-19 patients. (Keputusan Menteri Kesehatan Republik Indonesia Nomor Hk.01.07/Menkes/413/2020 Tentang Pedoman Pencegahan Dan Pengendalian, 2020). A study showed that Covid-19 patients with comorbid heart and kidney failure have the potential to have severe symptoms. Meanwhile, patients with comorbid Diabetes Mellitus have a 2.78 times risk of dying from Covid-19 (Nandy et al., 2020).

The second branch of the decision tree model explained that both comorbid and non-comorbid patients have different possibilities for recovery based on age groups. The older the age group, the higher the percentage of patients who died, both comorbid and non-comorbid. A study found that being over 60 years old and having comorbidities was a risk factor for death in Covid-19 patients. Although younger patients with hypertension and diabetes had a risk of having a worse prognosis than the older age group (Bae et al., 2020).

Another study found that those less than 50 years of age had low awareness of hypertension and tended to ignore it compared to older people (Sehestedt et al., 2007). It supports the decision tree model in the comorbid patient group, where mortality increases at 30 years. An interesting thing was found in the group after 85+ without comorbidities, where the decision tree model showed a worse prognosis in the symptomatic group and male gender. A study found that biological and sociocultural factors caused vulnerability in men; many cases found men showed more severe symptoms of Covid-19 infection. (Jin et al., 2020; Papadopoulos et al., 2021; White, 2020)

Conclusions

The decision tree model describes patients with Covid-19 infection up to 2021 before high vaccine coverage and Omicron-type. The resulting death is likely to be in patients who have not received the vaccine. However, with a high level of accuracy, the resulting decision tree model can be used as a risk assessment step in Covid-19 patients. Especially in the old age group and have comorbidities. The results of this study are evidence that in handling Covid-19, there is a need for a comorbid risk assessment. It is hoped that health services can utilize the results of this study to prevent the severity of Covid-19 infection—the development of comorbid awareness programs and community-based education on the management of patients with comorbidities.

Acknowledgment

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Relationship between Nutritional Status and Living Conditions with the Risk of Tuberculosis in Children

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Article Info

Abstract

Children are very susceptible to TB infection. One of the causes of TB in children is nutritional status. Poor one causes a weak immune system, making contracting tuberculosis easier. In addition, living conditions can spread to children due to contact with active pulmonary TB in one household. This study aims to determine the relationship between nutritional status and living conditions with TB incidence in children. This case-control study involved 76 samples consisting of 38 cases and 38 controls. Research subjects were taken using the purposive sampling method. The subjects were children aged 0-18 years diagnosed with TB based on anamnesis, physical examination, tuberculin skin test, and chest X-ray. This study was conducted at Bhakti Medicare Sukabumi Hospital from July to December 2019. The results of the Chi-square test found that there was a relationship between nutritional status (p=0.023), ventilation area (p=0.043), and humidity (p=0.001). There is no relationship between age (p=0.639), gender (0.490), parental education (p=0.803), lighting (p=0.200), temperature (0.260), density (p=1.000), and type of floor (p=0.240).

Introduction

Tuberculosis (TB) is an infectious disease caused by bacteria from the Mycobacterium group, namely Mycobacterium tuberculosis (M.tb), which can attack the lungs and other organs (Roya-Pabon & Perez-Velez, 2016). TB in children can cause various problems, ranging from failure to thrive, disability, and even death. Clinical symptoms in children can be systemic or according to the related organs (Apriliasari et al., 2018; Osman et al., 2021; Thomas, 2017; Velayati, 2016). Common symptoms include persistent cough, weight loss, failure to thrive, fever for a long time, lethargy, and inactivity (Roya-Pabon & Perez-Velez, 2016).

In 2020, 1.5 million people will die from TB (including 214,000 people with HIV). TB is the 13th leading cause of death and the second infectious killer after COVID-19 worldwide. By 2020, eight countries accounted for two-thirds of the total 86% of new TB cases, with India leading the tally, followed by China, Indonesia, Philippines, Pakistan, Nigeria, Bangladesh, and South Africa (WHO, 2021). The number of tuberculosis cases in West Java Province reached 99,398, the highest in Indonesia in 2018 (Hariyani et al., 2020). By 2020, an estimated 1.1 million children worldwide will have TB. The proportion of pediatric TB cases among all cases treated in Indonesia from 2010 to 2018 ranged from 9.4% to 11% (Kementerian Kesehatan Republik Indonesia, 2011). TB in children and adolescents is often overlooked by healthcare providers and is difficult to diagnose and treat (WHO, 2021).

The increase in TB cases is influenced by individual factors. Such as the immune system, nutritional status, personal hygiene, and the density of the residential environment. Housing that does not meet physical requirements will cause health problems. Such as pulmonary tuberculosis. Room area, ventilation, floor construction, and sunlight lighting must meet sanitary needs (Hayana et al., 2020). Research

supports this (Haeruddin et al., 2020) that environmental factors such as occupancy density, ventilation, and inappropriate room temperature can cause pulmonary TB. TB is more easily transmitted to people who live in dense residential areas, lack of sunlight entering the house and less sunlight (Haeruddin et al., 2020).

One of the risk factors for contracting TB is nutritional status. If it is poor, it can cause immune system disorders, thereby increasing the risk of contracting TB. Children with poor nutrition will be thin, weak, and susceptible to TB infection. It is because the immune system is reduced in children. Poor nutritional status can affect the body's response to the formation of antibodies and lymphocytes against disease germs. This formation requires protein and carbohydrate raw materials so that in children with poor nutrition, the production of antibodies and lymphocytes is inhibited (Ren et al., 2019). This study aims to determine the relationship between nutritional status and living conditions with TB incidence in children.

Method

This case-control study was conducted at Bhakti Medicare Sukabumi Hospital from July to December 2019. Research subjects were taken using the purposive sampling method. The number of samples for the case and control groups was 38 samples each. All subjects were diagnosed with tuberculosis based on anamnesis, physical examination, tuberculin skin test, and chest X-ray.

The inclusion criteria for this study were children aged 0-18 years diagnosed with TB. Exclusion criteria for this study were HIV-positive or parental history of HIV, recent contact with a case of active TB, children with long-standing TB who recovered, on treatment with immune-suppressing agents, and patients undergoing long-term systemic corticosteroid therapy (> of six weeks). Determination of nutritional status is carried out based on body weight (BB) according to body length (PB) or height (TB) (BB/PB or BB/TB). The growth chart used as a reference is the 2006 WHO charts for children under five years old and the 2000 CDC chart for children over five years old. For ages above five to 18 years, the growth chart refers to the 2000 CDC, with the 2007 WHO chart not having a weight/TB chart and data from WHO 2007 representing the 1981 NCHS smoothing (Ikatan Dokter Anak Indonesia (IDAI), 2011). Standards for determining ventilation area, humidity, lighting, temperature, occupancy density, and floor type follow the Regulation of the Minister of Health of the Republic of Indonesia No. 1077 (Kementerian Kesehatan, 2011).

Data analysis used the Chi-square test to determine the relationship between nutritional status and living conditions with the incidence of pulmonary TB in children. Residential conditions include ventilation area, humidity, lighting, temperature, occupancy density, and type of floor. Data analysis using SPSS version 25 software. P-value < 0.05 indicates a significant relationship.

Result and Discussion

We recruited 76 samples of 38 TB-positive children (case group) and 38 TB-negative children (negative group). A total of 46 (61%) were aged 0-5 years, and 30 (39%) were 6-18. Most positive TB were aged 0-5 years, each 22 (29%). Children aged 0-5 years are more susceptible to infection because they have immunity that has not yet functioned and developed optimally (Kollmann et al., 2017; Patra et al., 2015). In this study, there was no relationship between age and the incidence of pulmonary TB in children (p=0.639). This result is similar to the study (Yani et al., 2018), which found no relationship between age and the incidence of pulmonary TB in children (p = 0.609).

Table 1. Result of The Study

| Variable | Diagnosis TB (N=76) | | Total n (%) | p-value | OR (95%CI) |
	Negative n (%)	Positive n (%)			
Age (year)					
0-5	24 (32)	22 (29)	46 (61)	0.639	1.247 (0.496 – 3.133)
6-18	14 (18)	16 (21)	30 (39)		
Gender					
Male	22 (29)	19 (25)	35 (46)	0.490	0.727 (0.294 – 1.798)
Female	16 (21)	19 (25)	41 (54)		
Nutritional status					
Severely wasted	1 (1)	0 (0)	1 (1)	0.023	
Wasted	8 (11)	19 (25)	27 (36)		
Normal	29 (38)	19 (25)	48 (63)		
Parental Education					
Did not graduate from high school	11 (15)	12 (16)	23 (30)	0.803	0.883 (0.331 – 2.351)
Graduated from senior high school	27 (36)	26 (34)	53 (70)		
Ventilation Area					
not eligible	23 (30)	31 (41)	54 (71)	0.043	0.346 (0.122 – 0.986)
qualify	15 (20)	7 (9)	22 (29)		
Humidity					
Not qualify	9 (12)	23 (30)	32 (42)	0.001	0.202 (0.075 – 0.545)
qualify	29 (32)	15 (20)	22 (29)		
Lighting					
Not qualify	25 (33)	30 (40)	55 (72)	0.200	0.513 (0.183 – 1.434)
qualify	13 (17)	8 (11)	21 (28)		
Temperature					
Not qualify	32 (42)	28 (37)	60 (79)	0.260	1.905 (0.614 – 5.909)
qualify	6 (8)	10 (13.2)	16 (21)		
Occupancy Density					
Not qualify	23 (30)	23 (30)	46 (61)	1.000	1.000 (0.399 – 2.509)
qualify	15 (20)	15 (20)	30 (39)		
Type of Floor					
Not qualify	3 (4)	0 (0)	3 (4)	0.240	
qualify	35 (46)	38 (50)	73 (96)		

Source: Primary Data, 2019

In this study, there was no relationship between gender and the incidence of TB in children (p=0.490). The male and female sexes had the same percentage in the case group, namely 19 (25%) subjects. In the control group, 22 (29%) were male. These results are similar to studies (Yani et al., 2018) that there is no gender relation with TB incidence in children. However, this result is different from research (Nurjana et al., 2019) which found that male children were most likely to be infected with pulmonary TB 1.6 times greater than females.

Overall, the normal nutritional status was 48 (63%). In the case group, 19 (25%) had less and normal nutritional status. There were no children severely wasted in the case group. Based on statistical analysis, there was a relationship between nutritional status and the incidence of pulmonary TB in children (p=0.023). This result is the same as the research (Hajarsjah et al., 2018; Widyastuti et al., 2021). The first factor that plays a role in the nutritional status of malnutrition is age. Age less than 60 months was associated with significantly more detrimental nutritional status than age over 60 months (Dieu et al., 2017). Nutritional status is related to the risk of suffering from TB (Aibana et al., 2016; Farhadi & Ovchinnikov, 2018; Feleke et al., 2019). Poor nutritional status caused by inadequate dietary

intake can result in low body resistance, making it susceptible to TB germs. Malnourished children are more susceptible to infection due to altered immune responses (Jenum et al., 2014). Nutrition in the perinatal period and early childhood is necessary for the thymus, which has an essential role in the maturation of T lymphocytes (Savino & Dardenne, 2010). Thymic atrophy in malnourished children is associated with increased infant mortality due to infection (Losada-Barragán et al., 2019; Nabukeera-Barungi et al., 2021). Protein-energy malnutrition reduces the size of the thymus and cortical thymocyte apoptosis, changes the microenvironment around lymphoid tissue and epithelial cells, and decreases the hormone production and proliferation of thymocytes (Hajarsjah et al., 2018). Studies show that malnutrition affects genetic expression and immune function, which are predisposing factors for the development of tuberculosis (Stevens et al., 2014). Malnutrition adversely affects the host immune response to mycobacterial infection by impairing various steps of cell-mediated immunity and affecting T lymphocyte function and cytokine production (Bourke et al., 2016; Chandrasekaran et al., 2017; Ibrahim et al., 2017). Therefore, the risk of localized lesions developing into progressive disease increases (Chhetri et al., 2018; Jaganath & Mupere, 2012; Tamara et al., 2022). Research conducted by (Silva et al., 2018) found that people with poor nutrition are nine times more likely to suffer from TB.

The level of education affects the absorption of various information that will result from inactivity in health maintenance (Piirtola et al., 2016). Parents' education levels in the case and control groups were primarily high school seniors, 26 (34%) and 27 (36%). There was no relationship between the education level of parents and the incidence of TB in children (p=0.803). This result is different from research (Apriliasari et al., 2018) that there is a relationship between the level of parental education and the incidence of TB. This could be because, in the study, most of the subject's parents were educated enough or graduated from senior high school.

Overall, both the case and control groups had ventilation areas that did not meet the standards. In the case and control groups, 31 (41) and 23 (30) ventilation areas did not meet the criteria. This study found a relationship between the extent of ventilation and the risk of TB in children (p=0.043). These results are similar to studies (Hayana et al., 2020). Ventilation is beneficial for the circulation of air changes in the house and reduces humidity. Ventilation is where the entry of ultraviolet light. The presence of ultraviolet light can kill TB germs and other germs (Apriliasari et al., 2018; Gwynne & Gallagher, 2018; Martinez et al., 2019). Pulmonary TB transmission generally occurs in a room where, when coughing or sneezing, TB bacteria spreads into the air in the form of phlegm (droplets). It can reduce the number of splashes with ventilation, while direct sunlight can kill the pulmonary TB bacteria. In addition, the level of O_2 needed by the house's occupants is not maintained, and the level of CO_2, which is toxic to the occupants' decreases and cannot free the room air from bacteria, especially pathogenic bacteria. The house must be equipped with ventilation of less than 20% of the floor area with a cross-ventilation system (Kementerian Kesehatan, 2011). When a person with smear-positive TB coughs or sneezes, the bacteria in the phlegm spreads into the surrounding air, and one cough can produce about 3000 sputum sprinkling (Arifin et al., 2020). The area of house ventilation that does not meet the standards can increase exposure to tuberculosis by increasing the concentration of TB bacteria in the household. However, ventilation that meets the criteria will reduce the concentration of TB bacteria, which will decrease TB transmission (Adane et al., 2020; Thanh et al., 2014).

In this study, there was a relationship between humidity and the incidence of pulmonary TB (p=0.001). House humidity in the control group met the requirements of as many as 29 (32%) subjects. Twenty-three (30%) did not meet the appropriate humidity standards in the case group. From the observations during the study, this was because most respondents did not open windows during the day so that sunlight could not enter directly, which resulted in the room in the house becoming dark and becoming humid so that TB germs could survive longer. The humidity value, according

to the health standard, is between 40-80% (Wolkoff, 2018). The results of this study are in line with (Apriliasari et al., 2018) that humidity that does not meet the requirements has a risk of 3 times causing the incidence of TB.

In the case group, 25 (33%) subjects and 30 (40%) subjects in the control group did not meet good lighting standards. The results of the analysis of the lighting level variable showed that there was no relationship with the incidence of pulmonary TB in children (p=0.200). This result is different from the study (Apriliasari et al., 2018). During field observations during the survey, generally lighting that did not meet health requirements was caused by insufficient or even closed ventilation. The sunlight entering the respondent's house is also inadequate. So the incoming light does not meet health requirements. In addition to the ventilation factor, poor lighting conditions can also be caused by the close distance between houses. Sometimes, it is so tight. It causes the incoming light to be blocked by the walls and roof tiles of the house.

Most subjects in the case and control groups had 32 (42%) and 28 (37%). Based on the observations, many respondents' houses have room temperatures of more than 30°C. In the Regulation of the Minister of Health of the Republic of Indonesia, No. 1077/MENKES/PER/V/2011 concerning requirements for indoor air quality related to room temperature that meets the requirements is 18-30°C. Another factor causing the high room temperature in the respondent's house is the building materials and structures used, such as zinc roofing and mild steel made of metal, thus triggering an increase in the indoor temperature of the respondent's house. Statistical analysis showed no relationship between temperature and TB risk in children (p=0.206). M.tb is a bacterium that grows in the range of 25°C – 40°C or mesophilic (Lagier et al., 2015), but bacteria will grow optimally at a temperature of 31°C – 37°C. The room temperature in the house that does not meet the requirements will be a medium for the growth of pathogenic bacteria and can last a long time in the house air; this will be a source of disease transmission, one of which is M.tb bacteria. By heating at 60oC for 15-20 minutes, the M.tb will turn off (Myneedu

& Aggarwal, 2020; Sabiiti et al., 2019). Bacteria in dry phlegm that stick to dust can last longer, 8-10 days (Sabiiti et al., 2019).

Most case and control groups had floor types that met the standards, namely 38 (50%) and 35 (46%). Based on the results of statistical tests, there was no relationship between the type of floor and the incidence of TB (p=0.240). A healthy home must own the element that the house is equipped with a waterproof floor so that the humidity is good. The floor of the house that meets the requirements of a permanent home according to the Indonesian Ministry of Health No. 829/MENKES/SK/IIV/1999, is waterproof and easy to clean (Kementerian Kesehatan, 2011). The floor of a house made of wood or houses on stilts has a minimum floor height requirement of 75 cm from the ground, according to the Ministry of Public Works in 2011. From the observations, the respondent's house with this type of floor uses ceramics, but there are also respondents whose floors are only with cement plaster. The top of the plaster is covered using thick patterned plastic; the use of this plastic is to make cleaning easier. The house with this ceramic floor and cement plaster has a waterproof floor. It is not easily moist to prevent the growth of bacteria on the floor, while the respondent's house, which lives with a wooden house/house on stilts, has met the requirements where the floor height of the house is more than 75 cm from the surface soil.

Most case and control groups had occupancy densities that did not meet the requirements, namely 23 (30%). In this study, there was no relationship between occupancy density and TB in children (p=1,000). This result is similar to the survey (Marquez Id et al., 2020; Seddon et al., 2013). It can be caused because most of the house area is quite large with a small number of family members. Houses that are not too crowded can minimize contact if a family member has TB (Rakhmawati et al., 2019). The occupancy density of a sleeping home that meets the requirements is a minimum bedroom area of 8 meters. It is not recommended to use more than two people sleeping in one bedroom (Kementerian Kesehatan, 2011). Occupancy density will allow household contact, with more intense contact such as those who share the same room/bed with TB sufferers will

be more likely to have more significant and constant exposure to infectious M. TB aerosols (Acuña-Villaorduña et al., 2018). Occupancy density is related to household contacts if family members are positive for active pulmonary TB (Beyanga et al., 2018; Laghari et al., 2019). Close contact will allow the transmission to children, especially if parents suffer from pulmonary TB. Our study has limitations because it did not assess any history of contact between parents or family members with the child.

Conclusion

There is a relationship between nutritional status, ventilation area, and humidity on the risk of TB incidence in children. Further research is needed on other variables or risk factors, such as the history of childhood immunizations, attitudes, and parents' behavior. The results of this study are expected to be information related to taking policies in promotive, preventive, and curative efforts that can be done to reduce the incidence of tuberculosis in children.

Acknowledgments

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Work Accident at Sugar Farmers in Banyumas Regency

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Article Info

Abstract

A work accident is an accidental event in the employment relationship, including diseases of the working relationship, the accident that happened on the way go to work, and coming home in the usual way. Work accidents can be experienced by sugar farmers. In Banyumas Regency, there are about 26.580 Sugar farmers. Based on Kesra Setda Banyumas Regency, from 2017 to November 2019 there were 323 cases of sugar farmers accidents, with 236 disabilities and 87 deaths. The purpose is to analyze the risk factors of work accidents consisting of behavioral and environmental factors. The method is an analytical survey with a cross-sectional approach. The sample was 200 people in Cilongok Districts. Data analysis includes univariate, bivariate, and multivariate. The results show that behavioral factors significantly associated with work accidents are breakfast status ($p = 0,010$) and unhealthy conditions ($p = 0,002$). Environmental factors significant to work accidents are past medical history ($p = 0.000$) and protein adequacy ($p = 0,000$). Recommendations for this research are socialization about the importance of breakfast and paying attention to the body condition before climbing, also training energy consumption diet of protein corresponding to the workload.

Introduction

A work accident is an undesirable event that can cause loss and occurs during working hours and in the workplace. A work accident is an accidental event related to the employment relationship, including diseases that arise because of the working relationship. Similarly, accidents that occur on the way out of the house to go to work and come home to the house through the street an ordinary or reasonable passed and the disease caused by the workplace. There are many working conditions we don't realize are hazardous. These include working very quickly, operating defective, unfamiliar equipment, or handling dangerous substances without training (Commission on Health and Safety and Workers Compensation, 2010).

Based on BPJS employment in Indonesia, in 2019 recorded 114.235 cases of accidents. While in 2020, from January to October, BPJS noted 177.161 cases. As many as 53 are work cause, while 11 are cases of Covid-19. The number of work accidents in Central Java has decreased quite significantly from 2018 to 2019. Disnakertrans of Central Java recorded work accidents in 2019, about 1.468. Down 48% from 2018, as much as 3.083 accidents. Whereas in Banyumas Regency, the number of work accidents in 2020, as much as 1339 events, increased compared to 2019, as much as 928 events.

Work accidents can be experienced by sugar farmers. It is due to the work activity, including those at risk of having an accident. In Banyumas Regency, there are about 26.580 Sugar farmers. Based on Kesra Setda Banyumas Regency, from 2017 to November 2019, there were 323 cases of Sugar farmers accidents, where 236 disabilities and 87 died. Based on research by Ulfah (2016), in Cilongok District, especially in the Village of Pageraji, Langgongsari, and Rancamaya, there are accidents on the Sugar farmers, as many as 94 people (89,5%), of which 94 people. Where 2 people (1.9 percent)

fell from a coconut tree, 66 people (62,9%) slipped, and 26 people (24,8%) other scratched and splashed hot coconut water.

Based on research by Sulong et. al. (2018), the prevalence of work accidents among workers was 9.46%, but underreporting was 39.27%. In general, the findings indicate that the rate of work accidents among the FELDA oil coconut workers was relatively low, but the underreporting was at an alarming rate. Interventions to improve safety and health reporting among workers are crucial to reduce this issue. Hence a further study to identify the predictors for safety and health reporting is recommended.

Based on research by Mohankumar et al (2013), the ergo refined coconut tree climbing device (T2) enhanced the comfort and safety of male subjects with 7.8, 12.2, 10.7, and 20.5% reduction in heart rate, energy expenditure, overall discomfort rating, and body part discomfort score, respectively, and 2.6 and 4.1% increase in overall safety and ease of operation rating respectively when compared to T1. The ergo refined coconut tree climbing device resulted in 20.6% savings in cost and 11.8% savings in time of climbing and harvesting the coconut when compared with T1 mode.

The efforts to prevent work accidents among sugar farmers were actually, programmed by the government of Banyumas Regency in 2013 by offering coconut tree seeds "genjah entok". The type of "genjah entok" is a coconut tree with varieties size relatively short (no more than 2 meters), lots of fruit, and a harvest of 2 to 3 years. Hopefully, this program can minimize the occurrence of accidents. But the program implementation is very difficult for sugar farmers because the type of "genjah entok" should be planted on the soil with the average texture. While in the Banyumas region, most of the plantation land has the ground bumpy texture or hilly (Kesra Setda Banyumas, 2015).

The government of Banyumas Regency also has a benefits program for sugar farmers injured at work, amounting to 5 million rupiahs for fall, have a physical disability, and are unable to work again, and 10 million rupiahs for death. The granting of compensation is managed by the Regional Welfare Section of the Banyumas Secretary Office (Kesra Setda Banyumas). Sugar farmers who had an accident while working can ask for it by showing the Sugar farmers card. Losses due to the accident could not be covered by the compensation fund. Loss of material and non-material experienced sugar farmers not suitable with the compensation fund received. Most of the sugar farmers are the family head. They became the backbone of the family. If an accident occurred, it would result in the economic conditions of the family.

Methods

This study was conducted in Cilongok District, Banyumas Regency, with samples of as many as 200 people who work as sugar farmers. The sampling technique used purposive sampling, with inclusion criteria: sugar farmers willing to be respondents of the study, sugar farmers whose working period is more than 3 years, sugar farmers age is classified as productive between 18 to 40 years old, and the level of education at least primary school. While exclusion criteria: sugar farmers out of the profession as sugar farmers.

The instruments used in this study are questionnaires, checklists, and documentation tools. The first part of the questionnaire contains questions related to the characteristics of the sugar farmers, such as age, gender, education, work period, nutritional status, and knowledge. The second part of the questionnaire contains questions about the use of Personal Protective Equipment (PPE), past medical history, training accidents, breakfast before the climb, rainy conditions, and whether unhealthy conditions still climbing. Data analysis is univariate with a frequency distribution, bivariate with chi-square and multivariate with a logistic regression test.

Results and Discussion

Table 1 The Characteristics of Sugar Farmers in Banyumas Regency

No	Characteristics	Category	Frequency
1	Age	a. Age is not a risk (<40 years)	162
		b. Age-risk (≥40 years)	31
2	Education	a. Pass basic education (Elementary and Junior School)	193
		b. Pass advanced education (High School)	0
		c. Pass of higher education (D3 and S1)	0
3	Gender	a. Male	193
		b. Female	0
4	Work period	a. Long (>10 years)	110
		b. Medium (6-10 years)	62
		c. New (<6 years)	21
5	Nutritional Status	a. Not normal (<18,5) /(≥ 23,0)	109
		b. Normal (18.5 to 22.9)	84

Table 2. The Results of Univariate Analysis

No	Characteristics	Category	Frequency
1	The use of Personal Protective Equipment (PPE)	a. Not use PPE	192
		b. Using PPE	1
2	Past medical history	a. There is no past medical history	164
		b. There is past medical history	29
3	Training occupational accidents	a. Never follow training	169
		b. Follow training,	24
4	Breakfast before climbing	a. No breakfast before climbing	80
		b. Breakfast before climbing	113
5	Rainy condition still climb	a. Does Not climb	107
		b. Keep climbing	86
6	Unhealthy condition still climbing	a. Does Not climb	148
		b. Keep climbing	45

Table 3. The Results of Bivariate Analysis

Variables	Category	Accident					
		Yes	%	No	%	Total (N)	p value
Past medical history	a. There is no past medical history	5	2.6	24	12.4	29	0,000
	b. There is past medical history	4	2,1	160	82,9	164	
Protein adequacy	a. Hyper	1	0,5	0	0	1	
	b. Deficit	3	1,6	77	39,9	80	0,000
	c. Normal	5	2,6	107	55.4	112	
Breakfast	a. Breakfast	9	4.7	104	53.9	113	0,010
	b. Not breakfast	0	0	80	41,4	80	
Unhealthy condition still climbing	a. Does Not climb	3	1,6	145	75,1	148	
	b. Keep climbing	6	3,1	39	20,2	45	0,002
	Number (N)	9	4,7	184	95,3	193	

Table 4. The Results of Multivariate Analysis

No.	Variables	significance Value (p)	Odds Ratio (OR)
1.	Past medical history	to 0.020	0,155
2.	Protein adequacy	0,207	2,479
3.	Breakfast	0,996	0,000
4.	Unhealthy condition still climbing	0,022	5,943

The results showed a significant relationship between past medical history and accidents of falling from trees because of broken stems. In unhealthy conditions, the body's response in performing the work activity is significantly decreased, and alertness is reduced. Those can lead to accidents. The history of chronic diseases suffered can be an aggravating circumstance if the accident occurred.

The history of chronic diseases suffered by Sugar farmers, like complications, gastritis, rheumatism, anemia, and hypertension, allegedly reduce work productivity and can cause accidents. It is in line with the research of Akhtar et al. (2022), which shows a significant relationship between chronic past medical history with the loss of work productivity. Frely et al. (2017) stated that work accidents are influenced by internal and external factors. One of the internal factors that affect the past medical history. In addition, De Sousa Sena et al., (2017) said that workers with a history of Chronic Obstructive Pulmonary (COP) have attendance work more and the quality of work is lower than workers without a history of COP. Adam et al. (2017) said a significant relationship between Chronic Rhinosinusitis with loss of work productivity.

The results showed a significant relationship between protein adequacy with the accidents of the Sugar farmers in Banyumas Regency. It shows that the better the protein adequacy, then it will be the less likely the occurrence of the accident. A significant relationship between protein adequacy and an accident, allegedly caused by a lack of protein adequacy decreasing the work concentration. Miyamoto & Amrein (2017) said that when the glucose level in the blood is low, there will be a glycolysis process. It is regulated by two hormones secreted by alpha and beta cells namely glucagon and insulin. When glucose is low, then glucagon is secreted. When glucagon is secreted, it will break glycogen (the reserves of glucose) in the liver into glucose. In addition, when glycogen is less, then the formation of glucose-dependent enzymes increases the formation of glucose from carbon sources, namely amino acids and lactic acid.

Based on Wang et al. (2022) said that the synthesis ability of glucose from the metabolites is very vital for humans. We consume approximately 140-180 grams of glucose daily. As many as 75% is absorbed by the brain. Body fluids carry about 20 grams of glucose. So, if glucose flows in the blood a little bit, the body produces glucose through the precursor of non-carbohydrates. It is called gluconeogenesis. The effect of using glucose by muscle cells through the glycolysis and gluconeogenesis process is lactic acid. It makes the body tired. Every person who works in tired conditions is risky to cause accidents.

Breakfast habits (p-value = 0,000) significantly correlated with work fatigue that can be a trigger for workplace accidents (Watulinggas et al., 2020). Our findings suggest an association between nutritional variables and work-related accidents. It indicates the need, during the formulation of policies for these kinds of government benefits, to include nutrition aspects to minimize work-related accidents risks. Higher protein intake and physical activity are associated with healthier body composition and cardiometabolic health in Hispanic adults. Higher protein consumption, as a fraction of energy, is associated with a strong, independent, dose-responsive lower risk of incident frailty in older women. Using uncalibrated measures underestimated the strength of the association. Incorporating more protein into the diet may be an intervention target for frailty prevention (Brown et al., 2019).

Based on Yunieswati et al. (2020), worker

nutrition is the implementation of the principles and processes of nutrition for workers. When workers are not well fed, their health is deteriorating, so the risk of work accidents increases, and performance, efficiency, and production capacity are significantly affected by this situation. Researches emphasize that workers whose nutritional status is corrected produce several times more than those whose nutritional status is uncorrected. There is a significant relationship between nutritional status with labor productivity, p-value = 0.020 (Adrianto & Ningrum, 2010). The main reasons for the inadequate and unbalanced nutrition of the workers are; insufficient nutritional education and awareness of workers and employers, insufficient purchasing power, rapid population growth, and negative environmental conditions. The health and safety of the workers are closely related to their intake of quantity and quality of food in accordance with their work.

The results show a significant relationship between breakfast with the accident. A significant relationship between breakfast with the accident because not having breakfast before work leads to a lack of carbohydrates in the body. Carbohydrates as a source of energy to carry out activities. Workers who do not breakfast allegedly experience fatigue, lack of concentration, and carelessness, so still have work accidents.

It is in line with Khanna et al. (2016), stating significant differences in students aged 18-24 years at 3 different universities in Pune, India. Of 119 students who are accustomed to breakfast in the morning, 84 have good concentration, while 87 students who do not use to breakfast in the morning, 81 of them have poor concentration. The student used to breakfast by consuming milk. According to Jenkins et al. (2016), milk contains calcium that can release neurotransmitters. Milk also contains tryptophan, a precursor to serotonin and neurotransmitters needed in psychological processes. Tryptophan is an essential amino acid that can not be synthesized by the body. Increased concentration of tryptophan in the body will increase the release of serotonin, which play a role in cognition, memory, learning, concentration, comfortable, and happiness (Carhart-Harris & Nutt, 2017). It is

in line with Furqaani (2017) stating the effect of physical exercise against brain boosters in children. Physical exercise stimulates the release of tryptophan that stimulates the secretion of serotonin, which can improve memory skills, concentration, and achievement in children (Young, n.d.)

Based on Heo et al. (2021), 11,952 (56.4%) participants consumed breakfast regularly. The prevalence of abnormal metabolic outcomes was higher among those with irregular breakfast consumption habits. Among young male workers, the negative binomial regression analysis showed that unregular breakfast eaters had a higher risk of abnormal metabolic outcomes, after adjusting for covariates.

Based on Yoshikawa et al. (2019), 575 employees across three Japanese worksites, depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (CESD). The frequency of breakfast consumption was categorized into 6 levels. Multi-regression analysis suggested that skipping breakfast was associated with high trait aggression, living alone, and low levels of physical exercise. Logistic regression suggests that skipping breakfast was associated with depression, even after adjusting for potential psychosocial factors, including trait aggression, resilience, physical exercise, fish and fried food consumption, social support, and life events that cannot be ruled out.

The results showed a significant relationship between unhealthy conditions still climbing with the accident. It is allegedly caused by the lack of Sugar farmers' concentration when climbing because of the unhealthy conditions, so Sugar farmers had an accident. It is in line with Celikhisar & Dasdemir Ilkhan (2019), stating a significant relationship between Obstructive Sleep Apnea Syndrome (OSAS) with work accidents at heavy equipment operators. OSAS is a disorder of breathing during sleep that result in disruption of the activity outside sleep. It is caused by obstacles in the upper respiratory tract during sleep. The barriers of the upper respiratory tract are due to impaired movement of the tongue and muscles of the dilators of the airway. In addition, OSAS can be caused by genetic factors (Spicuzza et al., 2015). OSAS is characterized by snoring

and choking during sleep, excessive sleepiness during the day, difficulty concentrating, loss of memory, anxiety, decreased libido, headaches in the morning, and quick-tempered. (Jordan et al., 2014) OSAS leads to disruption of work performance and traffic accidents.

Conclusions

Based on the results, all variables including past medical history, protein adequacy, breakfast, and unhealthy conditions still climbing have a significant relationship with the accident on the Sugar farmers in Banyumas Regency. Recommendations for this research are socialization about the importance of breakfast, paying attention to the body condition before climbing, energy consumption, and a protein diet related to the workload.

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A work accident is an undesirable event that can cause loss and occurs during working hours and in the workplace. A work accident is an accidental event related to the employment relationship, including diseases that arise because of the working relationship. Similarly, accidents that occur on the way out of the house to go to work and come home to the house through the street an ordinary or reasonable passed and the disease caused by the workplace. There are many working conditions we don't realize are hazardous. These include working very quickly, operating defective, unfamiliar equipment, or handling dangerous substances without training (Commission on Health and Safety and Workers Compensation, 2010).

Based on BPJS employment in Indonesia, in 2019 recorded 114.235 cases of accidents. While in 2020, from January to October, BPJS noted 177.161 cases. As many as 53 are work cause, while 11 are cases of Covid-19. The number of work accidents in Central Java has decreased quite significantly from 2018 to 2019. Disnakertrans of Central Java recorded work accidents in 2019, about 1.468. Down 48% from 2018, as much as 3.083 accidents. Whereas in Banyumas Regency, the number of work accidents in 2020, as much as 1339 events, increased compared to 2019, as much as 928 events.

Work accidents can be experienced by sugar farmers. It is due to the work activity, including those at risk of having an accident. In Banyumas Regency, there are about 26.580 Sugar farmers. Based on Kesra Setda Banyumas Regency, from 2017 to November 2019, there were 323 cases of Sugar farmers accidents, where 236 disabilities and 87 died. Based on research by Ulfah (2016), in Cilongok District, especially in the Village of Pageraji, Langgongsari, and Rancamaya, there are accidents on the Sugar farmers, as many as 94 people (89,5%), of which 94 people. Where 2 people (1.9 percent)

fell from a coconut tree, 66 people (62,9%) slipped, and 26 people (24,8%) other scratched and splashed hot coconut water.

Based on research by Sulong et. al. (2018), the prevalence of work accidents among workers was 9.46%, but underreporting was 39.27%. In general, the findings indicate that the rate of work accidents among the FELDA oil coconut workers was relatively low, but the underreporting was at an alarming rate. Interventions to improve safety and health reporting among workers are crucial to reduce this issue. Hence a further study to identify the predictors for safety and health reporting is recommended.

Based on research by Mohankumar et al (2013), the ergo refined coconut tree climbing device (T2) enhanced the comfort and safety of male subjects with 7.8, 12.2, 10.7, and 20.5% reduction in heart rate, energy expenditure, overall discomfort rating, and body part discomfort score, respectively, and 2.6 and 4.1% increase in overall safety and ease of operation rating respectively when compared to T1. The ergo refined coconut tree climbing device resulted in 20.6% savings in cost and 11.8% savings in time of climbing and harvesting the coconut when compared with T1 mode.

The efforts to prevent work accidents among sugar farmers were actually, programmed by the government of Banyumas Regency in 2013 by offering coconut tree seeds "genjah entok". The type of "genjah entok" is a coconut tree with varieties size relatively short (no more than 2 meters), lots of fruit, and a harvest of 2 to 3 years. Hopefully, this program can minimize the occurrence of accidents. But the program implementation is very difficult for sugar farmers because the type of "genjah entok" should be planted on the soil with the average texture. While in the Banyumas region, most of the plantation land has the ground bumpy texture or hilly (Kesra Setda Banyumas, 2015).

The government of Banyumas Regency also has a benefits program for sugar farmers

injured at work, amounting to 5 million rupiahs for fall, have a physical disability, and are unable to work again, and 10 million rupiahs for death. The granting of compensation is managed by the Regional Welfare Section of the Banyumas Secretary Office (Kesra Setda Banyumas). Sugar farmers who had an accident while working can ask for it by showing the Sugar farmers card. Losses due to the accident could not be covered by the compensation fund. Loss of material and non-material experienced sugar farmers not suitable with the compensation fund received. Most of the sugar farmers are the family head. They became the backbone of the family. If an accident occurred, it would result in the economic conditions of the family.

Methods

This study was conducted in Cilongok District, Banyumas Regency, with samples of as many as 200 people who work as sugar farmers. The sampling technique used purposive sampling, with inclusion criteria: sugar farmers willing to be respondents of the study, sugar farmers whose working period is more than 3 years, sugar farmers age is classified as productive between 18 to 40 years old, and the level of education at least primary school. While exclusion criteria: sugar farmers out of the profession as sugar farmers.

The instruments used in this study are questionnaires, checklists, and documentation tools. The first part of the questionnaire contains questions related to the characteristics of the sugar farmers, such as age, gender, education, work period, nutritional status, and knowledge. The second part of the questionnaire contains questions about the use of Personal Protective Equipment (PPE), past medical history, training accidents, breakfast before the climb, rainy conditions, and whether unhealthy conditions still climbing. Data analysis is univariate with a frequency distribution, bivariate with chi-square and multivariate with a logistic regression test.

Results and Discussion

Table 1 The Characteristics of Sugar Farmers in Banyumas Regency

No	Characteristics	Category	Frequency
1	Age	a. Age is not a risk (<40 years)	162
		b. Age-risk (≥40 years)	31
2	Education	a. Pass basic education (Elementary and Junior School)	193
		b. Pass advanced education (High School)	0
		c. Pass of higher education (D3 and S1)	0
3	Gender	a. Male	193
		b. Female	0
4	Work period	a. Long (>10 years)	110
		b. Medium (6-10 years)	62
		c. New (<6 years)	21
5	Nutritional Status	a. Not normal (<18,5) /(≥ 23,0)	109
		b. Normal (18.5 to 22.9)	84

Table 2. The Results of Univariate Analysis

No	Characteristics	Category	Frequency
1	The use of Personal Protective Equipment (PPE)	a. Not use PPE	192
		b. Using PPE	1
2	Past medical history	a. There is no past medical history	164
		b. There is past medical history	29
3	Training occupational accidents	a. Never follow training	169
		b. Follow training,	24
4	Breakfast before climbing	a. No breakfast before climbing	80
		b. Breakfast before climbing	113
5	Rainy condition still climb	a. Does Not climb	107
		b. Keep climbing	86
6	Unhealthy condition still climbing	a. Does Not climb	148
		b. Keep climbing	45

Table 3. The Results of Bivariate Analysis

Variables	Category	Accident					
		Yes	%	No	%	Total (N)	p value
Past medical history	a. There is no past medical history	5	2.6	24	12.4	29	0,000
	b. There is past medical history	4	2,1	160	82,9	164	
Protein adequacy	a. Hyper	1	0,5	0	0	1	
	b. Deficit	3	1,6	77	39,9	80	0,000
	c. Normal	5	2,6	107	55.4	112	
Breakfast	a. Breakfast	9	4.7	104	53.9	113	0,010
	b. Not breakfast	0	0	80	41,4	80	
Unhealthy condition still climbing	a. Does Not climb	3	1,6	145	75,1	148	0,002
	b. Keep climbing	6	3,1	39	20,2	45	
	Number (N)	9	4,7	184	95,3	193	

Table 4. The Results of Multivariate Analysis

No.	Variables	significance Value (p)	Odds Ratio (OR)
1.	Past medical history	to 0.020	0,155
2.	Protein adequacy	0,207	2,479
3.	Breakfast	0,996	0,000
4.	Unhealthy condition still climbing	0,022	5,943

The results showed a significant relationship between past medical history and accidents of falling from trees because of broken stems. In unhealthy conditions, the body's response in performing the work activity is significantly decreased, and alertness is reduced. Those can lead to accidents. The history of chronic diseases suffered can be an aggravating circumstance if the accident occurred.

The history of chronic diseases suffered by Sugar farmers, like complications, gastritis, rheumatism, anemia, and hypertension, allegedly reduce work productivity and can cause accidents. It is in line with the research of Akhtar et al. (2022), which shows a significant relationship between chronic past medical history with the loss of work productivity. Frely et al. (2017) stated that work accidents are influenced by internal and external factors. One of the internal factors that affect the past medical history. In addition, De Sousa Sena et al., (2017) said that workers with a history of Chronic Obstructive Pulmonary (COP) have attendance work more and the quality of work is lower than workers without a history of COP. Adam et al. (2017) said a significant relationship between Chronic Rhinosinusitis with loss of work productivity.

The results showed a significant relationship between protein adequacy with the accidents of the Sugar farmers in Banyumas Regency. It shows that the better the protein adequacy, then it will be the less likely the occurrence of the accident. A significant relationship between protein adequacy and an accident, allegedly caused by a lack of protein adequacy decreasing the work concentration. Miyamoto & Amrein (2017) said that when the glucose level in the blood is low, there will be a glycolysis process. It is regulated by two hormones secreted by alpha and beta cells namely glucagon and insulin. When glucose is low, then glucagon is secreted. When glucagon is secreted, it will break glycogen (the reserves of glucose) in the liver into glucose. In addition, when glycogen is less, then the formation of glucose-dependent enzymes increases the formation of glucose from carbon sources, namely amino acids and lactic acid.

Based on Wang et al. (2022) said that the synthesis ability of glucose from the metabolites is very vital for humans. We consume approximately 140-180 grams of glucose daily. As many as 75% is absorbed by the brain. Body fluids carry about 20 grams of glucose. So, if glucose flows in the blood a little bit, the body produces glucose through the precursor of non-carbohydrates. It is called gluconeogenesis. The effect of using glucose by muscle cells through the glycolysis and gluconeogenesis process is lactic acid. It makes the body tired. Every person who works in tired conditions is risky to cause accidents.

Breakfast habits (p-value = 0,000) significantly correlated with work fatigue that can be a trigger for workplace accidents (Watulinggas et al., 2020). Our findings suggest an association between nutritional variables and work-related accidents. It indicates the need, during the formulation of policies for these kinds of government benefits, to include nutrition aspects to minimize work-related accidents risks. Higher protein intake and physical activity are associated with healthier body composition and cardiometabolic health in Hispanic adults. Higher protein consumption, as a fraction of energy, is associated with a strong, independent, dose-responsive lower risk of incident frailty in older women. Using uncalibrated measures underestimated the strength of the association. Incorporating more protein into the diet may be an intervention target for frailty prevention (Brown et al., 2019).

Based on Yunieswati et al. (2020), worker

nutrition is the implementation of the principles and processes of nutrition for workers. When workers are not well fed, their health is deteriorating, so the risk of work accidents increases, and performance, efficiency, and production capacity are significantly affected by this situation. Researches emphasize that workers whose nutritional status is corrected produce several times more than those whose nutritional status is uncorrected. There is a significant relationship between nutritional status with labor productivity, p-value = 0.020 (Adrianto & Ningrum, 2010). The main reasons for the inadequate and unbalanced nutrition of the workers are; insufficient nutritional education and awareness of workers and employers, insufficient purchasing power, rapid population growth, and negative environmental conditions. The health and safety of the workers are closely related to their intake of quantity and quality of food in accordance with their work.

The results show a significant relationship between breakfast with the accident. A significant relationship between breakfast with the accident because not having breakfast before work leads to a lack of carbohydrates in the body. Carbohydrates as a source of energy to carry out activities. Workers who do not breakfast allegedly experience fatigue, lack of concentration, and carelessness, so still have work accidents.

It is in line with Khanna et al. (2016), stating significant differences in students aged 18-24 years at 3 different universities in Pune, India. Of 119 students who are accustomed to breakfast in the morning, 84 have good concentration, while 87 students who do not use to breakfast in the morning, 81 of them have poor concentration. The student used to breakfast by consuming milk. According to Jenkins et al. (2016), milk contains calcium that can release neurotransmitters. Milk also contains tryptophan, a precursor to serotonin and neurotransmitters needed in psychological processes. Tryptophan is an essential amino acid that can not be synthesized by the body. Increased concentration of tryptophan in the body will increase the release of serotonin, which play a role in cognition, memory, learning, concentration, comfortable, and happiness (Carhart-Harris & Nutt, 2017). It is

in line with Furqaani (2017) stating the effect of physical exercise against brain boosters in children. Physical exercise stimulates the release of tryptophan that stimulates the secretion of serotonin, which can improve memory skills, concentration, and achievement in children (Young, n.d.)

Based on Heo et al. (2021), 11,952 (56.4%) participants consumed breakfast regularly. The prevalence of abnormal metabolic outcomes was higher among those with irregular breakfast consumption habits. Among young male workers, the negative binomial regression analysis showed that unregular breakfast eaters had a higher risk of abnormal metabolic outcomes, after adjusting for covariates.

Based on Yoshikawa et al. (2019), 575 employees across three Japanese worksites, depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (CESD). The frequency of breakfast consumption was categorized into 6 levels. Multi-regression analysis suggested that skipping breakfast was associated with high trait aggression, living alone, and low levels of physical exercise. Logistic regression suggests that skipping breakfast was associated with depression, even after adjusting for potential psychosocial factors, including trait aggression, resilience, physical exercise, fish and fried food consumption, social support, and life events that cannot be ruled out.

The results showed a significant relationship between unhealthy conditions still climbing with the accident. It is allegedly caused by the lack of Sugar farmers' concentration when climbing because of the unhealthy conditions, so Sugar farmers had an accident. It is in line with Celikhisar & Dasdemir Ilkhan (2019), stating a significant relationship between Obstructive Sleep Apnea Syndrome (OSAS) with work accidents at heavy equipment operators. OSAS is a disorder of breathing during sleep that result in disruption of the activity outside sleep. It is caused by obstacles in the upper respiratory tract during sleep. The barriers of the upper respiratory tract are due to impaired movement of the tongue and muscles of the dilators of the airway. In addition, OSAS can be caused by genetic factors (Spicuzza et al., 2015). OSAS is characterized by snoring

and choking during sleep, excessive sleepiness during the day, difficulty concentrating, loss of memory, anxiety, decreased libido, headaches in the morning, and quick-tempered. (Jordan et al., 2014) OSAS leads to disruption of work performance and traffic accidents.

Conclusions

Based on the results, all variables including past medical history, protein adequacy, breakfast, and unhealthy conditions still climbing have a significant relationship with the accident on the Sugar farmers in Banyumas Regency. Recommendations for this research are socialization about the importance of breakfast, paying attention to the body condition before climbing, energy consumption, and a protein diet related to the workload.

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COVID-19 Vaccination Status and Pregnant Women's Perceptions of Pandemic Omicron COVID-19 Wave in Indonesia

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Article Info

Abstract

Pregnant women are susceptible to COVID-19 infection. COVID-19 vaccination protects pregnant women. This study aims to determine their perception of COVID-19 vaccination and its relation to the Omicron Variant wave of the COVID-19 pandemic in Indonesia. This cross-sectional study took time from February to March 2022. Subjects were asked to sign an informed consent and fill out a questionnaire. Demographic data, vaccination status, and perception of the pandemic were collected and statistically analyzed. Of the 361 study subjects, 219 (60%) are vaccinated, and 142 (40%) are unvaccinated. The vaccinated pregnant women were less anxious about the COVID-19 pandemic (p<0.001, OR 2.24). Pregnant women with higher education or those who work were also less anxious about the COVID-19 pandemic (p<0.05; OR 1.58 and OR 1.6). Most unvaccinated subjects were afraid of the vaccine's effects on the fetus (62%). The emergence of the Omicron variant is the most cause of anxiety (38%). The most reason for pregnant women who were not anxious is because they had received vaccination (55%). The COVID-19 vaccination can provide a sense of security for pregnant women facing the COVID-19 pandemic.

Introduction

Developments in the COVID-19 case show that there has been an increase in cases of confirmed COVID-19 pregnant women in some major cities in Indonesia who are in severe condition. Pregnant women have an increased risk of becoming severely ill if infected with COVID-19, especially pregnant women with certain medical conditions. Pregnant women with COVID-19 have a higher risk of developing preeclampsia/eclampsia, severe infections, admission to intensive care units, maternal death, preterm birth, and increased morbidity and mortality in their fetuses compared to pregnant women who are not infected with COVID-19 (Villar et al., 2021). The Working Group on Reproductive Tract Infections of the Indonesian Obstetrics and Gynecology Association (POGI) reported that from April 2020 to April 2021, there were 536 cases of COVID-19 in pregnant women. The Royal College of Obstetrics & Gynecologists (RCOG) reports that more than two-thirds of pregnant women with COVID-19 are asymptomatic. But of those with symptoms, around 5% require intensive treatment and further breathing assistance (Royal College of Obstetricians & Gynaecologists, 2022). Thus, the morbidity and potential mortality caused by COVID-19 in pregnant women should not be underestimated. Especially during the Omicron variant wave period, where the Omicron COVID-19 variant was found to increase the risk of reinfection with COVID-19 through an immune-evasion mechanism (Pulliam et al., 2022). Preventive measures must be taken, such as administering the COVID-19 vaccine to pregnant women.

Several world health agencies have recommended COVID-19 vaccination for pregnant women. Like WHO, on June 2, 2021, it

recommended giving COVID-19 vaccination to pregnant women as long as the benefits outweigh the risks. For example, pregnant women with high exposure to COVID-19 or comorbidities (Goodman, 2021). ACOG (American College of Obstetricians and Gynecologists) also stated that no complications were found in pregnant women or the fetus in pregnant women who received the COVID-19 vaccination (Ghamri et al., 2022). On June 21, 2021, POGI (Indonesian Gynecological Obstetrics Association) issued a recommendation for advocacy on COVID-19 vaccination for pregnant women and children through Focused Group Discussions (FGD) with BKKBN, BPOM, ITAGI, POGI, and IDAI. It is hoped that this advocacy will encourage pregnant women to take part in vaccinations. Considering the increasing number of pregnant women infected with COVID-19 and the high risk for pregnant women if the infection with COVID-19 becomes severe and affects their pregnancy and their babies, efforts are needed to provide COVID-19 vaccinations for pregnant women. The Indonesian government issued a policy on August 2, 2021, to give COVID-19 vaccinations to pregnant women with priority in high-risk areas. Vaccines that can be used for pregnant women are the Pfizer and Moderna mRNA platform COVID-19 vaccines, and the Sinovac inactivated-vaccine platform vaccine, according to availability (Kementerian Kesehatan Republik Indonesia, 2021). The administration of the 1st dose of the COVID-19 vaccination begins in the second trimester of pregnancy, and the 2nd dose is administered according to the interval of the vaccine type. Vaccination will reduce the worries of pregnant women about the COVID-19 pandemic amid the recent increase in cases, especially the new Omicron variant which is believed to transmit more quickly than other variants. Thus, the formulation of the problem in this study is how pregnant women perceive the COVID-19 pandemic and its relationship with COVID-19 vaccination status.

Method

This research is analytical research with a cross-sectional design. This study was conducted on pregnant women in the obstetrics & gynecology outpatient clinic owned by researchers in Medan, Indonesia. This research took time from February to March 2022. This study received information that it had passed an ethical review from the Health Research Ethics Committee, Faculty of Medicine, University of HKBP Nommensen. The target population of the study was pregnant women who had their prenatal check-ups at the private practice of a specialist in Obstetrics and Gynecology in the city of Medan. The reachable population is pregnant women who come to check their pregnancies at the Obstetrics & Gynecology outpatient clinic owned by researchers in Medan, Indonesia. The study inclusion criteria were: pregnant women who had antenatal checks and were willing to be interviewed and signed research consent. The study exclusion criteria were: pregnant women with complications of hyperemesis gravidarum, hypertension in pregnancy, abortion, antepartum hemorrhage, and fetal death in the womb.

Researchers provide explanations to respondents about the benefits and objectives of the study. After explaining the research to be carried out, respondents who were willing to sign an informed consent were asked to sign the informed consent. Respondents who signed informed consent were interviewed and filled out a questionnaire. Researchers collected demographic data such as age, obstetrical status, education level, and employment status. Respondents then filled out the questionnaire by answering questions. Questions on the questionnaire asked about vaccination status, vaccination frequency, and perceptions of being worried or not worried about the COVID-19 pandemic in this Omicron wave. The questionnaire also contains questions about the subject's reasons for not receiving the vaccination, as well as the reasons for choosing the perception of being worried or not worried about the COVID-19 pandemic.

Results and Discussions

A study was conducted on 361 pregnant women with characteristics including age, education, occupation, parity, and gestational age, which can be seen in Table 1. The majority of pregnant women, 317 people (88%), were at a healthy reproductive age, i.e. <35 years,

and there were as many as 44 (12%) who were above healthy reproductive age. The majority of respondents in this study had a higher education level, namely, at least a bachelor's degree or diploma (56%), were not working (52%), were multigravida (54%), and were in their third trimester of pregnancy (55%). Table 1 shows that regardless of vaccination status, education and work have relationships with perceptions of worry about the COVID-19 pandemic (p < 0.05). The odds-ratio results found that pregnant women with higher education are 1.58 times more likely to not worry about the COVID-19 pandemic than pregnant women with low education. Meanwhile, the possibility of working pregnant women not worrying about the COVID-19 pandemic is 1.6 times greater than pregnant women who are not working. No relationship was found between the age of pregnant women, gravida, and gestational age on perceptions of worry about the COVID-19 pandemic (p > 0.05).

Table 1. Respondent's Characteristic

Characteristics	Worried N (%)	Not Worried N (%)	Total N (%)	OR*	95% CI	P-value*
Age						
< 35 years	145 (40%)	172 (48%)	317 (88%)	1.00	(0.339, 1.210)	
35 years	25 (7%)	19 (5%)	44 (12%)	0.641		0.168
Education						
Low	85 (23,5%)	74 (20,5%)	159 (44%)	1.00	(1.040, 2.403)	
High	85 (23,5%)	117 (32,5%)	202 (56%)	1.58		0.032
Work Status						
Working	71 (19,6%)	102 (28,4%)	173 (48%)	1.6	(1.053, 2.424)	
Not working	99 (27,4%)	89 (24,6%)	188 (52%)	1.00		0.027
Gravida						
Primigravida	86 (24%)	81 (22%)	167 (46%)	1.00	(0.918, 2.107)	
Multigravida	84 (23%)	110 (31%)	194 (54%)	1.390		0.120
Gestational Age						
1st Trimester	36 (10%)	40 (11%)	76 (21%)			
2nd Trimester	41 (11%)	46 (13%)	87 (24%)			0.998
3rd Trimester	93 (26%)	105 (29%)	198 (55%)			

*P-value and Odds-Ratio calculation by Chi-square Test.

Table 2 shows the frequency of the respondents' COVID-19 vaccinations in this study. A total of 219 respondents (60%) had been vaccinated against COVID-19, and 142 respondents (40%) had not received the vaccination. Of all study respondents, 40 people (11%) had received the first dose of vaccination, 167 people (46%) had received complete vaccination twice, and 12 people (3%) had received a booster.

The respondents' reasons for not being vaccinated against COVID-19 are shown in Figure 1. Most pregnant women (62%) are afraid of the dangers that the vaccine poses to the fetus they contain. As many as 31 people (22%) of pregnant women have difficulty adjusting their schedule to be vaccinated. Meanwhile, other reasons for not being vaccinated include comorbid/other diseases in the mother (9%), no notification (5%), and fear of the dangers of vaccines in the mother (2%).

Table 2. Respondent's COVID-19 Vaccination Frequency

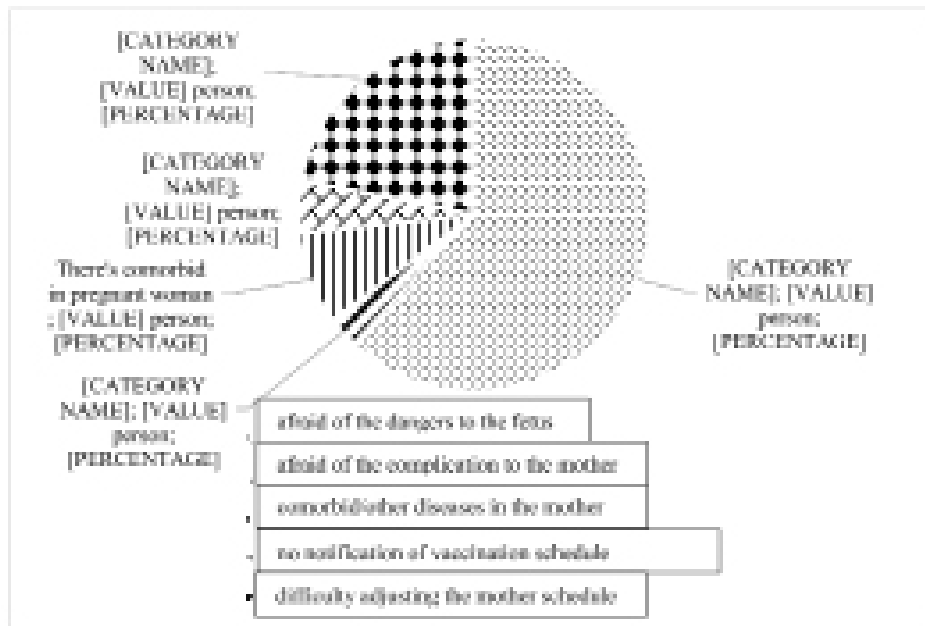| Vaccination Frequency	N	%
Not yet	142	40
I	40	11
II	167	46
III	12	3
Total	361	100

PICTURE 1. Reasons of COVID-19 Unvaccinated Respondents

Table 3 shows that 219 (60%) pregnant women have been vaccinated against COVID-19, and 142 (40%) have not been vaccinated against COVID-19. From the group that had received the COVID-19 vaccine, 133 people (36%) were not worried about facing the current pandemic, while 86 people (24%) were worried. From the group that had not been vaccinated, 58 people (17%) felt not worried, and as many as 84 people (23%) felt worried

about the current pandemic. From this data, a significant relationship was found between vaccination status and perceptions of worry about the COVID-19 pandemic (p < 0.001). The statistical test obtained an odds-ratio value of 2.24. It means pregnant women who have been vaccinated against COVID-19 are 2.24 times more likely than pregnant women who have not received the COVID-19 vaccination.

Table 3. Distribution of Perception to Vaccination Status

Characteristics	Worried N (%)	Not Worried N (%)	Total N (%)	OR	95% CI	P-value
Has been vaccinated	86 (24%)	133 (36%)	219 (60%)	2.24		
Has not been vaccinated	84 (23%)	58 (17%)	142 (40%)	1.00	(1.456, 3.446)	< 0.001
Total	170 (47%)	191 (53%)	361 (100%)			

As many as 170 (47%) of respondents were worried about the COVID-19 pandemic. Respondents' reasons for choosing the perception of worry are presented in Figure 2. In the group that had received the vaccine, the most common reason for worry was the presence of the Omicron variant (38%), followed by fear of exposure (37%). In the unvaccinated group, the most common reason for worry was

because they had not been vaccinated (38%), followed by fear of exposure (31%). While overall, the most reasons to feel worried were fear of exposure (34%), the presence of new variants such as Omicron (26%), the condition of respondents who were pregnant (17%) and had not received the COVID-19 vaccination (14%).
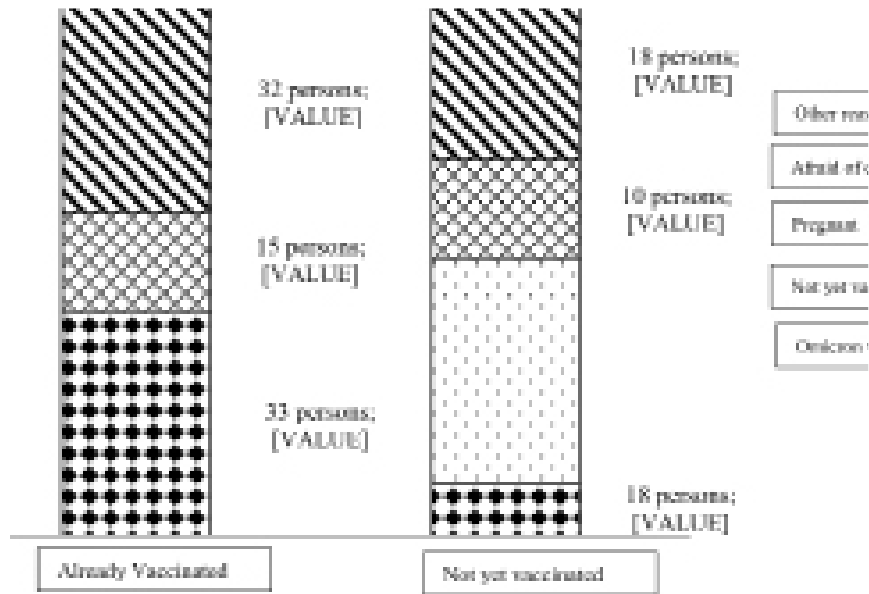
PICTURE 2. Reasons of Pregnant Woman Choose Worry Perception

As many as 191 (53%) respondents felt they were not worried about the COVID-19 pandemic. Respondents' reasons for choosing not to worry about the COVID-19 pandemic are presented in Figure 3. Of the group who had the vaccine, the most reasons for not worrying were because they had been vaccinated (38%), had implemented health protocols (9%), and surrendered to God (8). %). From the group that had not been vaccinated, the most reasons for not worrying were surrendering to God (10%), trying to maintain health (8.5%), and following health protocols (6%). Overall, the most reason not to worry is that they have been vaccinated against COVID-19 (38%). Other reasons in order were surrendering to God (18%), implementing health protocols (15%), maintaining health (14.5%), getting used to it because they had been through the COVID-19 pandemic for a long time (11%), and had had previously been infected with COVID-19 (3.5%).

Picture 3. Reasons of Pregnant Woman Choose Not to Worry Perception

To the authors' knowledge, this study is the only one assessing the relationship between COVID-19 vaccination status and perceptions of the COVID-19 pa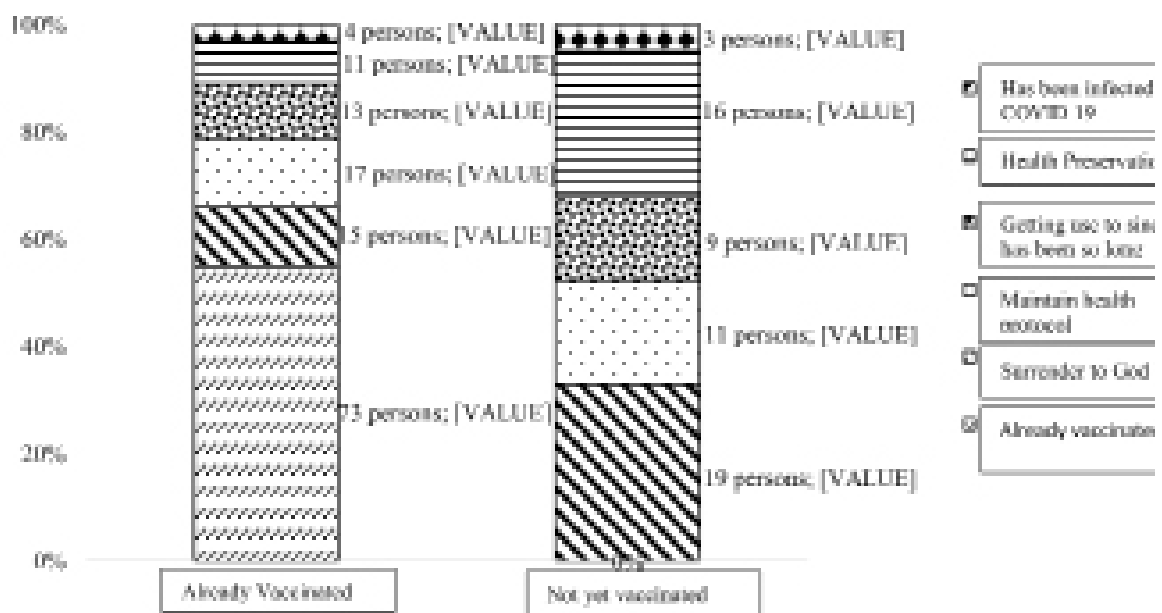ndemic in pregnant women visiting private obstetrics & gynecology practices for antenatal check-ups when cases of the Omicron variant were infecting Indonesia and continues to experience an increase, namely in February - March 2022.

This study finds a relationship between education and perceptions of worry about the COVID-19 pandemic (p <0.05), and an odds-ratio value of 1.58. In other words, it is 1.58 times more likely that pregnant women with a high level of education are not worried about the COVID-19 pandemic than pregnant women with a low level of education. The education level can be linked to a good literacy level so that respondents with a higher level of education will have a better understanding of health protocols, the benefits of vaccinations, and other ways to stay safe during the COVID-19 pandemic. It is per studies in China found that a higher level of education indicates better knowledge about COVID-19. Respondents with higher levels of education are also more aware of fake news about the COVID-19 pandemic, so they are less worried (Zhong et al., 2020). This research is also in line with research in Malaysia that the level of tertiary education, namely at the university level or equivalent, is significantly related to the mother's level of knowledge about the COVID-19 pandemic, so it is also related to positive perceptions of the COVID-19 pandemic (Syed Anwar Aly et al., 2021).

The level of knowledge about COVID-19 vaccination can be caused by a lack of information obtained by pregnant women about the importance of the COVID-19 vaccination or the many hoaxes circulating in the community that cause misinformation. Different educational backgrounds, varied environments, and receiving various messages are certainly opportunities for spreading fake news regarding the COVID-19 vaccine. Knowledge is a process that occurs after an individual sense a particular object. Most individuals' sense is obtained through the eye and ear, namely through seeing and hearing. Knowledge can also be obtained through experiences and learning processes in formal and informal education.

One of the information sources playing a vital role in knowledge is the mass media. Information conveyed through the mass media that describes the common reactions that occur after the COVID-19 vaccination includes pain or redness around the injection site, itching, mild fever, fatigue, drowsiness, headache, and muscle aches are common reactions and only last less than a week and not a barrier to vaccination. It is necessary to encourage various socializations, both through various types of media and directly by health workers or other parties who have competence regarding the importance of providing a calm sense about the COVID-19 vaccination in pregnant women.

This study also found a significant relationship between employment status and perceptions of worry about the COVID-19 pandemic (p<0.05) and obtained an odds-ratio value of 1.6. It indicates that the possibility of pregnant women who work not worrying about the COVID-19 pandemic is 1.6 times greater than pregnant women who do not work. By studies in several other populations, work status is related to the level of knowledge about COVID-19 so that they follow health protocols properly and generate positive perceptions or are not worried about the COVID-19 pandemic (Al-Hanawi et al., 2020; Zhong et al., 2020).

Of all respondents, 219 (60%) pregnant women had received the COVID-19 vaccination. As many as 40 people (11%) had received the first dose, 167 people (46%) had received complete vaccination twice, and as many as 12 people (3%) had received a booster dose. The Ministry of Health of the Republic of Indonesia previously permitted COVID-19 vaccination for pregnant and lactating women in Indonesia on August 2, 2021, due to increased morbidity and mortality due to COVID-19 in this population (Sarwal et al., 2021). The data for this study were collected in February - March 2022, about 6-7 months after the issuance of a circular letter from the Ministry of Health of the Republic of Indonesia to vaccinate COVID-19 in pregnant women. So that the subject has been exposed for quite a long time to information and outreach regarding the COVID-19 vaccination on pregnant women. Research in England showed that two months

after the recommendation was issued to give COVID-19 vaccination to pregnant women by the JVCI (Joint Committee on Vaccination and Immunization), only around 28.5% of pregnant women received at least one dose of COVID-19 vaccination. Thus, time is needed to provide information and outreach to pregnant women regarding the safety of the COVID-19 vaccine and data regarding the vaccine efficacy to increase vaccination coverage (Blakeway et al., 2022).

As many as 142 people (40%) of the respondents had not received the COVID-19 vaccination. Most respondents (62%) did not receive the COVID-19 vaccination because they were afraid of the danger the vaccine would pose to the fetus they were carrying. There were 31 people (22%) pregnant women who had difficulty getting the opportunity to be vaccinated. A study in France on 664 pregnant women in February – April 2021 also explained that the most common reason pregnant women did not want to be vaccinated was fear of side effects of the COVID-19 vaccine on their fetus (76.9%) and on themselves (33.8%) compared to the fear of the COVID-19 infection itself (Egloff et al., 2022). A meta-analysis study involving 40,978 pregnant women stated that COVID-19 vaccination in pregnant women was not associated with adverse fetal outcomes such as abortion, stillbirth, low birth weight babies, or fetal death (Ma et al., 2022). Thus, it is necessary to provide education and socialization that the COVID-19 vaccination is safe for pregnant women, thereby increasing the coverage of COVID-19 vaccination in pregnant women.

The data analysis found a relationship between vaccination status (already or not) and perceptions of the COVID-19 pandemic (worried or not worried) with ($p < 0.001$). In other words, respondents who had received COVID-19 vaccination felt significantly less worried about the pandemic compared to those who had not. A study on the American adult population from December 2020 to March 2021 showed that receiving one dose of the COVID-19 vaccine could improve the mental status of respondents, such as reducing the prevalence of depression and anxiety in respondents (Perez-Arce et al., 2021). So, with

the decreased anxiety in pregnant women, because they have received the COVID-19 vaccination, it is in line with the results of this study that the COVID-19 vaccination can create a sense of security for pregnant women in dealing with the COVID-19 pandemic.

Overall, the most common reasons for pregnant women to feel worried were fear of exposure (34%), the existence of new variants such as Omicron (26%), the condition of respondents who were pregnant (17%), and had not received the COVID-19 vaccination (14%). The perception of worry about facing the COVID-19 pandemic is found in both. Those who have received vaccination and those who have not. In the group that had received the vaccination, the most common reason for worry was the presence of the Omicron variant (38%), followed by fear of exposure (37%). It shows that the increase in cases of the new Omicron variant is very troubling for pregnant women. As reported by the Ministry of Health of the Republic of Indonesia on February 21, 2022, there were already 5,277 cases of the Omicron variant of COVID-19 in Indonesia at that time. This fact is confirmed by the understanding that the Omicron variant spreads quicker than the previous variants and affects groups of people, families, and communities.

The Omicron variant has also become a problem in several other countries from late December 2021 to early 2021. A COVID-19 study in England from December 2021 to January 2022 stated that more than 90% of subjects infected with COVID-19 were infected with COVID-19 variants of Omicron BA.1 or BA.2 (Chadeau-Hyam et al., 2022). Meanwhile, on 15 February 2022, WHO stated that of the 432,470 specimens collected from mid-January to mid-February 2022 from around the world, 98.3% of the Omicron variants of COVID-19 were obtained (World Health Organization, 2022). Apart from its faster transmission ability, it is also stated that the Omicron variant is more likely to cause reinfection than the previous COVID-19 variant. The risk of reinfection was 1.7 times higher in November 2021, when Omicron was circulating in South Africa, compared to the first wave of the pandemic in early 2020 (Pulliam et al., 2022). So this further supports the reasons pregnant women

are worried about the Omicron variant of COVID-19.

In addition, a cause of concern for pregnant women is fear of exposure. If exposed, it will be susceptible to vertical infection from mother to child (Saccone et al., 2020). A study in Pakistan also stated that vertical transmission of infection from mother to baby is the main factor for high levels of anxiety (Hossain et al., 2020). Although in-utero infection and vertical transmission of COVID-19 seem rare, infection in pregnancy can increase the risk of preeclampsia, premature birth, low birth weight, or infant death (Kotlyar et al., 2021). Overall, the most reason for pregnant women not to worry is because they have been vaccinated against COVID-19 (38%). Other reasons in order were surrendering to God (18%), implementing health protocols (15%), maintaining health (14.5%), getting used to it because they had been through the COVID-19 pandemic for a long time (11%), and had had previously been infected with COVID-19 (3.5%).

The perception of not worrying about the COVID-19 pandemic was found in the vaccinated group of 133 (70%) respondents and 58 (30%) who had not received the vaccination. Perceptions are not worried more in the group receiving the COVID-19 vaccine because they had received the vaccine (38%). It is in line with one of the results of this study that pregnant women who have received vaccination are less worried about the COVID-19 pandemic than those who have not been vaccinated (p<0.05). This finding further strengthens that vaccines give pregnant women a sense of security and calm in the face of the current COVID-19 pandemic. Individuals who have been vaccinated feel secure and believe in reducing the possibility of mortality due to COVID-19 infection (Singh & Jaswal, 2020). This reduction in stress and worry levels significantly dropped even after the first dose of the COVID-19 vaccine.

In the group that had not received the vaccination, 58 people (30%) feel not worried about facing the COVID-19 pandemic, even though there was an increase in the new Omicron variant. Most mothers stated that their reasons for not worrying were surrendering to God's

will (10%) and maintaining their health (8.5%). A study in Iran found concerning perceptions of COVID-19, where research subjects believed that life and death are in God's hands, so humans do not need to worry about contracting the COVID-19 virus (SoleimanvandiAzar et al., 2021). There is a tendency for a small group of people to feel that this pandemic is an ordinary respiratory infection that is nothing to worry about and does not need a vaccine. Others believe that following health protocols, eating healthy food, exercising diligently, and taking supplements will prevent COVID-19 infection. Little knowledge about disease and health guidelines is one of the individual factors reason for the lack of preventive measures for COVID-19 infection (Liem et al., 2020). Thus, some people believe that COVID-19 is an ordinary respiratory infection and don't need to worry. There needs to be more education and outreach to the community so that they become more compliant with health protocols and are aware of the dangers of COVID-19 infection.

Conclusion

From this study, we confidently conclude that vaccination provides a sense of security for pregnant women facing the COVID-19 pandemic, especially during the Omicron variant of COVID-19 in Indonesia in February-March 2022.

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Directly Observed Treatment for Iron Tablet Supplements Consumption Among Female Senior High School Students

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Article Info

Abstract

Anemia is one of the reproductive health problems in adolescents. The incidence of anemia is still high in Indonesia. Supplementation of Iron tablets per week is one of the policies to decrease the anemia incident. This study aims to determine the effectiveness of the implementation of Directly Observed Treatment (DOT) for Iron Tablet Supplements. Consumption was observed in high school students for 12 weeks. This study was a quantitative study with a quasi-experimental design, with the experiment group being peers as DOT and the control group being guidance counseling teachers. This research was conducted from July to October 2019 in Sleman and Bantul. Samples used for both groups were 70 respondents. Data analysis used univariate and bivariate. The results of this study showed that the incidence of anemia for both groups was still high at 51.4% before giving the iron tablets to 34.3% after the tablets were given. The implementation of DOT in the consumption of iron tablets in the teacher group showed non-adherence to drinking iron tablet only 2.9% and by peers up to 31.4%. Observed by the teacher showed an effect on the difference in Hemoglobin levels before and after treatment with $p=0.037$ and peer as observed with $p=0.247$.

Introduction

Adolescents are estimated 1.2 million worldwide. In some countries, the proportion of adolescents is almost a quarter of the total population (WHO, 2019). Adolescence is the most vulnerable period of life for reproductive health problems such as anemia. The incidence of anemia is still high. Based on Riskesdas 2018 showed that the prevalence of anemia among females adolescents more than 15 years old is about 48.9% (Indonesian Ministry of Health, 2018).

Female adolescents are the vulnerable groups to nutritional deficiencies, including anemia. Anemia among females can cause by heavy blooding during menstruation. Female adolescents with anemia are at risk of developing anemia during pregnancy. It is a negative impact on the growth and development of the fetus during pregnancy and potential to cause complications in pregnancy and labor, even causing maternal and neonatal death. The Maternal Mortality Rate (MMR), according to the 2015 Inter-Census Population Survey, is 305 per 100.000 live births and the major causes of maternal death are pre-eclampsia and eclampsia (32.4%) and postpartum hemorrhage (20.3%). A previous study suggests that severe prenatal anemia increases postpartum hemorrhage risk (Omotayo et al., 2021).

Anemia among pregnant women was related to did not prenatal take iron supplementation (Derso, Abera and Tariku, 2017). In the baby, no consumption of iron tablets is related to low birth weight (Oktriyanto et al., 2022). Therefore, it is necessary for female adolescents aged 12-18 years to consume iron supplementation to prevent anemia in adolescents as preparation to prevent anemia in the future during pregnancy and childbirth (Ministry of Health, 2016).

The agreement between UNICEF

(United Nations Children's Fund) and UNFPA (United Nations Fund for Population Activity) as well as WHO on adolescent reproductive health 1989, stated that efforts to solve adolescent health problems were needed. This period is commonly crucial, considering that adolescence is a process of physical, psychological, and behavioral changes that highly affect the health status of adolescents. It is also known that during this period, there is a deficiency of several essential nutrients in adolescents, and most of them occur in developing countries (Patil, Wasnik and Wadke, 2009).

WHO recommendations in 2011 regarding anemia prevention among adolescents focused on promotion and prevention activities, such as increasing the consumption of iron-rich foods, supplementing iron supplement tablets, and increasing the fortification of foodstuffs with iron and folic acid. Professionals and the private sector are expected to contribute to supporting these comprehensive activities. The success of prevention and control of anemia among female adolescents requires SMART (Specific, Measurable, Attainable, Relevant, Timely) management support. Behavior change intervention starts by providing rules or guidelines and information education and communication (IEC) (Ministry of Health, 2016).

Previous studies showed some problems related to the consumption of iron tablets among female adolescents. For example, a study in Iran reported that 24.6% of adolescents didn't consume the iron tablets. Some reasons given 41% said they forgot, 28.2% gave reasons related to the side effects they felt, and several other reasons (Nikfallah et al., 2017). A previous study in India also reported that female adolescents that the adherence to consume iron tablets was still low. For 6 months, it was found that adherence to iron tablets consumption is as much as 36.3% of female adolescents (V. and Jacob, 2017). The low adherence to iron tablets consumption requires strategy. The concept of DOT is known in the consumption treatment for TB and ARVs therapy for patients. DOT or an accompanying person/'buddy' is a strategy that will likely be a component of any comprehensive HIV program.

Family and friends can play the role of 'buddy' and may be enough to provide needed support to improve adherence, optimize clinical and social outcomes and minimize drug resistance and stigma (Reid, Reid and Vermund, 2004).

DOT is also the effective TB control policy recommended by the World Health Organization (WHO). Implementing DOT is the best strategy to scale up CB-DOT in low-to-middle income countries with high TB burdens because it is cost-effective and acceptable (Zhang et al., 2016). The previous disease, such as Tuberculosis and HIV treatment, proved DOT was considered effective (Hassard, Ronald and Angella, 2017). Previous studies found that the DOT intervention was effective in increasing adherence to taking medication. In this study, the concept of facilitation for the consumption of iron tablets is school-based. The purpose of implementing DOT for iron tablet supplementation was to change the behavior, which is expected to change the knowledge and attitudes of students so they will consume iron tablets as recommended. Giving iron tablets in schools, the involvement of companions is from friends and teachers (Ministry of Health RI, 2016).

The role of friends/peers is considered vital based on the results of previous research. The role of peers/friends is very important in providing information to adolescents and also as an accompanying person for remembering the iron tablet consumption. This study also states that the delivery of information about reproductive health by the peer group in three meetings can increase reproductive health knowledge (Lestari, no date; Huriah, T; Nisma, 2008). Other studies also prove that peer education is an effective method for adolescents. Peer education can increase the average score before and after the intervention for adolescent knowledge and attitudes about reproductive health (Sriasih, 2013; Hatami, Kazemi and Mehrabi, 2015). Other research showed that school-based healthcare in adolescent sexual, reproductive, and mental health is very effective. The teacher's role is very vital in this program (Hull, Hasmi and Widyantoro, 2004). This study aims to know the effectiveness of the implementation of DOT for iron tablet supplementation among senior high

female students by peer educators and guidance counseling teachers on adherence to iron tablets consumption to increase hemoglobin levels among female adolescents in senior high school students in Yogyakarta.

Methods

This study is a quantitative study with a quasi- experimental nonequivalent control group design. The treatment group was DOT for iron tablets through the peer educator and the control group was DOT for iron tablets through the teacher. This study was to determine the effectiveness of DOT for iron tablets in increasing hemoglobin levels among female adolescents. This research used behavioral science according to the Procede Precede theory approached (Green, 2000).

This study investigated the DOT for iron tablets on increasing the Hemoglobin levels of high school students after being given iron tablets with the brand Fermia consisting of Fumarate 60 mg, Folic acid 0.25 mg, and Vitamin B6 37.5 mg. DOT implementation by peer and teachers. Peers and teachers were given 12 tablets and a control card, for each respondent. These buddies/ accompanying persons have been trained using the same module. This research took place at SMA 1 Gamping Sleman and SMA 1 Kasihan Bantul from July to October 2019. Ethical clearance for this study from the ethical committee of Poltekkes Kemenkes Yogyakarta No. e-KEPK/ POLKESYO/0101/V/2019.

The sample in this study was calculated by Lemeshow, as many as 35 for each treatment group, resulting in 70 respondents. The inclusion criteria in this study were students who were willing to be respondents and to be treated and signed the agreement after the explanation. While the exclusion criteria in this study were students who did not take the hemoglobin levels. The hemoglobin level measurement is by a digital measuring device. Both in the pre and post-tests. The treatment was carried out for 12 weeks. The analysis used is univariate and bivariate. The variables in this study include the income of parents divided by < Index and > Index, Body Mass Index (Thin, Normal and Fat), and adherence to iron tablets consumption are categorized as obedient if students consume all iron tablets and disobedient if students do not consume all iron tablets as many as 12 tablets iron tablet were written according to the notes in the control book.

Results and Discussion

The research was conducted on XI grade students at SMA 1 Gamping Sleman in the role of peer educator and SMA 1 Kasihan Bantul as the rule of the experiment group. These two schools have not been programmed for iron tablets from the government at the time of the research. In this study, a peer and teacher give 1 tablet to female students every week. In practice, the teacher assists by asking students to drink iron tablets in front of the teacher, and then the teacher fills it in the control book. Meanwhile, the peer gives it to his friend and gives him the freedom to drink at that time or before going to bed to be more comfortable with the side effects. This study was followed by 70 respondents. They had signed the consent and also their parents/guardians. This research took 12 weeks, from July to October 2019. The age range of the respondents was 15-17 years. The largest age group is 16 years (81.4%).

Table 1. Frequency Distribution of Respondents in the Two Research Groups

Variables	Experiments/Peers		Counseling Control/Teacher	
	n	**%**	**n**	**%**
Parent's income				
<Index	12	34.3	9	25.7
≥ Index	23	65.7	26	74.3
BMI				
Thin	6	17.1	4	11.4
Normal	20	57.1	20	57.1
Fat	9	25.7	11	28.6

Source: Primary data, 2019

Table 1 describes the proportion of the income of the respondent's parents, which is also the majority more than the minimum wage in each district. Most respondents also have a BMI in the normal category, which is 57.1%.

Table 2. Distribution of the Frequency of Anemia in the Pre and Post Test in Each Study Group

Variables	Peers		Counseling guidance teacher	
	n	%	n	%
Pre-Test				
Anemia				
Yes	10	28.6	18	51.4
Not	25	71.4	17	48.6
Post-Test				
Anemia				
Yes	10	28.6	12	34.3
Not	25	71.4	23	65.7
Iron tablet compliance				
Disobedient <12	11	31.4	1	2.9
Obedient (12)	24	68.6	34	97.1

Source: Primary data, 2019

Table 2 shows that before treatment there was a difference in the proportion of anemia. In the peer group, the incidence of anemia was 28.6%, while in the teacher group, the incidence of anemia was higher at 51.4%. After 12 weeks, this research showed that the proportion of anemia in the peer group remained at 28.6%, while in the teacher mentor group, the incidence of anemia decreased up to 34.3%. Compliance with taking iron tablets was seen from the number of iron tablets consumed based on the respondents' answers recorded in the control book. The results showed that some of the companions who drank iron tablets were obedient to drinking 12 items given one item per week at 68.6%. Those who were accompanied by teachers were 97.1%. Compliance was lower in the peer compared to the teacher group. Where adherence was very high or almost all of the iron tablets given were consumed by students.

Table 3. Analysis of the Pair t Test of the Difference in Hb Levels before and After the Study in the 2 Research Groups

Groups		Mean	95% CI		t	p
Peers	HB_pre	12.6886	-.16553	.62267	1.179	.247
	HB_post	12.4600				
Counseling guidance teacher	HB_pre	12.0343	-.84581	-.02847	-2.174	.037
	HB_post	12.4714				

Source: Primary data, 2019

Table 3 showed that in the peer group, there was no difference in hemoglobin levels before and after the study with p-value = 0.247. Meanwhile, in the teacher group, there were differences in HB levels before and after treatment with p-value = 0.037.

Table 4. Analysis of the Difference in Hb Levels Before and After the Study in the 2 Research Groups

Variable	Difference in Hb Levels				
	N	Mean	Levens's test	t	p
Research Group					
Peers	35	-0.23	0.459	-2.383	0.020
Teacher	35	0.44			

Source: Primary data, 2019

Table 4 shows that statistically, the difference in Hb data is homogeneous data as indicated by lavender's test with the result of 0.459. In the bivariate analysis, it was proven that there was an effect of giving iron tablets with the difference in hemoglobin levels for 12 weeks with p-value = 0.020. Anemia is mostly experienced by young women, who are a population group prone to nutritional deficiencies, especially iron deficiency. During adolescence, physiological demands increase to accommodate rapid growth and development. Adolescent girls and women (10 to 19 years), in particular, are at increased risk of iron deficiency owing to menstrual blood loss and increased requirements during pregnancy for maternal metabolism and fetal growth (Finkelstein et al., 2018). The results also showed that the anemia rate was still commonly high, namely 28.6% in the case group and 51.4% in the control group. These data support data on the high prevalence of anemia in Indonesia. Anemia has many consequences, including low IQ in children and adolescents (Kusmiyati, Meilani and Ismail, 2013; Ministry of Health, 2016).

Adolescent girls as a vulnerable group require supplementation of iron tablets containing at least 60 mg of elemental iron and 400 mcg of folic acid. This program is carried out throughout to optimize the prevention of anemia. In this study, iron tablet consumption for 12 weeks had a statistically significant effect on changes in adolescent Hb levels before and after the study. This result refers to the policy of the government of the Republic of Indonesia, which is to give iron tablets to adolescent girls aged 12-18 years one tablet per week to prevent anemia (Indonesian Ministry of Health, 2016).

Nevertheless, other studies showed no increasing hemoglobin levels in iron tablet consumption. This study refers to the result of the peer groups. But the previous data that the peer groups had fewer tablets compared to the teacher groups. So, that's better than the recommendation. Iron tablets should be given throughout the year and consumed per a week (Soekarjo et al., 2004; Ministry of Health, 2016; Jalambo et al., 2018).

In addition to consuming iron tablets, to prevent anemia is recommended to increase iron consumption and fulfill balanced nutrition. The most common cause of anemia is iron deficiency and folic acid deficiency due to an imbalance in nutritional intake and inadequate food intake, both in terms of pattern and nutritional quality food (Helliyana, Aritonang and Sanusi, 2019). Increasing the consumption of iron-rich foods is a strategy for dealing with anemia (Seaharattanapatum et al., 2020). Iron can be obtained from the consumption of healthy foods such as shrimp, liver, red meat, shellfish, green vegetables, etc. (Mansour, Hofmann and Gemzell-Danielsson, 2021). A previous study in 2020 showed that consumption of 200 mg/day long bean leaf extract in combination with iron supplementation for 14 days improved hematological status as indicated by an increase in hemoglobin levels, hematocrit, and erythrocyte counts (Nurjanah, Hadisaputro and Fatmasari, 2020). A balanced nutritional diet and iron supplementation help to treat anemia and reduce the risk of complications (Mishra et al., 2021).

Several studies state that iron consumption can be accompanied by the consumption of vitamin C or vitamin C supplementation. Vitamin C intake can be sourced from several food ingredients, especially vegetables and fruits such as guava, oranges, tomatoes, and several other sources (Mansour, Hofmann and Gemzell-Danielsson, 2021). A high intake of vitamin C has an effect

on the absorption of iron intake in the body. Another study stated a significant relationship between vitamin C intake and Hb levels. Vitamin C intake affects hemoglobin levels in young girls (Wahyurin and Rahmah, 2021).

This study showed that adherence to iron tablets consumption is better in the guidance counseling teachers group compared to the peers' group. The proportion of non-compliance with drinking iron tablets in the peer group was 31.4%. This result showed that the teacher's role is more than pursuing but also controlling and accompanying the students at the time they consume the iron tablet. And as a friend, peers feel more comfortable and close, and not to give the compulsion to consume the iron tablet. Peers only share the iron tablets and ask their friends to drink as soon as possible or at night if they have any doubts or side effects. The peers only record in their notebooks even their friends deny consuming iron tablet in front of them. Peers cannot replace teachers in their role of providing knowledge about reproductive health and also in this role as DOT for iron tablet consumption. Teachers have a vital role in the world of education. It is because teachers interact directly with students in providing education. Adolescent Reproductive Health Education by teachers is an effort to address student reproductive health problems (Pit-Ten Cate et al., 2018).

Conclusion

There is an effect of consuming iron tablets for 12 weeks on hemoglobin levels before and after treatment. The role of the guidance and counselor teacher cannot be replaced by the presence of a peer so these two roles can be carried out together to be more optimal. Consumption of iron tablets is very vital for female adolescents. Directly Observed Treatment (DOT) as a "buddy" or companying person is needed to bring this program successful. The involvement of the formal sector, such as schools, is very vital, including teachers and synergizing with peers, as well as the role of parents in reducing the incidence of anemia.

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Determinants of Unplanned Pregnancy in Married Women in North Sumatra Province

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Article Info

Abstract

Unplanned pregnancy remains a public health problem as it negatively affects fetal development and adversely impacts the mother and child's health. In the efforts to reduce maternal dan infant mortality, as well as improve maternal health, unplanned pregnancy occurs due to several factors such as age, knowledge, contraceptive failures, and finances. The study aimed to determine the factors associated with the incidence of unwanted pregnancy. This study implemented a cross-sectional design using secondary data from the 2019 Program Performance and Accountability Survey of North Sumatra Province. The bivariate analysis was performed through a simple logistic regression. Multiple logistic regression was performed in multivariate analysis. The result showed that there were 21.3% of women reported their last pregnancy as an unplanned pregnancy. The study concluded that factors associated with an unplanned pregnancy are age at the last pregnancy, wealth at a lower index, having two or more children, and not working. Having two or more children is the most dominant factor in an unplanned pregnancy.

Introduction

Pregnancy is one of the determinants of fertility. Therefore married couples should plan whether to have children and when to have children so they can plan their pregnancy properly (Bongaarts, 2015). Because pregnancy is the initial stage of life formation, husband and wife should be prepared to face an increase in family members, and women should be ready to carry out their pregnancy properly and responsibly per recommendations from the World Health Organization (World Health Organization, 2016 p.2). Pregnancy planning allows women and their partners to prepare a supportive environment for conception to occur. This preparation includes physical, psychological, and social readiness, which includes, among other things, the nutritional adequacy of women and their partners, financial/economic readiness, and

management of pre-existing diseases in married couples (Oktalia and Herizasyam, 2016; Stephenson et al., 2018). Adequate planning and pregnancy management are one of the efforts to improve maternal and child health, which until now, is still one of the focuses of sustainable development goals. Based on the guidelines of the World Health Organization, pregnancy should be prepared by carrying out health checks, completing vaccinations, and conducting screening/early detection of diseases (World Health Organization, 2016).

However, efforts to reduce maternal and child mortality have not shown the expected progress. Communities in developing and developing countries still face obstacles, including a high preventable mortality rate, namely maternal deaths related to pregnancy (Kassebaum et al., 2014). It includes unplanned pregnancies, both of which eventually end up as

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unplanned pregnancies, later desired (wanted pregnancy), or become unwanted pregnancies. Unplanned pregnancy (UP) is a public health problem because it burdens society. Both financially and socially (Yazdkhasti et al., 2015). Unplanned pregnancies affect family financial/economic conditions and inadequate parenting, even associated with weak health conditions of mothers and children (de La Rochebrochard and Joshi, 2013). UP also contributes to the high incidence of abortion and unsafe abortion, where previous research showed that 1 in 5 unwanted pregnancies end in abortion (Eftekhariyazdi et al., 2021). UP also contributes to the high incidence of abortion and unsafe abortion, where previous research showed that 1 in 5 unwanted pregnancies end in abortion (Bastola, 2015). Given the high proportion of unplanned pregnancies, ranging from around 38% in 2010. Even estimated 48% of the total pregnancies in 2019, unwanted pregnancies are still very common (Singh, Sedgh and Hussain, 2010; Bearak et al., 2022).

An unplanned pregnancy (UP) is defined as an event of pregnancy that occurs that is actually not planned or is not wanted (mistimed), or the pregnancy is wanted later (BKKBN and BPS, 2019). Unwanted pregnancies can be resulted from sexual violence and risky sexual behavior in adolescents (Azinar, 2013). In developed countries, unwanted pregnancy is often associated with teenage pregnancies, low incomes, unmarried women, and ethnic minorities (Troutman, Rafique and Plowden, 2020). Studies in the United States also confirm that the proportion of unwanted events in unmarried women is four times higher than in married women (Finer and Zolna, 2016). Although the number of UP has decreased significantly in developing countries such as the United States and New Zealand, recent studies still show that nearly half of the pregnancies are still unplanned. (Finer and Zolna, 2016; Hohmann-Marriott, 2018).

Meanwhile, in countries with low and middle incomes, adverse events can occur as a result of contraceptive failure, poverty/financial difficulties, and unmet need for contraception where the husband and wife do not plan to have children soon. But they are not using a contraceptive method. Therefore, UP are

associated with low access to contraception, which results in low birth weight babies and pregnancy complications experienced by pregnant women (Rahman et al., 2016, 2019; Bishwajit et al., 2017; Jain and Winfrey, 2017). Unplanned pregnancies are also associated with delays in knowing about pregnancy. Therefore will contribute to the risk of delays in fulfilling nutrition in early pregnancy characterized by anemia (Leppälahti et al., 2013). The physical condition of a pregnant woman before pregnancy is a vital factor in preparing a woman's body for pregnancy (Stephenson et al., 2018). Besides that, women also need various nutrients that are important and support fetal development during pregnancy, including vitamin D, folic acid, and iron, especially before the start of pregnancy (Hodgetts et al., 2015). Ignorance of pregnancy can also place women in unhealthy behaviors such as smoking, unbalanced consumption patterns, and strenuous physical activity (Stephenson et al., 2018). While according to WHO recommendations, pregnant women are expected to maintain physical fitness with only light exercise during pregnancy (World Health Organization, 2016).

The results of a study using 2010 Basic Health Research (RISKESDAS) data show that the UP incidence in 2010 varied by province, with the lowest at 0.4 percent in Central Kalimantan to the highest proportion in West Java at 22.8% (Pranata and Sadewo, 2012). Meanwhile, based on an analysis using the 2017 IDHS data, as many as 16.2% of UP were found in Indonesia (Supriyadi and Yanti, 2020) and the 2019 SKAP results showed that there were 17.5% of UP nationally, with the proportion varying in each provinces ranging from the lowest proportion in Central Sulawesi Province (9.3%) to 29.9% in the Bangka Belitung Islands Province (BKKBN and BPS, 2019 p.102).

North Sumatra Province is one of the highest contributors to the population on the island of Sumatra. North Sumatra Province has unique demographic characteristics, marked by the low number of first marriages at a young age. North Sumatra Province is one of the provinces with a high median age at first marriage, namely 20.8 years, higher than the national median age at marriage of 19.5 years. North Sumatra

Province has the least proportion of women who marry for the first time at the age of 10-14 years (BKKBN and BPS, 2019 p.119), indicating women in North Sumatra Province marry for the first time at an older age compared to women in other provinces. However, North Sumatra Province is also one of the provinces with a proportion of married couples who want many children. The results of the 2017 IDHS analysis show that in the last 10 years, North Sumatra Province has not shown a significant change in the total fertility rate (TFR), with the TFR in 10 years still around 3 children per woman (Raharja, Fadila and Rahmadewi, 2021). In addition, 63.8% of married couples aged 15-49 years stated that the ideal number of children is three or more, and only about one in three married couples of childbearing age think that the ideal number of children is two children or less (BKKBN and BPS, 2019 p.109). Data also shows the high unmet need for contraception in North Sumatra, where 10.7 percent of women of childbearing age aged 15-49 in North Sumatra Province want to space births and limit births but do not use contraception (BKKBN et al., 2018). This high unmet need for contraception will contribute to unwanted and unplanned pregnancies. Besides that, the 2019 SKAP data also shows that the UP rate in North Sumatra Province is higher than the national average (BKKBN and BPS, 2019 p.102).

An understanding of unplanned pregnancies is a strategic step in efforts to improve maternal and child health based on evidence-based programs, as well as an effort to reduce the gap between programs and policies (Tsui, McDonald-Mosley and Burke, 2010). Understanding pregnancy intentions also equips program managers in planning the needs of women of childbearing age for a series of reproductive health programs (Hall et al., 2017). Given the vital role of provincial-level community factors in explaining the incidence of UP (Supriyatna, Dewi and Wilopo, 2018), the researchers wanted to explore the factors that play a role as determinants of unplanned pregnancies in married women in North Sumatra Province.

Method

This study used a cross-sectional design using secondary data from the 2019 Program Performance and Accountability Survey (SKAP) of North Sumatra Province. SKAP 2019 is an annual survey with provincial representation using a cluster approach represented by 35 households. Overall there are 78 clusters spread across all districts/cities in North Sumatra Province, with a total of 2,730 households; 2,757 families, and 2,392 women of childbearing age (WCA). The inclusion criteria are all married women aged 15-49 years, contained in the 2019 SKAP WCA data set for North Sumatra Province, women of childbearing age (15-49 years) who had been married and were participants in the 2019 Program Performance and Accountability Survey (SKAP). Postmenopausal women and women who had never been pregnant at the time of the survey were excluded from the analysis. As many as 1,764 married women of childbearing age met the criteria and became research samples.

The dependent variable in this study was an unplanned pregnancy. Data regarding pregnancy planning were from questions regarding pregnancy intention (FQ18). The questions were: "when you were pregnant with your last child, did you really want this pregnancy at that time, or did you want to wait until later, or did you not want (another) child?" (BKKBN and BPS, 2019 p.314). Planned pregnancies were grouped if the respondent answered: "wanted at that time". While the answers "then or did not want more children" were grouped into unplanned pregnancies. The independent variables in this study were demographic characteristics. They consist of the woman's age at her last pregnancy and when she first married, the number of living children and the number of children she wanted, the education level completed, history of contraception use, category of wealth index, and ownership of health insurance. Data were then processed through bivariate analysis using simple logistic regression, with a significant relationship determined if the p-value <0.05. Multivariate test through multiple logistic

regression with the enter method variables that have significance in bivariate analysis.

Results and Discussions

Characteristics of married women based on pregnancy planning can be seen in Table 1.

Table 1. Demographic Characteristics of Married Women in North Sumatra Province in 2019

Variables	UP		Planned		Total	
	n	%	n	%	n	%
n	375	21.3	1,389	78.7	1,764	100
Pregnancy Status						
Not Pregnant	353	94.1	1,315	94.7	1,668	94.6
Pregnant	22	5.9	74	5.3	96	5.4
Age (years) [†]						
Not Ideal	106	28.3	257	18.5	363	20.6
Ideal	269	71.7	1,132	81.5	1,401	79.4
Age at first marriage						
≤ 20 years	187	49.9	559	40.2	746	42.3
≥ 21 years	188	50.1	830	59.8	1,018	57.7
Wealth Index						
Middle Low	304	81.1	1,022	73.6	1,326	74.1
High	71	18.9	367	26.4	438	24.9
Education						
Uneducated – Junior High	177	47.2	595	42.8	772	43.8
Senior High – Graduate	198	52.8	794	57.2	992	56.2
Contraception Use						
Ever	322	85.9	1,075	77.4	1,397	79.2
Never	53	14.1	314	22.6	367	20.8
Ideal number of children						
≤ 2	112	29.9	475	32.4	587	33.3
> 2	263	70.1	914	65.8	1,177	66.7
Number of children						
> 2	260	69.3	667	48.0	927	52.6
≤ 2	115	30.7	722	52.0	837	47.4
Working Status of the Woman						
Not working	215	57.3	677	48.7	892	50.6
Working	160	42.7	712	51.3	872	49.4
Own Health Insurance						
No	137	36.5	500	36.0	637	36.1
Yes	238	63.5	889	64.0	1127	63.9

Source: Processing of 2019 SKAP Secondary Data of North Sumatra Province

Of 1,764 married women of childbearing age, 5.4 percent of married women were pregnant, and 21.3 percent of women reported their last pregnancy as unplanned. The analysis showed that in the last pregnancy, around 79% of women were at the ideal age for pregnancy (21-35 years). Half of the women were in working status, and 56.2 percent of the participants had secondary or higher education. About 66 percent stated that the ideal number of children they wanted was more than two, and more than half of married women had more than two children. About 79 percent of women said they had used one method of contraception, and 74 percent of women were in the lower middle-class wealth index.

Unplanned pregnancies (UP) were almost entirely reported by women who were not pregnant (94.1%). Just 5.9 percent were reported by pregnant women when data collection. One in four UP is at an age that is not ideal for pregnancy, while based on the age of first marriage is not much different. More than 80 percent of those occur in women in the middle to lower wealth index and women who have never used contraception. Nearly 70

percent of unwanted events were reported by women with more than two and women who wanted more than two children. As many as 57.3 percent of all UP incidents were reported by married women who were not working, and nearly two-thirds by married women with health insurance. Unplanned pregnancies (UP) were almost entirely reported by women who were not pregnant (94.1%). Just 5.9 percent were reported by pregnant women when data collection. One in four UP is at an age that is not ideal for pregnancy, while based on the age

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Table 2. Results of Bivariate and Multivariate Analysis of Determinants of UP

Variables	Bivariate			Multivariate		
	OR	95% CI	p-value	OR	95% CI	p-value
Age (years) †						
Not Ideal	1.736	1.335-2.256	**<0.001**	1.579	1.202-2.075	**0.001**
Ideal	ref					
Age at first marriage						
≤ 20 years	1.477	1.175-1.857	**0.001**	1.227	0.966-1.558	0.094
≥ 21 years	ref					
Wealth Index						
Middle Low	1.538	1.157-2.044	**0.003**	1.374	1.021-1.849	**0.036**
High	ref					
Education						
Uneducated – Junior High	1.193	0.949-1.500	0.131			
Senior High – Graduate	ref					
Contraception Use						
Never	1.775	1.293-2.435	**<0.001**	1.360	0.977-1.893	0.068
Ever	ref					
Ideal number of children						
≤ 2	0.819	0.640-1.049	0.114			
> 2	ref					
Number of children						
> 2	2.447	1.919-3.122	**<0.001**	2.270	1.750-2.943	**<0.001**
≤ 2	ref					
Working Status of the Woman						
Not working	1.413	1.123-1.779	**0.003**	1.684	1.318-2.153	**<0.001**
Working	ref					
Own Health Insurance						
No	1.023	0.807-1.297	0.848			
Yes	ref					

Source: Processing of 2019 SKAP Secondary Data of North Sumatra Province

The time of pregnancy, the number and composition of children you have, and the number of children you want are factors affecting fertility (Bongaarts, 1990). Including the age of the woman at the time of her last

pregnancy, age at the time of her first marriage, wealth index, number of children she had, history of contraception use, and employment status. Further multivariate analysis showed that age that is not ideal for pregnancy,

wealth index, current number of children, and unworking women are determinants of unplanned pregnancies in married women of childbearing age participating in SKAP North Sumatra Province in 2019.

The analysis result showed the relation between a woman's age at pregnancy and the incidence of unplanned pregnancy, with those who experience pregnancy at unideal age (less than 21 years or above 35 years) having a 1.5 times chance of experiencing UP compared with women who are the ideal age to get pregnant. In general, previous studies have shown the same trend that an increase in a woman's age during pregnancy is directly proportional to the reporting of pregnancy as a UP (Anggraini et al., 2018). Other research in Indonesia also shows that women who are not of the ideal age have 1.6 times the risk of experiencing unwanted pregnancy (Supriyadi and Yanti, 2020). It may be due to the increased risk of pregnancy experienced by women in the older age group (Hajizadeh and Nghiem, 2020). Pregnancy at too old (over 35 years) places women at risk of pregnancy-related complications, including gestational diabetes, hypertension, and the risk of giving birth to babies with abnormalities (Dietl et al., 2015). In addition, pregnancy at the age of over 40 years also increases the risk of fetal death in the womb and babies born with low birth weight (Hoffman et al., 2007).

Meanwhile, women who experience pregnancy at a too-young age have an increased risk of pregnancy complications, including 1.8 times the risk of anemia and 3 times the risk of experiencing urinary tract infections and pre-eclampsia, where the risk and complications of pregnancy increase when the woman pregnant in young age (Leppälahti et al., 2013). The age of a woman when she first marries or starts reproduction is related to the number of possible pregnancies during that reproductive period. The younger a woman starts pregnancy, the longer the period that allows the woman to experience pregnancy (Raharja, Fadila and Rahmadewi, 2021). Besides that, a woman's age is also related to the use of contraception, where women over 35 generally have low contraceptive participation because they think they are not fertile enough to experience

pregnancy. Therefore, even though married couples aged >38 years do not plan to have additional children, they do not use any contraceptive methods (Saputri et al., 2022).

Unplanned pregnancies are often associated with low economic (financial) levels and low levels of education. Based on this study, the incidence of unwanted pregnancy among married women in North Sumatra Province is significantly related to the wealth index, where women with a middle-lower index have an unwanted pregnancy risk by 1,374 times compared to women with a high wealth index (p 0.036). It may be related to the low ability of women in the middle to lower wealth index to access contraception services in the context of planning a pregnancy, so most cases of UP occur in women with the lowest economic index (Anggraini et al., 2018; Muthmainnah et al., 2020). Research in Banten also shows that a low wealth index is the unmet need predictor for contraception among married couples (Saputri et al., 2022). Research using IDHS 2017 data also shows an increase in the use of modern contraception in childbearing-age couples in the middle-upper wealth index (Irawaty and Gayatri, 2021). The wealth index also describes the ability economically to meet needs during pregnancy and after childbirth. It is supported by a study showing income is related to a woman's readiness for pregnancy (Oktalia and Herizasyam, 2016). Meanwhile, analysis of the determinants of adverse events with the 2012 IDHS data indicates that the incidence of adverse events is not significantly related to the wealth index (Andini, Mutahar and Yeni, 2020).

The results of this study indicate a strong relationship between the number of children more than two and the reporting of pregnancy as an unwanted event by 2.70 times compared to women with fewer children. The trend of increasing KTD along with the number of parity is also on a national scale, where the percentage of women who do not want more children increases as parity increases (BKKBN and BPS, 2019). The relationship between the number of children and planned pregnancies has been consistently demonstrated by studies in developing and developed countries (Curtis, Evens and Sambisa, 2011; Bongaarts, 2015;

Anggraini et al., 2018; Muthmainnah et al., 2020). Furthermore, because the desire for pregnancy is influenced by a woman's intention to reproduce, parity is the most dominant determinant of the various determinants that affect pregnancy intentions (Bongaarts, 2015; Andini, Mutahar and Yeni, 2020). It is, of course, influenced by the fertility intentions of women of childbearing age and their partners so that women who have fulfilled their fertility intentions will use contraception to prevent pregnancy (Irawaty and Gayatri, 2021). Research on fertility intentions using national scale survey data for 5 consecutive years shows that women who have decided to terminate the will to reproduce again will be more likely to report the additional pregnancy as a UP compared to women who have not chosen whether to end its reproductive intent (Supriyatna, Dewi and Wilopo, 2018).

Based on the research results, married women who do not work had 1,674 times the risk of experiencing unwanted pregnancy compared to married women who worked. Work is related to women's access to income. It may also be related to the relationship between the wealth index and unwanted pregnancy, where married women with a lower wealth index have a higher risk of having an unplanned pregnancy. The women's employment status still shows inconsistent results, whereas research by Muthmainnah et al., (2020) indicates an insignificant relationship between work and UP. Meanwhile, other studies show that unplanned pregnancies are more common in women who are old, have low education, and women who are not working (Yanikkerem, Ay and Piro, 2013). It is possible because women with access to work will have better opportunities to access pregnancy prevention efforts, including access to information and contraceptive devices/drugs (Irawaty and Gayatri, 2021). Therefore, working provides higher financial opportunities and is indirectly related to influencing women and their partners to be better at planning a pregnancyTherefore, working provides higher financial opportunities and is indirectly related to influencing women and their partners to be better at planning a pregnancy (Yanikkerem, Ay and Piro, 2013). In addition, working status relates to women's participation in efforts to increase family income and is therefore indirectly with increased access to preventing pregnancy (Yazdkhasti et al., 2015).

Conclusions

The results of the analysis show that one in four pregnancies in married women who are respondents to the 2019 SKAP in North Sumatra Province experience unplanned pregnancies. It can be concluded that the factors associated with unplanned pregnancies in married women in North Sumatra Province are age at pregnancy, middle to lower wealth index, having two or more children, and the status of women who are not working. The number of children of more than two is the most dominant determinant in influencing the incidence of unwanted pregnancy. The results of the analysis show that one in four pregnancies in married women who are respondents to the 2019 SKAP in North Sumatra Province experience unplanned pregnancies. It can be concluded that the factors associated with unplanned pregnancies in married women in North Sumatra Province are age at pregnancy, middle to lower wealth index, having two or more children, and the status of women who are not working. The number of children of more than two is the most dominant determinant in influencing the incidence of unwanted pregnancy.

Acknowledgement

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Jurnal Kesehatan Masyarakat

Knowledge and Calcium Intake to the Risk of Scoliosis at Boarding School Students

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Article Info

Abstract

Teenagers in the modern era often have improper sitting positions, which will affect posture abnormalities, namely scoliosis. Scoliosis occurs due to many factors, such as information obtained from knowledge. In addition, there are nutritional factors obtained from calcium intake because a deficiency will affect bone density. This study aims to understand the relationship between knowledge and calcium intake with the risk of scoliosis in adolescents. The method used was an analytic observational study and a cross-sectional study design. Thirty-five students were chosen by purposive sampling. The respondent checked using Adam Forward Bending Test Checklist and the Food Frequency Questionnaire (FFQ). All data were processed using SPSS. The results of the correlation test from the Spearman-rho test on the knowledge variable with a significance value of 0.309 (p>0.05) and the calcium intake variable of 0.624 (p>0.05) concluded that H1 was rejected and H0 was accepted, which means there is no relationship between knowledge and calcium intake on the risk of scoliosis in adolescents. This study concluded that there is no relationship between knowledge and calcium intake on the risk of scoliosis in adolescents. But the long-term effects of insufficient calcium intake need further investigation.

Introduction

Posture is composed of soft tissues such as central and peripheral nerves, muscles, ligaments, and hard tissues such as bones and joints. If the shaper of the body has problems, it will affect posture deviations characterized by stiff muscles, back pain, and body imbalances, and not anatomically (Qureshi & Shamus, 2012). This deviation causes the placement of the body related to gravity and the base of support is not per its position. The lateral deviation happened in the frontal plane. If it occurs continuously, then there is a posture abnormality, namely imbalance of the body with vertebral rotation is called scoliosis (Herdea et al., 2022). The condition of scoliosis is characterized by having a degree of vertebral curvature (Cobb angle) of >10⁰ which can be seen on the coronal plane radiograph (Brox, 2014).

The prevalence of scoliosis worldwide reaches 1% of the population, mainly diagnosed in adolescents between the ages of 10 to 18 years (Seleviciene et al., 2022). However, idiopathic scoliosis, which has an unclear cause, is found in around 80% of scoliosis cases. If there is no discernible underlying condition, scoliosis is referred to as idiopathic (Negrini et al., 2018). Continuous position changes can also be a trigger for scoliosis, especially if awareness, related to cognitive behavior, of this ergonomic position is lacking (Fersum et al., 2013).

A person's knowledge can affect his behavior. If someone's knowledge is good, then his behavior will be better. Knowledge is information captured by the five human senses and results in a person knowing (Zahn et al., 2017). In addition to the knowledge factor, calcium intake is no less vital in changing one's body posture, especially in adolescents. Because low calcium intake will have an impact on early bone density, it can affect future development and accelerate bone loss (Vannucci et al., 2018).

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Calcium is a vital element in the process of structural renewal and bone formation or remodeling. According to the Recommended Dietary Allowance for Calcium, the number of calcium nutritional needs at the age of 14-18 years is 1300 mg/day (Vannucci et al., 2018). Experienced a calcium deficit during the growth period will impact growth barriers such as bones becoming less stable, easy to bend, and brittle, and at the age of 50 years can cause osteoporosis (Bolland et al., 2015).

The effects of posture abnormalities can directly or indirectly affect the spine and other systems, especially the respiratory and cardiovascular systems. It means that the circulation of oxygen to the developing organs becomes difficult, and the central nervous system is deprived of oxygen. The lack of oxygen can cause several conditions, such as memory loss, and can have a further impact on the ability to think difficult (Mitova et al., 2014). In the preliminary study, students at SMP Tahfidz Al-Manshurin Malang have a risk of bad posture due to a wrong sitting position and insufficient calcium intake. Based on the explanation above, the researcher is interested in conducting research entitled "Knowledge and Calcium Intake to the Risk of Scoliosis at Boarding School's Students".

Method

This research was conducted by an analytical observational method using a cross-sectional study approach. This research took place at Junior High School Tahfidz Al-Manshurin Malang. The technique was to select the sample by using purposive sampling and obtained 35 students from grades 7 to 9 who met the research criteria. Collecting respondent data regarding scoliosis knowledge using a questionnaire, then the final results are categorized. Namely good, sufficient, and lacking. Measurement of calcium intake using the Food Frequency Questionnaire (FFQ) method

from the Ministry of Health of the Republic of Indonesia (KEMENKES) by (Sirajuddin et al., 2018), the results from the interview was then analyzed using the Nutrisurvey system software (Arsyad et al., 2020). The final result then becomes less if the respondent's intake is <80% RDA (Nutrition Adequacy Rate), it is said to be good if it is 80-100% RDA, and it is said to be better if >100% RDA (Maharsari, 2018). The measurement of scoliosis uses a body posture observation sheet, namely the Adam Forward Bending Test Checklist from the Standard of Scoliosis Screening by (Sacramento, 2007). Univariate analysis in this study includes the characteristics of respondents based on knowledge, calcium intake, Body Mass Index (BMI), and body posture. The bivariate analysis includes a normality test using Shapiro-Wilk and a correlation test using Spearman-rho.

Result and Discussion

The characteristics of the respondents are in TABLE 1. Based on the Body Mass Index (BMI) of 35 respondents, the highest number was 17 female students (49%) with normal, while the smallest number was obese only 2 female students (6%). Based on the level of knowledge of the respondents, 23 students (66%) have sufficient knowledge, 9 (26%) of them have good knowledge, and only 3 students (8%) were less knowledge. Regarding calcium intake, 35 respondents who had less calcium intake with the highest percentage, namely 29 students (83%), while calcium intake was very good only in 4 students (11%), and good calcium intake was 2 students. (6%).

On the other hand, based on the risk of scoliosis, it was found that from 35 respondents who were not detected experiencing the risk of scoliosis, there were 14 students (40%), while those who had the risk of mild scoliosis as many as 18 students (51%), and the risk of moderate scoliosis was only 3 students (9%).

Table 1. Characteristics of Respondents

Characteristics	N	Type	Percentage
BMI	35	Underweight	11%
		Normal	49%
		Overweight	34%
		Obesity	6%
Knowledge	35	Lack	8%
		Sufficient	66%
		Good	26%
Calcium Intake	35	Lack	83%
		Good	6%
		Very Good	11%
Risk of Scoliosis	35	None	40%
		Low	51%
		Moderate	9%

Table 2. Results of the Correlation Knowledge and Calcium Intake to the Risk of Scoliosis

Variable		N	α	p
Knowledge	Risk of Scoliosis	35	0,05	0,309
Calcium Intake		35	0,05	0,624

The correlation test is by Spearman-rho test with a sample of 35 students. In the knowledge variable, the significance value was 0.309 (p>0.05) while the calcium intake variable had a significance value of 0.624 (p>0.05). Thus, in this study, it can be concluded that there is no relationship between knowledge and calcium intake on the risk of scoliosis in adolescents.

Knowledge is referred to as the main factor in changing a person's behavior through the process of seeking. So they can receive knowledge and skills (Liu et al., 2016). Knowledge about the risk factors for disease makes people try to behave in any way to avoid or prevent the risk of the disease. Understanding how perceptions of developing diseases affect the adoption of health-protective activities is crucial for identifying prospective health issues. It may also help public health messaging more effectively, targeted to promote the right kinds of behaviors (Faasse & Newby, 2020).

In contrast to the results of this study, there is no relationship between knowledge of the risk of scoliosis and respondents who are dominated by sufficient knowledge, thus requiring better. The level of knowledge is not the main factor affecting a person's health behavior in making decisions to prevent the risk of scoliosis. But several factors, including perceptions, emotions, motivation, and the environment (Purnamasari & Raharyani, 2020). A person's perception of something will be different because there are several selections in the stimulus process, so that perception is closely related to the encouragement of a person's behavior in making a decision (Coronado-Vázquez et al., 2020). As people get older, motivation will also increase to carry out healthy living behaviors so that a person continuously adapts to his environment. It will affect good and healthy activities so that there is a reduced risk of scoliosis in adolescents (Faasse & Newby, 2020; Seleviciene et al., 2022).

Adolescent life is counted in the age range of 12-21 years, which will experience a growth spurt period which means the peak of growth in height, weight, and growth of bone mass or peak bone mass. Adolescence is the fastest period in the formation of bones. So it will grow large, long, thick, dense, and influenced by body weight and composition. Therefore they need more nutritional intake, but this growth will stop when they reach the age of 30 (Ward et al., 2017). Calcium intake in adolescents is very vital. Around 1,300 mg of minimum calcium intake is needed by the age of 9-18 years (Vannucci et al., 2018).

One of the most significant biological roles of calcium in the body is the mineralization of the skeleton. Calcium is a necessary

element. The skeleton's strength and structure are provided by calcium, which makes up the majority of bone and is found there at concentrations of more than 99% as calcium-phosphate complexes. It makes the bone a metabolic reservoir for maintaining the intra- and extracellular calcium pool. The remaining portion mediates muscular contraction, vascular contraction and vasodilatation, nerve impulse transmission, intracellular signaling, and extracellular signaling. It is found in blood, extracellular fluids, and muscle. For muscle development and contraction, calcium has functions in protein interactions in muscles, namely actin, and myosin (Bronner, 2001; Vannucci et al., 2018).

The impact caused by lack of calcium in the body includes stunted bone growth, which can affect the occurrence of bone shortening conditions as well as bone pathological conditions such as osteoporosis (Weaver et al., 2016). Bone development and degeneration are significantly affected by calcium-phosphorus metabolism and balance, which are affected by a variety of variables, including vitamin D, parathyroid hormone (PTH), and calcitonin levels. If the need for calcium in humans is not met, it will indirectly obtain sources of calcium from other body parts, such as bones that store a lot of calcium. If the body's needs are fulfilled, but bone calcium levels are reduced, it triggers susceptibility to bone disorders such as scoliosis (Zhu et al., 2019).

However, in the results of this study, there was no relationship between calcium intake and the risk of scoliosis, and the respondents predominantly had less calcium intake. It could occur due to the possibility that other bone-forming main compositions, such as mineralized extracellular matrix containing organic and inorganic materials other than calcium are still being met, including phosphorus, protein, vitamin D, and magnesium. The extracellular matrix (MES) is a complex structure that surrounds the cell and functions to provide structural support (Allgrove, 2015).

Conclusion

Based on the results of the research entitled "Knowledge And Calcium Intake To The Risk Of Scoliosis At Boarding School Students" the following conclusions were drawn: (1) The highest level of knowledge related to the risk of scoliosis in Boarding School Students is having sufficient knowledge; (2) The highest level of calcium intake in Boarding School's Students is having less calcium intake; (3) Boarding School's Students are detected as having a mild risk of scoliosis; (4) There is no relationship between knowledge and calcium intake on the risk of scoliosis in Boarding School's Students. However, the long-term effects of insufficient calcium intake on other musculoskeletal disorders still need further investigation.

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The Effect of *Sansevieria* Plant on Particulate Matter 2.5 Levels in Classroom

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Article Info

Abstract

The Poor physical environment is the main cause of acute respiratory infections that result in death in school children aged 5 to 14 years due to exposure to PM2.5 at school. The improvement of the school's physical environment from high PM2.5 pollution is to involve the school community in planting Sansevieria Trifasciata as a solution to reducing PM2.5 pollution. This study aims to analyze the significance of differences in the physical environmental conditions of the Ciranjang 1 State Elementary School, Cianjur Regency, on the level of respiratory susceptibility of students seen from PM2.5 levels before and after the placement of Sansevieria Trifasciata. The study used 2 test classes and 1 control class. The study duration was 24 hours with two measurements, namely at the pretest and posttest. Data analysis used the Ancova one-way test followed by the Post-Hock test. The placement of 8 pots of Sansevieria Trifasciata was able to absorb PM2.5 compared to 6 pots of Sansevieria trifasciata. There is an effective and significant absorption of PM2.5 pollutants by placing 8 pots of Sansevieria trifasciata plants in a 49m2 classroom, which is 29μgr/m3 on the respiratory vulnerability level of Ciranjang 1 State Elementary School students, Cianjur Regency.

Introduction

Transportation has an important role as a source of air pollution. Commuters' exposure to concentrations of traffic-related air pollutants, including PM2.5, is generally higher due to their proximity to less dispersed emissions from mobile sources (Kumar et al., 2018). WHO estimates that 25% of all childhood diseases worldwide are caused by modifiable environmental factors (Cohen Hubal et al., 2020). The poor physical environment is the main cause of acute respiratory infections. Acute and chronic human exposure to ambient PM exposes receptors to high-risk diseases, including asthma, lung cancer, heart disease, stroke, type II diabetes, dementia, and loss of cognitive functions (Loxham and Nieuwenhuijsen, 2019). Pollutants produced by motorized vehicles are generally particulate matter (PM) (Tartakovsky et al., 2013). These particles can infiltrate the building even when the doors and windows are closed. Schoolchildren spend most of their time studying in the classroom. The air they breathe inside the school may be more polluted than the air outside. A contaminated school environment can cause or exacerbate health problems, including short-term health effects such as respiratory infections or asthma. It can reduce student attendance at school and learning abilities.

Research conducted in the Netherlands showed an increase in mortality associated with exposure to PM2.5 found indoors from vehicle emissions for people living at a distance of 50m from the main road or 100m from a highway (Hoek et al., 2002). Research in France proves a positive correlation between increasing respiratory problems in school children with high concentrations of PM2.5 in the classroom (Annesi-Maesano et al., 2012). Vehicle emissions were found to be higher in

schools located close to the highway than in schools located at a considerable distance from the highway (Kalaiarasan et al., 2017). Research conducted by Franklin (2007) stated that the concentration of indoor air pollution tends to be higher than outdoors. It is one of the causes of Acute Respiratory Infection (ARI) caused by exposure to PM2.5 in children (Franklin, 2007).

The school community should be aware of the environmental risks in schools and the importance of creating and maintaining a healthy physical school environment to protect the health of children and others who spend time in their schools. Thus, educators, planners, and school administrators must recognize ways to make the school environment safer. Improving children's environmental health can be realized by creating a healthy physical environment (Little et al., 2019). One of them is by engineering or modifying the physical environment in the classroom. Engineering or modification can be applied to create conditions for the school's physical environment to avoid high levels of PM2.5 pollution by involving the school community to plant that can absorb air pollution. Ornamental plants are one of the natural resources that exist in the community which can be used as a reliable and cost-effective solution to reduce pollution and improve air quality (Janhäll, 2015). In real situations, mixed pollutants pollute the indoor air, resulting in the application of technology phytoremediation to remove mixed pollutants requires further evaluation. A study of the efficacy of phytoremediation on air pollution mixture is needed to design a phytoremediation system appropriate and effective that can be used on an ongoing basis. Different plant species exhibit the ability to remove different air pollutants. Therefore, the selection of plant species can also be an vital factor for botanical biofilters (Irga et al., 2019).

A study to see the ability of Sansevieria Trifasciata to reduce PM2.5 concentrations was carried out by Siswanto et al (2020). Sansevieria Trifasciata can reduce PM2.5 concentrations in the room (Siswanto et al., 2020). Sansevieria plants don't need a lot of light or water to survive, so they can be used to filter out PM2.5 pollutants indoors (Kulkarni and Zambare, 2018). Sansevieria plant care

is easy to make this plant suitable for school children to help reduce it in the classroom. Ciranjang 1 State Elementary School is an elementary school located on the edge of the highway, precisely on the Cianjur-Bandung national road, Cianjur Regency, with a fairly high level of vehicle density. This condition could make the condition of the physical environment of the classroom worse and can affect the level of respiratory vulnerability of students at school. Based on this background, the researcher intends to analyze the condition of the physical environment of the Ciranjang 1 State Elementary School, Cianjur Regency, on the level of respiratory susceptibility of students seen from PM2.5 levels before and after the placement of Sansevieria Trifasciata.

Method

The research design used in this study is quasi-experimental in the form of a nonequivalent control group design. In this design, the experimental and the control group was selected randomly. Two groups will be given a pretest, a treatment, and a post-test. The population in this study is an elementary school classroom located near a highway in the Cianjur Regency area. The sample used in this study was a classroom at Ciranjang 1 State Elementary School, Cianjur Regency. The sample was taken purposively by determining the elementary school that met the research criteria, namely the Ciranjang 1 State Elementary School, Cianjur District. The inclusion criteria in this study were: Classrooms in Ciranjang 1 State Elementary School, Cianjur Regency, permanent classroom walls are made of walls, the distance between the classroom and the road is less than 100 meters, and the classroom is used as a place for teaching and learning. The independent variable in this study is Sansevieria Trifasciata. The dependent variable in this study was the concentration of PM2.5 in the classrooms of the Ciranjang 1 State Elementary School, Cianjur Regency. The confounding variables in this study were temperature and humidity.

The planting media used in this study consisted of soil, manure, and rice husks with a ratio of 2:1:1. Planting media is placed in plastic pots with the same quantity of planting

media in each pot. Sansevieria Trifasciata plants with 4 leaves and 50-100cm leaf size were placed in each plastic pot filled with planting media. Sansevieria plants were isolated for one week indoors to avoid contamination from pollutants before being used as samples. The research room prepared consisted of three classes, namely two classrooms for sample testing and one classroom for control. The area of the research sample testing room is 49m2. Each plastic pot containing planting media and Sansevieria trifasciata plants was placed on the floor of the classroom. The number in test room 1 was 8 pots, in test room 2 as many as 6 pots, and 6 pots containing only planting media without Sansevieria Trifasciata plants.

The research took duration for one day or 24 hours. Refers to the rules set by the Regulation of the Minister of Health of the Republic of Indonesia and WHO that the PM2.5 quality standard in the room is calculated on average per 24 hours (WHO, 2006). In carrying out the research, Sansevieria Trifasciata plants and planting media were placed on the research class floor. The number of Sansevieria plants in test room 1 was 8 pots, the test classroom 2 was 6 pots, and in the control room were 6 pots of growing media without Sansevieria Trifasciata. Measurements were made when teaching and learning activities took place, namely PM2.5 concentration, temperature, and humidity. During the research, 2 (two) measurements were taken, namely the initial measurement before placing the planting medium (for the control room) and before placing the Sansevieria Trifasciata plant sample (for the test class) and measuring at the end of the 24th hour. Initial measurements were carried out to determine PM2.5 pollutant levels in the control and experimental class before being influenced by the presence of planting media and Sansevieria Trifasciata plants. Measurements at the end of the 24th hour were carried out to see the effectiveness of Sansevieria Trifasciata in absorbing PM2.5 pollutants because the Botanic Filter's performance could effectively be seen after 24 hours (Siswanto et al., 2020). In addition, based on the rules set by the Regulation of the Minister of Health and WHO

that the PM2.5 quality standard in the room is calculated on average per 24 hours. The measurement time duration is 119 seconds for each measurement point. Measurements were carried out at as many as 5 (five) points for each sample and control classroom at approximately 110 cm height from the floor with close consideration of the respiratory system when sitting (Siswanto et al., 2020). The data from the measurements and observations are then recorded in the format provided.

Analysis of the data to answer whether there is a significant difference between the physical environmental conditions of the Ciranjang 1 State Elementary School, Cianjur Regency, on the respiratory susceptibility of students seen from PM2.5 levels before and after the placement of Sansevieria Trifasciata using the one-way ANCOVA test. This one-way ANCOVA test was carried out because other variables could not be controlled. So it needed to be controlled statistically. Before the one-way ANCOVA test was carried out, the normality, homogeneity, and linearity were first tested. After the data were normal, homogeneous, and linear, the one-way ANCOVA test was carried out. Based on the results of the one-way ANCOVA test, there were significant differences in PM2.5 levels before and after placement of Sansevieria Trifasciata,

This research took place in Ciranjang 1 Public Elementary School, Cianjur Regency, using three classrooms, namely class 5 and class 6 as the test classroom and class 4 as the control classroom. Data collection began on July 18, 2022, while measurements of PM2.5 levels took time on July 26 and 27, 2022. This research has obtained research ethics permit from the Research Ethics Commission of Padjadjaran University Bandung with number 636/UN6. KEP/EC/2022. The prerequisite test was carried out before the Ancova test to see residual normality, homogeneity of variance, linearity of correlation between dependent variables, and homogeneity of regression coefficients. Based on the results of the residual normality test using SPSS 24, the following results were obtained:

Table 1. The Prerequisite Result was Carried Out Before Carrying Out the Ancova Test

1. Residual Normality

Kolmogorov-Smirnova			Shapiro-Wilk		
Statistics	df	Sig.	Statistics	df	Sig.
.195	15	.128	.939	15	.373

a. Lilliefors Significance Correction

2. Homogeneity of Variance

Dependent Variable: Post-test

F	df1	df2	Sig.
1.842	2	12	.201

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.
a. Design: Intercept + Pre + Class

3. Regression Coefficient Homogeneity

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2224,240a	5	444,848	73.201	.000	.976
Intercept	.986	1	.986	.162	.696	.018
Class	19,449	2	9.725	1,600	.254	.262
Pre	102,400	1	102,400	16,850	.003	.652
Class * Pre	15,860	2	7,930	1.305	.318	.225
Error	54,693	9	6.077			
Total	88767,000	15				
Corrected Total	2278,933	14				

a. R Squared = .976 (Adjusted R Squared = .963)

Based on the Residual Normality table, the significance value obtained from the results of the Kolmogorov-Smirnov test is 0.128, and based on the results of the Shapiro-Wilk test is 0.373. It exceeds the required significance level of more than 0.05. Thus, the concentration of PM2.5 is normally distributed. Based on the Homogeneity of Variance table, the significance value obtained from the results of Levene's Test to see residual normality is 0.201. It exceeds the required significance level of more than 0.05. Thus, the variances of the three groups (test class 1, test class 2, and control class) are homogeneous.

Based on the Regression Coefficient Homogeneity Table, regarding the results of the homogeneity of the regression coefficients, it is found that the interaction between class (test and control) and covariate (Class*Pre) has a significance value of 0.318 exceeding a significance level of 0.05. Thus, the H0 test decision is accepted with the conclusion that the regression coefficients of the three groups (test class 1, test class 2, and control) are homogeneous. The regression coefficient homogeneity is met. It means that if there is no significant interaction, then the pretest value can be used as a covariate in the study. The linearity of the covariate correlation to the dependent variable (PM2.5 levels in class) from test class 1, test class 2, and control class can be seen below:
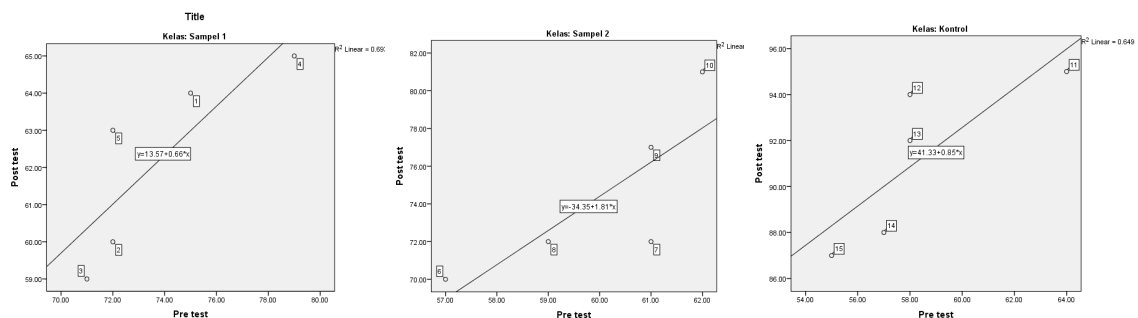

Figure 1. Scatter Plot Test The linearity of the covariate correlation

Based on Figure 1 regarding the Scatter Plot, the measurement results from a total of 15 points with each class carried out 5 measurement points, namely for test class 1, test class 2, and control class. The graph shows a straight line pattern to above. It can be concluded that the relationship or regression between the covariate (pretest) and the dependent variable (posttest) is linear.

Results and Discussion

The measurement of the research sample was carried out in test classroom 1, test classroom 2, and the control classroom. Each classroom was measured twice, at the pretest and posttest at the end of the 24th hour. Each measurement was carried out at 5 predetermined points for each test and control class. The results of measuring the concentration of PM2.5 in test classroom 1, test classroom 2, and control classroom are as follows:

Table 2 shows that before the intervention

PM2.5 conditions, the temperature and humidity of the classrooms were different. PM2.5 was highest in test class 1 and lowest in the control class, the highest temperature in test class 2, lowest in test class 1, highest humidity in test class 1, and lowest in test class 2. After 24 hours of intervention, there was a change in PM2.5 conditions, temperature, and humidity. The highest PM2.5 was in the control class, the lowest was in test class 1, the highest temperature was in the control class, the lowest was in test class 1, the highest humidity was in test class 1, and the lowest was in the control class. As additional information, during the Post-test measurement, there were different situations in the school environment, namely more traffic jams than usual and cloudy weather. This test is carried out with the consideration that there is a possibility that the pretest results are influenced by variables that can affect the final or post-test results. Ancova's one-way test results can be seen in table 5 below:

Table 2. Results of Measurement of $PM_{2.5}$ Concentration, Temperature, and Humidity

Measuring Point	Control Class			Test Class 1			Test Class 2		
	$PM_{2.5}$	°C	Rh	$PM_{2.5}$	°C	Rh	$PM_{2.5}$	°C	Rh
Pre-test									
Point 1	64	30.5	71	75	27	75.4	57	30.3	68.8
Point 2	58	29.4	70.3	72	27.5	74.3	61	30.6	67.4
Point 3	58	29.7	69.4	71	28.1	73.5	59	30.8	68.3
Point 4	57	30	69.2	79	28.6	71.9	61	31	66.5
Point 5	55	30.2	68.5	72	29.1	71.9	62	31.1	67.1
Average	58.4	29.96	69.68	73.8	28.06	73.4	60	30.3	68.8
Intervention	Planting media 6 pots			8 pots Test Plant			6 pots Test Plant		
Post-test									
Point 1	95	29.7	72.2	64	27.2	78.7	70	28.9	74
Point 2	94	29.8	71.8	60	27.6	78.1	72	29.1	73.3
Point 3	92	29.9	71.7	59	28	77.2	72	29.3	72.9
Point 4	88	30	71.8	65	28.4	75.8	77	29.5	73.2
Point 5	87	30	71.1	63	28.7	74.9	81	29.6	72.3
Average	91.2	29.88	71.72	62.2	27.98	76.94	74.4	29.28	73.14

Table 2 shows that before the intervention PM2.5 conditions, the temperature and humidity of the classrooms were different. PM2.5 was highest in test class 1 and lowest in the control class, the highest temperature in test class 2, lowest in test class 1, highest humidity in test class 1, and lowest in test class 2. After 24 hours of intervention, there was a change in PM2.5 conditions, temperature, and humidity. The highest PM2.5 was in the control class, the lowest was in test class 1, the highest temperature was in the control class, the lowest was in test class 1, the highest humidity was in test class 1, and the lowest was in the control class. As additional information, during the Post-test measurement, there were different situations in the school environment, namely more traffic jams than usual and cloudy weather. This test is carried out with the consideration that there is a possibility that the pretest results are influenced by variables that can affect the final or post-test results. Ancova's one-way test results can be seen in table 5 below:

Table 3. One-way ANCOVA Test Results

Tests of Between-Subjects Effects

Dependent Variable: Post-test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2208.380a	3	736,127	114.770	.000	.969
Intercept	7.240	1	7.240	1,129	.311	.093
Pre	88,247	1	88,247	13,759	.003	.556
Class	1052,931	2	526,466	82.081	.000	.937
Error	70,553	11	6.414			
Total	88767,000	15				
Corrected Total	2278,933	14				

a. R Squared = .969 (Adjusted R Squared = .961)

Based on the one-way ANCOVA test results table (Test of Between-Subjects Effects table) shows the significance level of the pretest covariate (covariate) of 0.003 less than 0.005. The significance level indicates that the pretest covariate (covariate) affects the posttest PM2.5 concentration. The class or independent variable (Sansevieria) was F=82,081 and =0,000. The significance level is less than 0.05, meaning that by controlling the pretest, there is a significant difference between the concentration of PM2.5 in test class 1 (8 pots of Sansevieria), test class 2 (6 pots of Sansevieria), and control class (6 pots of growing media). The results of the one-way ANCOVA test show a significant difference between the concentration of PM2.5 in test class 1 (8 pots of Sansevieria), test class 2 (6 pots of Sansevieria), and control class (6 pots of growing media). It is necessary to continue with the Post Hoc test to find out the different values of each sample to find which one is effective in reducing PM2.5 levels in the classroom. Post Hoc test results are in the following table:

Table 4. Post Hoc Test

Dependent Variable: Post-test

	(I) Class	(J) Class	Mean Difference (IJ)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Bonferroni	Sample 1	Sample 2	-12.20000*	2.30072	.001	-18.5948	-5.8052
		Control	-29,0000*	2.30072	.000	-35.3948	-22.6052
	Sample 2	Sample 1	12.20000*	2.30072	.001	5.8052	18.5948
		Control	-16.80000*	2.30072	.000	-23.1948	-10.4052
	Control	Sample 1	29,00000*	2.30072	.000	22.6052	35.3948
		Sample 2	16.80000*	2.30072	.000	10.4052	23.1948

*. The mean difference is significant at the 0.05 level.

Based on table 4, the Post-Hoc test results using the Bonferroni method show that the test class 1, test class 2, and control all have a significance value of less than 0.05. Thus, the sample and control have significant differences. Meanwhile, the difference in the mean levels of PM2.5 in the post-test measurement class in test room 1 decreased by 11.6μgr/m3 compared to the pretest measurement results. The results of post-test measurement in test room 2 experienced an increase in PM2.5 levels in the room by 14.4μgr/m3 compared to the pretest measurement results. Meanwhile, the results of post-test measurement in the control room experienced an increase in PM2.5 levels by 32.8μgr/m3 compared to the pretest measurement results.

The pretest measurement found that PM2.5 levels in test room 1 were the highest. Then the second order was in sample room 2, and the lowest PM2.5 levels were in the control room. This concentration difference is affected by the distance of the classroom from the highway. Test room 1 is 8m from it, test room 2 is 15m from it, and the control classroom is 22m from it. The concentration of PM2.5 in the school environment decreases with increasing distance between the measurement location point and the highway. Vehicle emissions were higher in schools located close to the highway than those at a considerable distance from the highway (Kalaiarasan et al., 2017).

Table 2 shows that between the control class and test class 2, there is a decrease in temperature in the room along with PM2.5 levels in the room. The result is per the theory which states that there is a positive relationship between temperature and the concentration of PM2.5. An increase in room temperature is proportional to straight with an increase in the concentration of PM2.5 (Wang and Ogawa, 2015). The decrease in room temperature, followed by an increase in PM2.5 in the control room and test room 2 was due to the density of vehicles on the highway and meteorological factors that occurred in the study area. At the time of the posttest measurement, the traffic flow was heavy and there was a traffic jam in front of the school, resulting in the temporal distribution of PM2.5 from the highway entering the classroom, while the weather

during the posttest measurement was observed to be cloudy so that the temperature at that time was not too high. This condition is different when taking pretest measurements where traffic conditions were smooth and the weather was sunny.

Pollution caused by PM2.5 is closely related to spatial and temporal distribution as a component of air quality measurement. In a short time, the concentration of PM2.5 usually has a very large difference, but the difference may be insignificant. It is affected by the characteristics of different pollutant sources in each region and the climatic conditions. Meteorological conditions also play an important role in influencing the concentration of PM2.5 at any time. Meteorological factors affecting it include wind direction and speed (Wang and Ogawa, 2015). Meanwhile, different conditions occurred in test room 1, where the decrease in temperature that occurred in the room, followed by a decrease in PM2.5 levels. It was due to the role of 8 pots of Sansevieria Trifasciata plants able to reduce PM2.5 levels in test room 1, which was sufficient and statistically meaningful.

The value of humidity is inversely proportional to temperature. The higher the humidity, there is the tendency for PM2.5 levels in the room to decrease. The humidity value significantly affects the daily variation of PM2.5 (Zereini and Wiseman, 2010). High humidity can encourage the formation of secondary organic particulates through photochemical reactions (Yang et al., 2011). Humidity has a negative relationship with PM2.5 in summer. It can be seen from the increase in the concentration of particulate matter in the air as temperature increases, and humidity decreases (Zereini and Wiseman, 2010) .Very high humidity can make the particulates in the air freely combine, then the particulates cannot survive in the air and fall to the ground so that the concentration of PM2.5 decreases (Chen et al., 2016).

The results of humidity measurements in the posttest in the control room and test room 2 showed an increase in humidity in the room, followed by an increase in PM2.5 levels. This result is not by the theory stated previously that the humidity level is inversely proportional to

the level of PM2.5. This incident is the same as what happened to the temperature indicator, that there is an influence of the temporal distribution of PM2.5 from the highway that enters the control room and test room and the weather factor is cloudy, causing humidity to increase.

Meanwhile, in test room 1, there was an increase in humidity followed by a decrease in the concentration of PM2,5. It is due to the role of 8 pots of Sansevieria Trifasciata plants, which can reduce PM2.5 levels in the room. The results of the One-way ANCOVA test showed that the significance level of the pretest covariate was 0.003 less than 0.005. The significance level indicates that the pretest covariate affects the posttest PM2.5 concentration. The class or independent variable (Sansevieria) has a level of F=82,081 and =0,000. The significance level is less than 0.05, which means that by controlling the pr test, there is a significant difference between the PM2.5 concentration in test class 1 (8 pots of Sansevieria). The significant differences obtained from the results of the One-way ANCOVA test need to be followed up with a post hoc follow-up test. It is done to find the value of the difference and whether it is positively or negatively correlated to the decrease in PM2.5 levels in each test room.

Overall, the study found that the placement of Sansevieria Trifasciata plants in the classroom had a positive impact on reducing PM2.5 levels in that class. However, the difference in traffic and weather conditions at the time of post-test measurement is very decisive for PM2.5 levels in the classroom. Vehicle pollutants from traffic jams contribute directly or indirectly due to the indirect role of fuel combustion in vehicles, including reactive gas emissions, both organic and inorganic, which can form secondary particulate matter through changes in the air. Vehicle speed on the highway includes the interaction of the vehicle with the road surface and the use of the brakes, which causes the release of particulate matter into the air. This category of emissions is known as non-exhaust emissions, which includes: tire wear, brake wear, road surface wear, and resuspension (Harrison et al., 2016). It occurs due to the process of mechanical aberration, grinding, crushing, and corrosion, while the latter is related to residual resuspension that collects around the road surface due to turbulence generated by vehicles due to congestion on the highway (Harrison et al., 2016). In Europe, 13% of all PM2.5 is transmitted to the air via motor vehicles, and this could increase to 40-50% (Harrison et al., 2016).

The cloudy weather during the post-test measurement made the temperature lower. It potentially reduces PM2.5 due to reduced photochemical reactions in the air because high temperatures contribute to photochemical activity in the air to produce more PM2.5 secondary particulates. Likewise, when it rains, Research (Gusnita and Cholianawati, 2019) says that PM2.5 concentrations are usually low. It is due to the presence of PM2.5 particulate washing process by rainwater (washing out) in the atmosphere. However, the high concentration of PM2.5 released by vehicles during traffic jams causes PM2.5 to be temporally distributed to spread larger to the surrounding area, including classrooms on the edge of the highway affected by wind direction and speed. Vehicle emissions were found to be higher in schools located close to the highway than in schools located at a considerable distance from it. Thus, although the temperature at the post-test time tends to be lower than the pre-test time due to cloudy weather, the congestion that occurred during the post-test measurement in a short time can increase the concentration of PM2.5 in the highway area temporally distributed in the classroom.

Based on statistical tests, the absorption ability of PM2.5 in test class 1 and test class 2 by the Sansevieria Trifasciata plant proved significant. The comparison of the ability of Sansevieria Trifasciata to absorb PM2.5 in test class 1 against the control class was 29μgr/m3. Meanwhile, the comparison of the absorption ability of Sansevieria Trifasciata in absorbing PM2.5 in the test class 2 to the control class was 16.6μgr/m3. The difference in the mean levels of PM2.5 in the post-test measurement class in test room 1 decreased by 11.6μgr/m3 compared to the pretest measurement results. The results of post-test measurements in test room 2 experienced an increase in PM2.5 levels in the

room by 14.4 gr/m3 compared to the pretest measurements. While the results of post-test measurements in the control room experienced an increase in PM2.5 levels.

Based on the standards applied by WHO and the Ministry of Health, these results do not meet the requirements for PM2.5 levels in the room. Although it has not met the requirements set by WHO or the Ministry of Health, the placement of Sansevieria Trifasciata plants in the classroom is quite effective in reducing PM2.5 levels in that class. This conclusion was because achieving PM2.5 levels in school classrooms close to the highway to conform to standards in community or field research is quite difficult. This condition is highly dependent on various kinds of external variables that must be controlled such as vehicle density, meteorological factors, and others. It is different from laboratory research.

The explanation above concludes that the placement of Sansevieria Trifasciata plants in the classroom can reduce PM2.5 levels. Meanwhile, placing 8 pots of Sansevieria Trifasciata in a 49m2 classroom is more effective in reducing PM2.5 levels, compared to placing only 6 of Sansevieria Trifasciata in the same classroom area. The results of this study support the WHO statement that realistically considered environmental factors can be changed using available technology, policies, and public health precautions, including contaminated air, soil, and water (Cohen Hubal et al., 2020). One of the environmental changes referred to by WHO is engineering or modifying the physical environment in the classroom by placing 8 pots of Sansevieria trifasciata plants which are proven to reduce the level of respiratory susceptibility of students seen from the decrease in PM2.5 levels in the classroom.

The results of this study answer the research problem, as well as the research objective that there is a significant difference in the physical environment of the Ciranjang 1 Elementary School, Cianjur Regency, seen from PM2.5 levels before and after the placement of Sansevieria Trifasciata and the placement of 8 pots of Sansevieria Trifasciata plants, proved to be more effective in reducing levels PM2.5 in class. Maintenance Sansevieria Trifasciata proved to improve the condition of the physical environment of the Ciranjang 1 State Elementary School classroom, Cianjur Regency on PM2,5 levels. This is one form of effort to reduce environmental hazards that have an impact on health as outlined in the Sustainable Development Goals, including strengthening capacity in terms of early warning, risk reduction, and management of national and global health risks as well as supporting and strengthening local community participation in sanitation improvements.

Air pollution is associated with many respiratory diseases (Lorensia et al., 2022). Adverse effects include decreased lung function, increased infection, increased respiratory symptoms, and acute exacerbation of COPD (Kim et al., 2018). The impact of air pollution on health, in the end, will cause an economic burden that must be borne by the Public. The economic burden of disease includes three cost components, namely: costs direct costs, indirect costs (indirect costs), and costs that are not real (intangible costs) (Mursinto and Kusumawardani, 2016). Sansevieria plant maintenance is easy and inexpensive, making this plant suitable for school children to help reduce PM2.5 pollutants in the classroom. One pot of Sansevieria plants costs around Rp. 30,000.00. This fee is used to buy plants for Rp. 25,000.00 and flower pots for Rp. 5000.00. So the cost incurred to maintain 8 pots of Sansevieria plants in a class of 49m2 with 30 students is Rp. 240,000.00. The costs incurred in preventive efforts to reduce PM2.5 levels by maintaining Sansevieria plants in the classroom are much cheaper than the burden of medical costs incurred if students experience respiratory diseases due to PM2.5.

Based on the results of research conducted by Sabin, et al (2020) in Ecuador, the costs incurred for the treatment of one case of ARI in children are approximately Rp. 745.500.00 (Sabin et al., 2020). These costs include direct medical costs covering payments made for diagnostic tests, medicines, inpatient consultations, and equipment related to inpatient child health; non-medical costs include transportation, meals, and accommodation for companions and other family members during hospitalization, communication, and child care costs for children who stay at home while

sick children are treated in health facilities; and indirect costs, i.e. taking into account lost wages and opportunity costs of lost time accompanying when a sick child is treated at a health facility. Based on the calculation of the cost of treatment above, if one student spends Rp. 745.500.00 for the treatment of ARI. The limitation of this study is that due to limited tools, researchers have not been able to identify and measure the temporal distribution that can affect PM2.5 levels in the room, such as wind direction and speed and vehicle density on the highway at the time of the study.

Conclusion

This study tested Sansevieria's ability to reduce PM2.5 pollutants in the classrooms of Ciranjang 1 State Elementary School, Cianjur Regency. Empirical equations were developed to measure the difference in PM2.5 pollutant levels in the classroom at SDN Ciranjang 1, Cianjur Regency, before and after the placement of Sansevieria Trifasciata. This study concludes that there is an effective and significant absorption of PM2.5 pollutants by placing 8 pots of Sansevieria trifasciata plants in a 49m2 classroom, which is 11.6μgr/m3 so that it can reduce the respiratory susceptibility of students at SDN Ciranjang 1, Cianjur District.

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Fogging Effectiveness Based on Time and Location of DHF Cases (Study in Sleman Regency)

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Article Info

Abstract

Dengue fever is a viral infection transmitted through the bite of the Aedes mosquito. Dengue fever is a public health problem worldwide, including in Indonesia. The increase in dengue cases is closely related to the presence of mosquito vectors. The prevention of dengue outbreaks is by fogging focus. Until now, there is no method to evaluate the effectiveness of focal fogging, yet many suspect that fogging focus is less effective because the incidence of DHF tends to increase over several decades. The study aims to find a method to evaluate the effectiveness of fogging with a spatial-temporal approach. It is an observational study using data on the incidence of DHF along with the date of illness, coordinates of DHF patients, and the date of fogging obtained from the District Health Office. Data processing is by ArcMap 10.5. Determination of the time limit and extent of protective fogging is based on the provision that if in the buffer area within a radius of 200 meters, there is more than one case of DHF on days 4-21 after the patient has a fever, then fogging is declared ineffective. There were 1,070 cases of DHF in 2008-2013 in Sleman Regency. 773 (72.24%) cases were fogged, while 290 were not. Of the 773 fogged cases, 59 (7.63%) were within the time and place of fogging protection. It means that the effectiveness of fogging in Sleman Regency reached 92.37%. Overall, there were 59 of 1,070 (5.5%) DHF cases came from ineffective fogging. By spatio-temporal approach, the fogging focus has been quite successful in suppressing the incidence of DHF in the Sleman Regency. In the future, it is necessary to consider fogging is focused other than in the patient's house and surroundings.

Introduction

One of the viral infectious diseases that is still a public health problem worldwide is dengue hemorrhagic fever (DHF). The geographic distribution of DHF was originally only in the tropics but has now spread to subtropical areas in America (Stephenson et al., 2022) and Europe (Ahmed et al., 2020; Gossner et al., 2022). The widespread of DHF occurs not only due to high population mobility in the era of globalization, but also due to global warming (Stephenson et al., 2022; Tran et al., 2020). The existence of global warming causes subtropical areas that were originally cold temperatures so that they are not suitable for mosquito life to change to become warmer so that the vector mosquito can live and transmit the virus.

There are 2 species known as vectors of DHF, namely Aedes aegypti as the general vector and Aedes albopictus as a secondary vector. Aedes aegypti are more in the house and its surroundings, while Ae albopictus is more common outside (Yuliani et al., 2021). Several reports indicate that Ae aegypti is more common as a DHF vector in urban areas with warmer temperatures, while Ae albopictus is more common as a vector in rural areas (Dev et al., 2014.) or urban and sub-urban areas in the

subtropics (Stephenson et al., 2022). The Aedes mosquito has a very short flight range (50-100 m),(Verdonschot & Besse-Lototskaya, 2014) diurnally, which actively sucks blood during the day, although it can also be at night if the room is bright (Rund et al., 2020). The feeding behavior of Ae aegypti is anthropophilic (Rund et al., 2020), while Ae albopictus is a generalist (Supartha, 2008). In addition, Ae aegypti is also interrupted feeding, which is sucking blood many times before it is full of blood (Harrington et al., 2014). This behavior can result in the number of sufferers being more than one person at the same time in one house or one environment.

Based on the Regulation of MOH RI No. 50/2017, focus fogging is carried out provided that the results of the epidemiological investigation showed larva-free rates < 95% in a radius of 100 m around the patient's house and there is 1 DHF patient or 3 people experiencing a fever of unknown origin. Fogging is carried out at the patient's house and surroundings with a radius of 200 m, 2 times with a range of 7 days. The fogging focus must be on competent field workers from the Health Office.

Many suspects that fogging focus is less effective, indicated by the incidence of DHF tends to increase over several decades (Harapan et al., 2019). Many studies to evaluate the effectiveness of fogging with entomological parameters have shown inconsistent results (Archiarafa et al., 2016; Bowman et al., 2016; Ibrahim et al., 2016). There is no method to evaluate the effectiveness of focal fogging in DHF cases.

Based on knowledge of the incubation period and the range of fogging, this study aims to evaluate the effectiveness of fogging with a spatial-temporal approach. This method tried to answer problems related to measuring the effectiveness of fogging in preventing dengue hemorrhagic fever. It is hoped that the research results can provide information about the effectiveness of fogging to prevent dengue outbreaks.

Method

This research is an analytic observational, using a cross-sectional design. The data used is the incidence of DHF from 2008-2013 in Sleman Regency, which includes the date of illness, the date of the first and second fogging, and the home address. The next step in the research is illustrated in Figure 1.
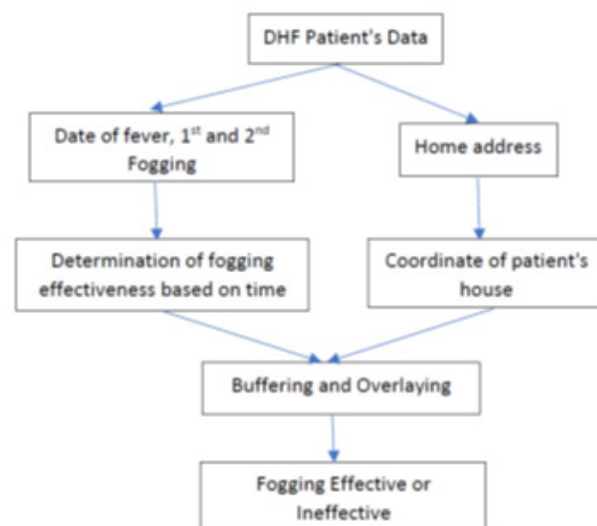

Figure 1. The Steps of the Research

The effectiveness of fogging was evaluated using GIS software (ArcMap 10.5), by creating a buffer area with a radius of 200 m from the center of the first patient's house. If there is more than one case of DHF in the buffer area on days 4-21 after the first patient has a fever, fogging is declared ineffective. The provision for a radius of 200 m is based on a fogging radius according to the provisions of the Sleman District Health Office. The provision of a protective period of 4-21 days is based on the estimated time required for the fever to appear after fogging is carried out. Data on the date of illness, the date of the first and second fogging as well as the home address of a DHF patient were obtained from the Sleman District Health Office. Based on the available home addresses, we look for the x and y coordinates by visiting the location, then determine the coordinates using the Global Positioning System (GPS).

The procedure for assessing the effectiveness of fogging with the Spatial-Temporal approach uses ArcMap 10.5. Data processing is done manually using the analysis buffer function. The steps for spatially processing data are as follows: 1). data preparation in the spreadsheet includes identity, date of illness, and information on fogging; 2). The unique coding of data per row in each sheet according to the year; 3). Choose the coordinates used, namely UTM; 4). Added sick time column (year, month, and date); 5). Giving information about fogging or not; 6). Added a time column when fogging was performed (year, month, and date); 7). Added fogging effect expiration time column; 8). Ensure that the date of the summation does not exceed the number of days in the month; 9). All data per year is stored in one sheet so that it can be recalled in the GIS; 10). Open the GIS, and add the .xls data that already has the unique code and UTM coordinates; 11). Perform data display and save as a point shapefile. The point shapefile contains information on the distribution of people with dengue fever, whether fogging or not; 12). Perform buffer analysis with a choice of a radius of 200 meters. The result of buffer analysis is polygon shapefile fogging; 13). Added the number of sick people column after fogging on the main spreadsheet; 14). Counting the number of people with dengue fever within a radius of 200 meters from the fogging point

Result and Discussion

The results of the evaluation of fogging using functions in GIS which were applied to data on the incidence of DHF in 2008-2013 in Sleman Regency are in Figures 1-3.
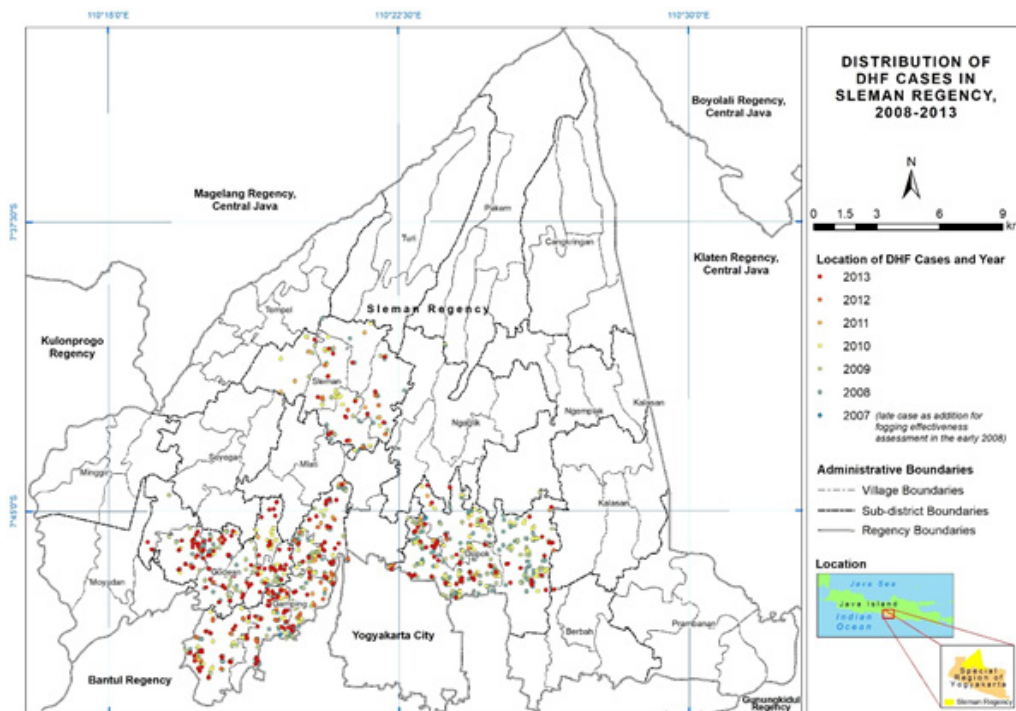

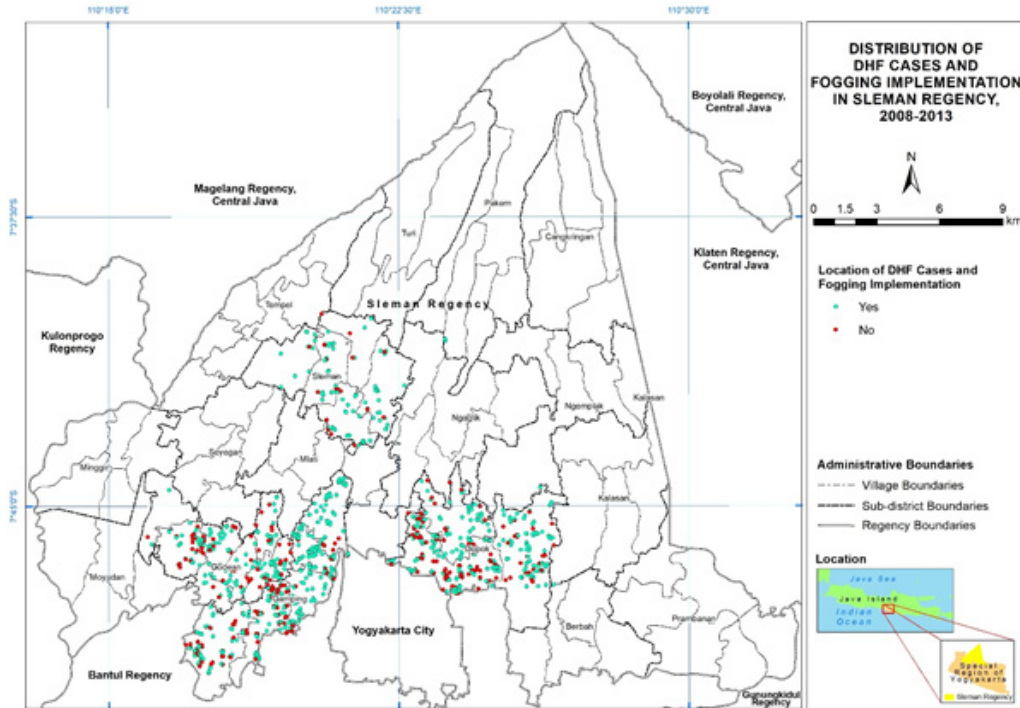Figure 2. Geographical Distribution of DHF Cases in Sleman Regency in 2008-2013

Figure 3. Geographical Distribution of DHF Cases with and without Fogging in Sleman Regency in 2008-2013
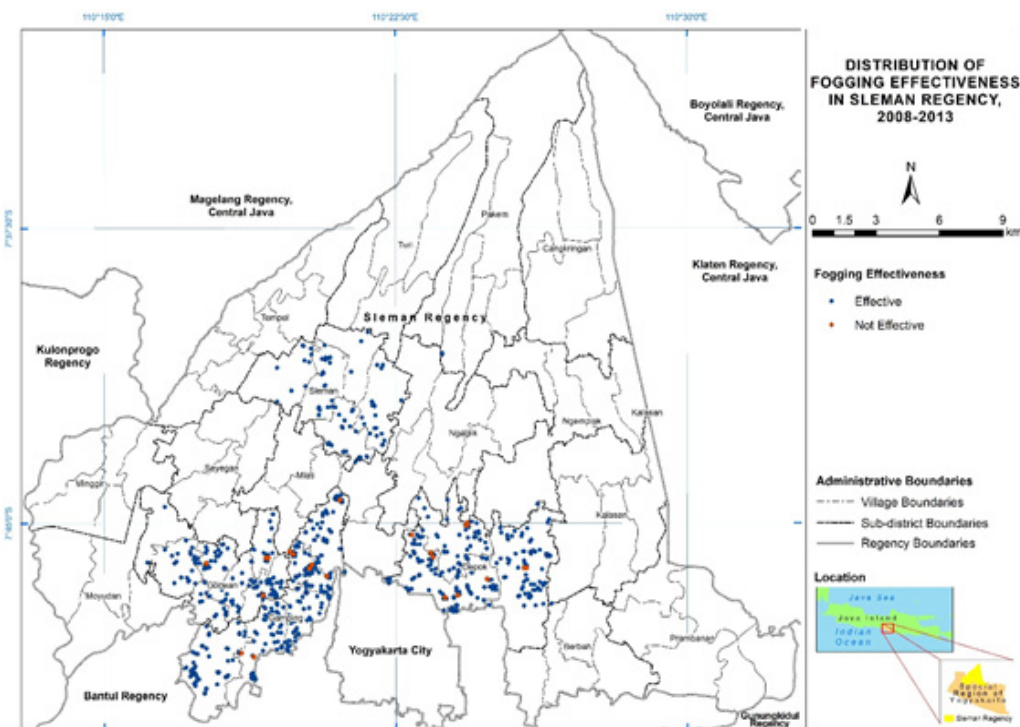

Figure 4. Geographical Distribution of Fogging Effectiveness

Figure 2 illustrates that the incidence of DHF in the Sleman Regency is more common in the southern part of the Sleman Regency. The area is bordered by the city of Yogyakarta and belongs to the agglomeration area of the city of Yogyakarta. Figure 3-4 describes the geographic distribution of DHF cases where fogging and effective fogging. It appears that effective fogging is more dominant than ineffective fogging.

There were 1,070 cases of DHF between 2008-2013 in the Sleman Regency. From those cases, 773 (72.24%) were fogged, while 290 were not. Of 773 fogging cases, 59 (7.63%) were caused by ineffective fogging (occurs within the time and place of fogging protection). Thus the effectiveness of fogging in Sleman Regency is 92.37%. Overall, there were 59 of 1,070 (5.5%) DHF cases came from ineffective fogging.

Fogging focus is a method to prevent outbreaks based on killing adult female mosquitoes (Usuga et al, 2019). Fogging is carried out after meeting particular requirements, namely after there are cases and the results of epidemiological investigations show the larva-free rate (LFR) is less than 95%, there are DHF patients or 3 people with symptoms of fever of unknown origin (Regulation MOH RI No. 50/2017). This restriction prevents Aedes mosquito resistance to insecticides due to uncontrolled use of insecticides.

Research on the effectiveness of fogging ever done, is with entomological parameters. These studies show inconsistent results. Fogging is effective in reducing mosquito density (LFR and House Index (HI) (Ibrahim et al., 2016) in Makassar, but does not reduce the HI and ovitrap index (OI) in Semarang City (Archiarafa et al., 2016), so its role in decreasing dengue cases is still debated. Research linking the frequency of fogging with the number of dengue incidents shows that the higher the frequency of fogging, the higher the number of dengue cases (Sipin et al, 2021), but this cannot be concluded that fogging fails to prevent dengue because fogging is done when the number of cases increases.

The results of the research that we have done show that 5.5% of cases of DHF in the Sleman Regency originate from ineffective fogging. Ineffective fogging may be caused by several things, including 1). The types and doses of insecticides used for fogging did not follow the rules (Nansen & Thomas, 2013); 2). The fogging technique did not comply with the procedure; (Nansen & Thomas, 2013) 3). The insecticide used was resistant to the target mosquito (Gan et al., 2021; Sudo et al., 2018).

The types of insecticides recommended for fogging focus in Indonesia include pyrethroids, carbamates, and organophosphates (Regulation of MOH RI No. 50/ 2017). Pyrethroids affect both target and nontarget central nervous systems. They interact with voltage-gated sodium channels in neurons as their principal mode of action (Riar, 2014). Meanwhile, Carbamate causes an increase in acetylcholine levels at parasympathetic and sympathetic nervous system ganglionic synapses, muscarinic receptors on parasympathetic nervous system target organs, the central nervous system, and nicotinic receptors in skeletal muscle tissue (Silberman & Taylor, 2022). Organophosphates can stably bind to AChE and stop ACh oxidation (Xu et al, 2018). Overstimulation of the muscarinic and nicotinic receptors results from the "liberation" of Ach causes the death of the insect (Adeyinka et al., 2022). Target site resistance and metabolic resistance are the two main types of resistance that exist in pests or insects. Target site resistance occurs when an insecticide's specific binding site is altered (mutated) or removed, rendering the target site unsuitable for activation. Additionally, metabolic resistance causes an overproduction of the enzymes that detoxify and break down pesticides, leading to pest resistance (Khan et al., 2020; Mulyaningsih et al, 2018).

Several studies related to Ae aegypti resistance to insecticides show that Ae aegypti has been resistant to pyrethroid insecticides at high levels (in PNG) (Demok et al., 2019), indicating the emergence of pyrethroid resistance in Saudi Arabia (Dafalla et al, 2019), both of pyrethroids and organophosphate resistance in California (USA) (Yang et al., 2020), and most likely expanding into less populated areas, according to a study in Kalimantan, Indonesia (Hamid et al., 2018). Studies in Southeast Asia using data from 2000-2019 show that there is a trend of increasing resistance of Aedes mosquitoes to insecticides used for fogging in controlling dengue (Gan et

al, 2021). Unlike in Assam, India, Aedes is still susceptible to Malathion (Yadav et al, 2015), a type of insecticide often used for fogging foci in the dengue control program. The results of this study also indicated that 95% of cases of DHF that occurred in Sleman Regency were probably caused by various things in the occurrence of DHF transmission other than the failure of fogging focus. Several risk factors for the occurrence of dengue cases may be due to mosquito bites at school (Ratanawong et al., 2016; Suarez and Cano, 2016), workplace (Perdomo et al., 2020; Zhang et al, 2022), or tourist attractions (Masyeni et al., 2018; Tan and Lee, 2022). Thus, fogging may also be carried out in a school environment/workplace/tourist location or other places that may be the site of dengue transmission other than the patient's house and surroundings

Conclusion

By the spatial-temporal method, 5.5% of the incidence of DHF in the Sleman Regency occurs because fogging is not effective, so the fogging focus has been quite successful in suppressing the incidence of DHF in the Sleman Regency. In the future, it is necessary to consider fogging focus other than the patient's house and surroundings.

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Moving Education and Individual Education as of Communities Health Education Models in Health Emergency Conditions

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Article Info

Abstract

Health education in the community is a part that must receive special attention during health emergencies. The research objective was to obtain the results of the implementation of the Moving Education and Individual Education models as the basis for the model of health education in the community during health emergencies. Research using experimental research (pre-test and post-test group). It took place in Semarang City in 2022. The population is 3616 people. The sample is determined by an accidental sampling technique that meets the requirements (age over 40 years, willingness to be a respondent, participating in Moving Education or Individual education activities). The statistical test results for the difference in the behavior of respondents before and after the intervention with the Moving Education and Individual Education Models obtained a p-value = 0.002 (p <0.05), or there was a difference between the two extension methods. The Individual Education method is stated to be more effective than the Moving Education method in implementing health protocols, but the impact on other factors is an important consideration.

Introduction

Public Health Emergency of International Concern (PHEIC) is a global public health problem that requires the support of international cooperation in all related fields according to the 2005 IHR (International Health Regulations), such as the pharmaceutical sector, drug and vaccine research, economics, medical technology. PHEIC is an extraordinary event that threatens the public health of other countries through global transmission and response requires a coordinated international response. The characteristics of PHEIC are causing concerned public health events, unusual/ unforeseen events, risk of international spread, and risk of international travel/trade restrictions (Wilder-Smith Osman, 2020).

One of the PHEIC conditions was when the COVID-19 pandemic occurred, which WHO identified as being caused by Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) (Handayani et al., 2018), (Bhatt et al., 2021), (Zhou, Zhang Qu, 2020). On January 30, 2020, WHO designated this incident as a Kedaruratan Kesehatan Masyarakat yang Meresahkan Dunia (KKMMD)/ Public Health Emergency of International Concern (PHEIC). On March 11, 2020, WHO declared COVID-19 a pandemic (She et al., 2020). The spread and number of cases worldwide, including in Indonesia, are increasing rapidly, and the number of deaths is difficult to control. Health experts are competing to move quickly to seek treatment, treatment, and vaccination to control and improve the situation. It is known that the 5 provinces with the highest cases of Covid include DKI Jakarta, East Java, West Java, Central Java, and South Sulawesi.

The mortality rate for COVID-19 in Indonesia is 8.9%, the highest in Southeast Asia (WHO, 2020). Several rules had been issued by WHO and the Government regarding protocols for preventing the transmission of COVID-19, namely using masks, washing hands, avoiding touching the face area, coughing and sneezing etiquette, maintaining distance, self-isolation when not feeling well, and maintaining health. Changes in behavior in adapting to new habits amid the COVID-19 pandemic are vital because COVID-19 has changed human civilization, such as how to socialize, work, and work. In conveying information regarding the implementation of health protocols, appropriate educational methods are needed in the community (Alimansur Quyumi, 2020).

Health education in the community is a part that must receive special attention when a health emergency occurs, as an example of a very concerned health problem, namely during the COVID-19 Pandemic, which is still ongoing until early 2022. Health education health promotion programs, encouraged in health centers, are individual and mobile counseling. Mobile counseling (Moving Education) is counseling that is carried out around the community (moving) without gathering residents (Fahmi Sitompul, 2022), (Maiman Becker, 1974). Individual counseling (Individual Education) is the process of conveying health messages briefly and clearly through a personal approach (Maiman Becker, 1974), (Tiraihati, 2018). The results of Zul Fikar Ahmad's research (2021) regarding efforts to provide health education in cases of diarrhea outbreaks during a pandemic which can have an impact on increasing knowledge, attitudes, and better preventive health behavior, it is very vital to choose health education methods and media to convey messages clearly and safely for officials and the target community (Zulfikar, Ahmad, 2021).

The general objective of the research is to obtain the results of an analysis of the use of the Moving Education and Individual Education models as the basis for a model of health education in the community during health emergencies. The specific objectives of the research: 1) To analyze behavior changes in public health protocols before and after the Moving Education model is implemented. 2) Analyze behavior changes in public health protocols before and after Individual Education. 3) Analyze the effectiveness of using the Moving Education and Individual Education models for changes in public health protocol behavior. 4) Get health education options in the community in health emergency conditions (PHEIC).

Method

This type of research uses experimental research with a pre-test and post-test group research design. The health emergency condition in this study, as an example that will be examined, is the condition of the COVID-19 Pandemic. The research location is in Kelurahan Sekayu, Semarang City, with a population of 3616 people (August 2020). The choice of location was based on the: it is located in the city of Semarang with high cases of COVID-19 (red zone), is an area visited by many migrants/workers living or boarding houses in the area, located in the area of a health center that has mobile and individual health education programs. The sample was determined using an accidental sampling technique to meet the requirements. The sample requirements are 1) Residents with an age range above 40 years, 2) Willing to be research respondents, and 3) Participating in Moving Education activities or individual education from the Sekayu Health Center. Determining the number of samples using the Slovin formula. So a minimum sample of 100 people is obtained (50 for the Individual Education group and 50 for the Moving Education group). The dependent variable in this study is community behavior concerning the COVID-19 health protocol. While, the independent variables are Individual Education and Moving Education models of health education.

Individual Education, is the process of conveying health messages, briefly and clearly, through an individual approach to increase knowledge and expected behavior changes, involving face-to-face contact between extension workers and targets, and counseling is carried out directly and does not use the media. Materials containing COVID-19 health protocols include: wearing masks, washing hands with soap and running

water, maintaining a safe distance, staying away from crowds, and limiting mobilization and interaction. Counseling was carried out for 15 minutes. Place in each other's homes or during a visit to the Health Center.

Moving Education, is counseling carried out around the community (moving) without gathering residents, using loudspeakers without using the media. Counseling was carried out by researchers with material on COVID-19 health protocols, including wearing masks, washing hands with soap and running water, maintaining a safe distance, staying away from crowds, and limiting mobilization and interaction. Counseling was carried out for 15 minutes. The behavior of the COVID-19 health protocol, is a community action concerning the Covid-19 health protocol (wearing a mask, washing hands with soap and running water, maintaining a safe distance, staying away from crowds, and limiting mobilization and interaction).

The research instruments consisted of counseling materials and questionnaires to assess community behavior regarding the COVID-19 health protocol, tested for validity and reliability. Univariate analysis to describe the characteristics of each research variable using the frequency distribution. Bivariate analysis to find differences in people's behavior concerning the COVID-19 health protocol before and after treatment using the Wilcoxon Test. Then to find out the differences in the effectiveness of using counseling methods on people's behavior concerning the COVID-19 health protocol, the Mann-Whitney Test was used. Meanwhile, to get health education options in the community in health emergency conditions (PHEIC) with literature studies, conclusions on the results of the effectiveness of health education obtained, and FGDs. FGD participants totaled 10 people, consisting of 4 people from the health promotion field from the puskesmas, 3 health promotion experts, and 3 community representatives. The research instruments consisted of counseling materials and questionnaires to assess community behavior regarding the COVID-19 health protocol, tested for validity and reliability. Univariate analysis to describe the characteristics of each research variable using

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Results and Discussions

The research area is the Sekayu Community Health Center located in the Central Semarang District, Semarang City, Central Java Province, a densely populated area. It is the center of government in Semarang City. Central Semarang District is divided into 15 Villages, 75 Community Units (RW), and 488 Household Units (RT). The income of most people is based on trade/entrepreneurship. There are 197 small industries with a workforce of 5,570 people and 21,791 home industries employing 19,062 people. There are 25 Hotels / Inns / Lodgings employing 1,100 people. There are 925 restaurants/food stalls employing 1,346 people. Trading 2,658 fruit with a workforce of 5,665 people. The transportation business has 50 units employing 158 people.

Table 1. Distribution of Health Protocol Behavior Before and After the Moving Education model intervention

Behavior	Before		After	
	n	%	n	%
Good	0	0	26	52
Medium	39	78	24	48
Low	11	22	0	0
Total	50	100	50	100

Source : Primary Data, 2020

Based on Table 1. the behavior of the respondent's health protocol before the intervention with the Moving Education model had the highest percentage in the moderate

category (78%). Meanwhile, the behavior of the respondents after the intervention was the highest in the good category (52%).

Table 2. Distribution of Health Protocol Behavior Before and After the Individual Education model intervention

Behavior	Before		After	
	n	%	n	%
Good	6	12	42	84
Medium	35	70	8	16
Low	9	18	0	0
Total	50	100	50	100

Source : Primary Data, 2020

Table 2 showed that the health protocol behavior before the intervention of the Individual Education model was the highest in the moderate category (70%), and after the intervention, the highest was good(84%).

The results of the pretest and post-test differential test of respondents' behavior in the Moving Education and Individual Education model intervention groups carried out by the Wilcoxon statistical test showed a p-value = 0.001 for the Moving Education model and a p-value = 0.000 for the Individual Education model. So it can be concluded that there are differences in people's behavior regarding health protocols before and after being given counseling using the Moving Education and Individual Education models.

Table 3. Differences in Respondents' Behavior Before and After the Intervention with the Moving Education and Individual Education Models

Methods	Before	After	Difference	p-value
Moving Education	35	45	10	0.002
Individual Education	35	55	20	

Source : Primary Data, 2020

The increase in the behavior of respondents before and after counseling with the Moving Education Method was an average of 10, while for the Individual Education Method, it was 20. The results of the Mann-Whitney statistical test obtained a p-value = 0.002 (p <0.05). So it was concluded that there was a difference between counseling with the Moving Education method and Individual Education. The Individual Education method is stated to be more effective than the Moving Education method in implementing health protocols.

The results of the FGD concluded that the choice of health promotion methods in health emergencies is affected by the emergency form that occurred, such as an emergency outbreak of diarrheal disease or poisoning or health problems due to natural disasters, and whether the degree covers one region, one country or the world. This research is related to the COVID-19 pandemic, with existing characteristics related to the mode of transmission, the impact on morbidity, mortality, and many non-health aspects. So Moving Education is the safest to do for health workers and the community. Although, the highest level of effectiveness is in the Individual Education model. The combination model is the best way, where Individual Education is carried out in counseling form, along with face-to-face examinations or via the internet.

Health emergencies, such as the COVID-19 outbreak, have changed people's behavior regarding health and will not return to normal soon after the emergency policy is lifted (Hara Yamaguchi, 2021). It has caused changes in the use of health services, the ability to make in-person medical visits, and services cannot be implemented evenly (Wang et al., 2021). It is due to the existing health emergency followed by policies that must be obeyed. China empowers technological facilities to deal with the COVID-19 outbreak. It is evident from the use of internet hospital services to alleviate the unavailability and inequality of health services during the COVID-19 pandemic and reduce misinformation that spreads in various media (Wu et al., 2021). Health education in the community is a part that must receive special attention when a health outbreak occurs, as an example of a critical health problem, namely during the pandemic, which is still ongoing until early 2022. During the COVID-19 pandemic, health promotion carried out by the government and various health facilities is vital. Selection of health promotion methods/models is urgent to get maximum results (Handayani et al., 2015), (Handayani et al., 2017). In addition to getting maximum results, it also considers the safety and security of officers as a result of carrying out their duties. The public needs to get as much information as possible, considering that the SARS-CoV 1 virus that causes COVID-19 is a relatively new type of virus. In addition, the learning process for student health workers, such as nursing, must find appropriate methods to avoid negative impacts, especially when practicing in the field. Another example is the mobile training program on immunization for nurses and doctors (ADVT). (Pramana et al., 2022), (Rajasekaran Sriman Narayana Iyengar, 2013).

The results of the research related to the analysis of the use of Moving Education and Individual Education as models of health education in the community in health emergency conditions conclude that there are differences before and after health education is carried out from the two methods provided, which are in the form of increasing behavior related to bathing and changing clothes after carrying out activities in outside the home, exercise regularly, and consume vitamins regularly. The results of the study found that there was a difference in the average value of the behavior of the respondents after counseling was carried out both by the Moving Education and Individual Education methods, with an increase in the behavior value of the respondents on an average of 20 in Individual Education and 10 in Moving Education. So Individual Education is more effective than Moving Education with a p-value = 0.002 (p <0.05). It is possible because the Individual Education method is given through an individual approach that directly involves face-to-face contact between extension officers and the target so that respondents will understand more about the presentation and can discuss respondents problems quickly and directly.

Even though the Individual Education method gives better, in conditions of a health emergency, other factors are important considerations, such as the level of security from the point of view of transmission, the spread of cases, and increased mortality. Safety from the point of view of sufferers or those who are positive cases or from the point of view of officers is also a factor that is an important consideration. Many victims of health workers carry out their duties well, which results in contracting the disease and even death, including the psychological impact on the officers who carry out their duties (Pollock et al., 2020). The Individual Education method in this study was carried out directly face-to-face. In addition, the Individual Education method can be realized in direct counseling or by each cell phone and carry out an individual approach that allows you to ask questions and answers. Many health education services are provided virtually, as is done for people with TB and HIV. Mobile education not only has a knowledge education function, but can also be integrated with clinical decision support, drug adherence, and quality of life and significantly increase knowledge (Guo et al., 2017). In Africa, the mobile education method is used for tuberculosis education media, like a TB screening medium for patient referrals and follow-up through increasing Public Private Mix (PPM) (Tumuhimbise Musiimenta, 2021). Mobile education is highly relevant in the context of the ongoing global pandemic, accelerating knowledge

transfer, increasing learning motivation, health promotion effects, and increasing self-management efficiency (Feng et al., 2021). Some of the obstacles experienced in the field, such as teletraining and telecardiology, which is the most appropriate method in the field, face several obstacles, like infrastructure and technology barriers, organizational and financial barriers, policy and regulatory barriers, and cultural barriers.

Other research states that E-learning can also be the method of choice for possible community characteristics, such as the results, which state that the use of online learning (e-learning) has a significant effect on increasing knowledge, attitudes, and behavior in preventing diarrhea during a pandemic (Meilinda et al., 2020). The use of digital information and communication technology (ICT) has enabled many professionals to continue providing their services during the COVID-19 pandemic, as research results suggest that compared to face-to-face interventions, psychologists recognize that preventive action/knowledge through ICT is an option for providing services can still run, fulfill client compliance, and produce positive results (Dores et al., 2020). The use of technology is also manifested in video media. Exposure to health education videos can enhance their social support and mental growth and can help them overcome the adverse effects of public health emergencies with better mental health and health-related behaviors (Yang et al., 2021).

In conditions of long-term health emergencies, a diversification strategy in health services needs to be implemented, including in terms of the selected health promotion program. Selvi DM's research (2020) found that the diversification of strategic services had an impact on a high community level in accessing and participating in Posyandu activities during the COVID-19 Pandemic, including those related to health education that had to be given to the target community using Posyandu (Integrated Health Service Post) (Meilinda et al., 2020). This diversification strategy can be utilized for selecting methods of health education activities in health emergency conditions, which are related to Individual Education carried out directly from door to door along with other visiting activities. For example, simultaneously weighing toddlers during pregnancy checks, or it can be a more comprehensive form in the counseling during health checks in health services. Research to determine the effectiveness of interventions during health emergencies is a high priority to get maximum results and consider the resilience and mental health of frontline workers, like during the COVID-19 Pandemic, where intervention evaluations need to

be carried out and become a lesson or study results for the future for proper and rigorous planning, including development, peer review, and reporting of research protocols that are transparent, following guidelines and standards for best practice, with an appropriate follow-up period. Factors that can act as barriers and facilitators to the implementation of interventions should be considered during planning when selecting interventions to be given and adapted to existing local circumstances (Pollock et al., 2020). In addition to socio-cultural, economic, psychological, and health factors that can be harmful to be considered, such as vulnerable groups or populations (elderly, children, people with comorbid diseases), as well as sociodemographic factors such as age, gender (Vaughan Tinker, 2009), (Onyeaka et al., 2021). Moving education is carried out in traditional societies with technological and socio-cultural limitations that do not support mobile education using digital devices, so it is the method of choice in health emergencies. Eventhough many research results state that mobile education has a success rate (Onyeaka et al., 2021), (Guo et al., 2017), (Abbaspur-Behbahani et al., 2022), (Asadzadeh Kalankesh, 2021).

Quality health education must involve delivering accurate information yet simple. A language that individuals or groups can understand, with the goals of raising awareness, changing behavior, and reducing disease and death. Health education is not a one-time event; but must be an ongoing activity and requires constant efforts to keep provider knowledge up to date (Pagliazzi et al., 2020). Behavior counseling/education can increase adherence to health improvement efforts. In this case, individual motivation to change unhealthy habits is an important enough factor to get effective results.

This study concluded the differences in people's behavior regarding the COVID-19 health protocol before and after being given counseling using the Moving Education method and the Individual Education method. Although the Individual Education Method results in better changes in people's behavior towards health protocols, compared to the Moving Education method, the impact on other factors is an important consideration. The combination will get better results, with better security for the community and officers. Deeper and broader information, in terms of, results for the community on morbidity and safety for health workers, is urgently needed for making appropriate program policies.

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Improving Community Knowledge and Behavior in the One House One Jumantik Program in Dengue Control

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Article Info

Abstract

Indonesia is a dengue-endemic country with cases of death every year, including East Kalimantan. One house one jumantik/larva monitor (G1R1J), has been carried out in Samarinda, East Kalimantan but has never been evaluated and implemented. This study aims to determine the communities' knowledge, attitudes, and actions regarding G1R1J, as well as to see the effect of mentoring by cadres. This research is a quasi-experimental research with a control design. The research activities took time from March - November 2019. Measurements were taken before and after treatment by conducting a pre-test and post-test in Sidodadi Village as an intervention and Dadimulia as a control. The sample size in this study was 300 respondents with the criteria of the occupants of the house/building appointed/person in charge of implementing G1R1J. The instrument used is a questionnaire. T-test statistics are used to determine differences in the control and treatment areas, as well as before and after the intervention. The results showed an increase in knowledge, attitudes, and actions regarding the understanding, symptoms, and causes of dengue fever, as well as about one house one jumantik/larva monitor (G1R1J) after assisting cadres when compared to the control area. There was a statistical difference between the treated areas when compared to the good control areas. Optimum utilization of cadres should be an alternative to reduce the incidence of DHF in the community.

Introduction

Indonesia is located in the tropics and is endemic to dengue. Deaths occur every year. East Kalimantan Province is one of the endemic areas for dengue fever in Indonesia. The case number or Incidence Rate (IR) of DHF in East Kalimantan Province in 2018 was 20.2. At the beginning of 2019, it was 11.8. Almost every year since 2014, the IR of DHF in the City of East Kalimantan is the highest compared to 11 other districts/cities in East Kalimantan Province. The activities of the DHF control and prevention program that are routinely carried out by the Health Office of the City of East Kalimantan are fogging, larviciding, and periodic larval monitoring carried out by village cadres together with the DHF program manager at the Puskesmas. Although various efforts have been carried out, cases of dengue

fever in East Kalimantan City remain high(East Kalimantan Provincial Health Office, 2021).

In 2018, the City of East Kalimantan carried out the one house one jumantik/larva monitor (G1R1J) socialization activity. This socialization is a follow-up to the Circular of the Minister of Health containing an invitation to urge the public to carry out the Eradication of Mosquito Nests (PSN) 3M (close, drain, bury) Plus by activating G1R1J in their residential neighborhoods (Circular Letter Number PM. 01.11/Menkes/591/2016 concerning Implementation PSN 3M 3m Plus with G1R1J, 2016. East Kalimantan Province is one of 111 regencies/cities that implemented G1R1J in 2018, with implementation indicators in the form of the issuance of a G1R1J Implementing Team Decree. G1R1J is a program to prevent dengue transmission through family-based

community empowerment. The spearhead of G1R1J is the Home and Environmental Jumantik, namely community members in every household who are trained to monitor and clean mosquito larvae in their homes and surroundings through the 3M Plus PSN movement and record the results on an examination card (Ridha et al., 2022).

The home and neighborhood jumantik (larva monitor) guidance is carried out by the coordinator who is usually a health cadre who is active in the community. The health cadres come from the community themselves. So more effective in increasing public awareness(K. Kartini et al., 2021). A jumantik coordinator is a vital element in the success of the G1R1J program. The recommendation from the jumantik coordinator, in this case, the health cadres, can influence the community's actions to participate in the eradication of DHF (Pratama et al., 2017). The jumantik coordinator should be equipped with knowledge and skills, so they can independently carry out their duties. Several studies state that the participation of cadres in the community is influenced by motivation, knowledge and technical skills, social skills, planning, and problem-solving abilities(Akol et al., 2017)(Simamora, 2017). Good knowledge and perceptions make cadres able to deliver counseling well. The positive attitude of cadres will have an impact on the willingness to be proactive and responsible in providing socialization to the community (Dewi & Anisa, 2018).

The G1R1J activities carried out in the City of East Kalimantan are still limited to socialization with the managers of the DHF control program at the Public Health Centre (Puskesmas) and distribution of larvae examination cards. It is not yet known how the community understands and implements G1R1J in East Kalimantan City. This study aims to determine the knowledge, attitudes, and actions of the community related to the implementation of the 1R1J movement and to see the effect of the pattern of cadre assistance on the knowledge, attitudes, and actions of the community in G1R1J.

METHOD

The observation changed into authorized through The Ethics Commission, National Institute of Health Research and Development, Indonesian Ministry of Health with the moral clearance variety LB.02.01/2/KE.296/2018. This research was carried out in Samarinda City, namely in Samarinda Ulu District, Sidodadi Village as an assisted area (intervention), and Dadi Mulia Village without assistance (control). The research took time from January to November 2019. The research design was quasi-experimental with control. The population in this study are community members who occupy houses/buildings in Sidodadi and Dadi Mulia Villages.

The sample in this study were household members appointed/responsible for carrying out G1R1J activities in each house/building. Based on the calculation, the minimum sample was 300, namely 150 for the control and 150 for the intervention (Whitley & Ball, 2002). Pre and post-test data were collected to measure differences in knowledge, attitudes, and actions of the community in the intervention area. Assistance in the form of counseling and Focus Group Discussions (FGD) was carried out for problem-solving, while the control area was not. Assistance is provided to cadres, followed by the head of the RT and village officials. Mentoring and FGD were conducted 5 times for 5 months. Assistance in this study was by cadres as jumantik coordinators. The process of mentoring cadres is interspersed with counseling. The cadre will accompany the house jumantik performing PSN (mosquito's nest eradication) actions and records the larva inspection card. In addition, assistance was provided to cadres by the puskesmas team. Assistance activities by the puskesmas by FGD containing discussions, consultations, and advocacy regarding PSN activities carried out by Jumantik Rumah, recording examination results, PSN monitoring activities, and visiting activities by the Jumantik Coordinator, and analysis of larvae-free rates by the Jumantik Supervisor.

The instrument in this activity is a structured questionnaire conducting interviews with adults in the selected sample houses. Data analysis used univariate analysis which presented the percentage of the characteristics of the research sample. Univariate data analysis

aims to explain the frequency distribution of the variables studied, namely knowledge, attitudes, and actions. The bivariate data analysis then used t-test paired sample to determine differences in knowledge, attitudes, and actions before and after the intervention.

Then, to see the difference between the values of knowledge, attitudes, and actions between the intervention and control areas during the post-test, a different test was carried out using an independent sample t-test.

Table 1. Characteristics of Respondents

Variables	Sidodadi (%)	Dadimulia (%)
Average density occupant house	4.29 (1-11)	4.15 (1-11)
Gender		
- Man	84.7	90.7
- Woman	15.3	9.3
Ages		
- 15-25	1.3	0
- 22-55	52	50
- >56	46.7	50
Education		
- Never school	10.3	4.6
- Elementary school	26	29.3
- junior high school	16	16.7
- high school	33.7	41.3
- Graduated	14	8.1
Occupation		
- Not work	10.7	16
- Government	8.7	20.7
- Employee	15.3	35.3
- Entrepreneur	41.3	10.7
- Farmer	5.3	1.3
- driver	12.7	13.3
- Other	6	2.7

Source : Primary Data, 2019

The Average density occupant houses is generally 4.29 in Sidodadi and 4.15 in Dadimulia. Respondents are generally men with an age range of 22-25. The level of education is high school, with the most jobs as entrepreneurs in Sidodadi and employees in Dadimulia (Table 1). There was a significant increase in knowledge on pre and post. Knowing jumantik and G1R1J increased in Sidodadi when compared to Dadimulia. The source of this knowledge was previously from officers of the Public health center (58.3%) to cadres (60.4%) (Table 2). There was an increase in the attitude of the respondents. Although

it was not significant, the attitude of the respondents before the intervention was good. Respondents generally wanted to conduct further socialization regarding G1R1J, cadre visits, and inspections every 2 weeks and agreed that sanctions were applied if violated (Table 3). Community practice changes in behavior, especially in draining reservoir water and recycling goods. It is per the pattern of finding mosquito larvae by the community which increases in bathtubs, buckets, drums, plant pots, and decreases in sewers. The community's plaque also increases by draining and storing water and keeping fish (Table 4).

Table 2. Knowledge Respondent Pre and Post Intervention

KNOWLEDGE			Sidodadi (%)		Dadimulia (%)	
			Pre	Post	Pre	Post
Know Jumantik	-	Yes	23.3	73.6	23.3	45.8
	-	Not	76.7	26.4	76.7	54.2
Know G1R1J	-	Yes	8	68.6	8	17.4
	-	Not	92	31.4	92	82.6
Source Information G1R1J	-	RT/RW	25	28.1	8.3	8
	-	Village / District	41.7	9.4	16.7	0
	-	Cadre	25	62	41.7	8
	-	Family	9.7	1	16.7	0
	-	Officer of Public health center	58.3	60.4	58.3	76
	-	Health Service Officer	25	0	2.1	8
	-	Print and Electronic Media	25	4.2	25	16
	-	Other	8.3	1	8.3	4
Knowing G1R1J Card	-	Yes	0	100	65	10
	-	Not	0	1	42	88

Source : Primary Data, 2019

Table 3. Attitude Respondent Pre and Post Intervention

ATTITUDE	Sidodadi (%)		Dadimulia %)	
	Pre	Post	Pre	Post
G1R1J no need socialized	10	16	16	4.2
G1R1 J need held at each house	95	95	95	97.2
All member house ladder responsible to cleanliness environment around home	98	97	99	96.5
Examination card larva must be filled when doing an inspection flick	97	97	92	90.3
3M plus activities no need conducted at each house	17	12	30	6.9
Only environment in house only need _ noticed cleanliness	11	14	15	26.4
Need drain bathtub or _ water storage at least 1 week 1 time	97	96	96	95.8
Visit officer / cadre Jumantik required for monitor environment around house inhabitant	97	92	96	95.8
I feel disturbed when visited officer or cadre Jumantik 2 weeks very	15	14	17	11.8
House which found flick given sanction	59	57	59	61.1

Source : Primary Data, 2019

The different tests in the Sidodadi village area before and after the intervention, as shown in Table 5, showed a significant difference in the average value of knowledge level and behavior/action. Meanwhile, at the attitude level, there was no difference in values before and after the intervention. The mean value on knowledge and behavior shows a negative sign, which means the mean score before the intervention is lower than the mean score after the intervention. The average attitude value shows a positive value and the below indicates that the average attitude value before and after the intervention does not have a significant difference in the mean value.

The assessment was carried out again in Sidodadi Village (intervention) and Dadimulya Village (control) after the intervention was carried out can be seen in Table 6. The results show a significant difference between the two villages regarding knowledge and behavior/action, whereas Sidodadi Village has a higher average value than Dadimulya Village. However, the mean value of the Dadimulya Village attitude is slightly higher than Kelurahan Sidodadi, although it is not significantly different.

Table 4. Practice Respondent Pre and Post Intervention

Practices	Sidodadi (%)		Dadimulia (%)	
	Pre	Post	Pre	Post
Do you do PSN 3M plus as follows :				
- Drain water reservoir	91	99	93	97
- Close meeting water reservoir	73	71	51	72
- recycle repeat goods used	11	21	6	17
- Changing flower vase water	15	9.3	8.7	7.6
- Sleep use mosquito net	6.7	6.4	8.7	8.3
- Using mosquito repellent	55	43	47	33
- To do larvicidation	7.3	5	5.3	1.4
- Caring for fish eaters flick	4.7	2.1	3.3	0.7
- Use trap mosquito	2	4.3	1.3	0
- Plant plant repellent mosquito	4	0.7	4.7	1.4
- Install wire gauze mosquito	37	1.4	25	22
- Other	0.7	31	0.7	0
Where to find mosquito larvae				
- Bathtub / WC	66	73	53	60
- Bucket	19	32	21	27
- Drum	49	56	40	54
- Dispenser	7.3	22	6.7	11
- Refrigerator Landfill	0.7	5	3.3	4.2
- Shell coconut	0.7	0.7	0.7	0
- Plant pots	2.7	11	2	5.6
- The place drink animal	0.7	2.1	0.7	2.8
- Aquarium	1.3	3.6	0.7	1.4
- Pool	0	5	1.3	3.5
- Goods used	21	12	30	17
- sewer / gutter	47	19	36	22
- Holy water place	1.3		0	0.7
- Other	0.7	1.4	1.3	0
What which conducted if found mosquito larvae				
- Throwing water	79	81	65	74
- Drain and brush	67	71	59	64
- Sprinkle drug exterminator flick	5.3	3.6	9.3	4.9
- Keeping fish	2.7	7.9	0.7	2.8
- Throw away the flick	3.3	1	4	4.9

Source : Primary Data, 2019

Table 5. The Results of the Different Intervention Areas at the Time of Pre and Post Conducted Intervention

	mean	Standard Deviation	f
Knowledge	-49,836	43,350	0.000
Attitude	0.950	18,784	0.551
Practice	-32.457	30,303	0.000

Source : Primary Data, 2019

Table 6. Test Different Among Ward Sidodadi and Dadimulia Post Conducted Intervention

Group		Mean	Standard Deviation	ƒ
Knowledge	Intervention	63.42	38,411	0.000
	Control	19.63	20,384	
Attitude	Intervention	86.94	12,468	0.291
	Control	88.52	12,683	
Behavior	Intervention	50.86	24,975	0.000
	Control	14.66	10,051	

Source : Primary Data, 2019

Public perception of the G1R1J program in this study varied widely. This condition is closely related to, one of them, the knowledge that is not yet comprehensive about dengue disease. It can be said that it influences his behavior in preventing the transmission of DHF. The knowledge-attitude-behavior model assumes that knowledge is vital to influence behavior change and that individuals can acquire knowledge and skills through learning (Sas et al., 2021). It is in line with the results of a study in Denpasar which showed that people with low levels of knowledge had a 2.72 times risk of developing DHF compared to people with higher education (Purnama et al., 2013). However, there is a tendency for the community not to absorb all the information obtained, which needs attention. This phenomenon is related to the level of motivation and views of each individual in responding information. When individuals do not feel the benefits, the information tends to be forgotten (Needham et al., 2018). The health belief model (HBM) approach is the basis for looking at cadres' perceptions of the G1R1J program in Samarinda City, East Kalimantan Province. This health belief model describes the existence of a person's consideration before behaving healthily. Following what was reported in a study in South East Ethiopia that the perception of severity is often based on medical information or other knowledge (Nigussie et al., 2019).

Understanding the severity of DHF varies depending on the knowledge and experience possessed by a person. Following the results of the study stated that the perception of the severity of DHF had a relationship with efforts to prevent DHF by the research subjects (Kumaran et al., 2018). If the perception of

vulnerability is high, the greater the efforts to prevent DHF. On the other hand, the smaller the assessment of perceived severity, the worse the efforts to prevent DHF are carried out. Appropriate counseling and empowerment of the community affect the success of the program. It is evidenced by research findings that community empowerment interventions show a significant increase in health knowledge (AhbiRami & Zuharah, 2020)(Rubenstein, 2016). Increased health knowledge makes it easier for people to understand the program implemented.

Community participation in health programs, apart from socialization, is also necessary to build trust from the relationships formed. Several studies report the successful implementation of the partnership process in a community empowerment intervention(Zhang, 2020)(Melo & Alves, 2019)(Melo & Alves, 2019). The results of the study prove that the existence of routine health counseling conducted by the puskesmas is one of the factors that correlate to the decrease in the incidence of DHF in elementary schools (P. R. Kartini et al., 2018). Likewise at the family level, to reduce the occurrence of cases of dengue infection, it is necessary, promoting health in the family is required to improve the knowledge, attitudes, and behavior of the community.

The substance of the G1R1J program is the empowerment of family members as jumantik, which previously were carried out by cadres. The delegation of tasks to the house jumantik is not yet complete due to the gap between the cadres and the house jumantik. Some house jumantik still depend and rely on cadres (jumantik coordinators) in implementing PSN. The difference in the implementation role between the jumantik coordinator and the

house jumantik can be caused by motivational factors. The study stated that cadres have internal and external motivation in carrying out their duties(Ratnasari et al., 2019). The most influential internal motivation is the responsibility, while external motivation is social relations. This motivation may not be owned by the house jumantik to be able to carry out their duties properly.

The results of the study describe an increase in the G1R1J intervention area in Samarinda City. The role of cadres in conducting counseling and assistance in the community can mobilize the community in efforts to eradicate mosquito advice. Previously encountered obstacles can then be overcome. On the other hand, another finding from the interview is the pragmatic attitude of the residents when larvae are found in their homes, assuming that in that place (their house), it is common to find larvae. It shows that cadres, as the spearhead of the G1R1J program implementation, cannot stand alone. The efforts of cadres require the support of the puskesmas as stakeholders and cross-sectoral collaboration with community leaders in their working areas, such as RT and RW. It is in line with (Simamora, 2017) stating that puskesmas and health offices should carry out regular outreach efforts to increase public knowledge about DHF and PSN.

The sustainability of this community empowerment program is closely related to a strong sense of belonging from the community to the program itself (Chon et al., 2020) (Rinawan et al., 2017). Increasing the sense of belonging to G1R1J needs to be carried out through cross-program and cross-sectoral activities. Socialization regarding the technical implementation of G1R1J is one way to increase public knowledge and awareness, which can affect a sense of belonging to the G1R1J program. There are still people who are not socialized with this program technically. Socialization by officers still needs to be improved. It is as reported (McCreight et al., 2019) stated that the role of officers is significant in influencing the behavior of eradicating mosquito nests by the community. The limitation of this study is that it is necessary to evaluate in the following year with a wider role. The findings in this study cannot be generalized to other areas where

dengue is endemic in the implementation of G1R1J.

CONCLUSION

There is an influence of community knowledge and behavior on the interventions carried out by cadres. Besides, there is also an influence between the intervention and control areas. G1R1J activities by empowering cadres are expected to reduce cases of dengue fever in the community. The role of cross-sectors such as sub-districts, sub-districts, and community health centers can be increased by conducting one mini-workshop every 2-3 months.

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Rice Husk Waste: Impact on Environmental Health and Potential as Biogas

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Article Info

Abstract

Indonesia is an agricultural country with dry-milled grain production reaching 55.6 million tons in 2022. Besides producing an abundance of rice, milled dry rice also results in waste in the form of rice husks. The handling of rice husk waste is mostly by burning. The smoke from burning is toxic, so it has a poor impact on environmental health. This study is regarding the effect of improper management of rice husks on environmental health, the utilization of rice husks in biogas energy, and its potential in Indonesia. Air quality measurement in areas burning rice husks on the parameters SO_2, CO, NO_2, and $PM10$ regarding the method of the Indonesian National Standard. Then anaerobic laboratory-scale research to convert rice husk into biogas. Chemical pretreatment was carried out with 3% NaOH and the C/N ratio determined was 25. Condition variations were determined for L-AD with 7% TS and SS-AD with 17% TS. We found that burning rice husks harm on environmental health. It is indicated by the SO_2 and $PM10$ parameters exceeding the quality standards, namely 167 and 132 μg/m3.The NO_2 parameter almost reached the quality standard, namely 178 μg/m3. Generated rice husk can be converted into renewable energy in biogas with good productivity in SS-AD conditions, with biogas production reaching 75.2 mL.gTS-1. Biogas potential from rice husks reached 1.5 million liters. It can support energy security for Indonesia.

Introduction

Indonesia is an agrarian country, with most of the population working in the agricultural sector. According to the Official Statistical News No. 74/10/Th. XXV released on October 17, 2022, by the Central Statistics Agency (BPS), the harvested area of rice plants reached 10.6 million hectares with production in the form of dry milled grain (gabah kering giling/GKG) of 55.6 million tonnes. If converted into rice, rice production is estimated to reach 32.07 million tonnes (Statistik, 2022). Of course, it is good news that Indonesia has a staple food in the form of rice. So it can be fulfilled properly. However, it needs to understand that GKG does not completely turn into ready-to-cook rice. Rice obtained from GKG is 64.02%.

The rest is waste in the form of rice husks. If calculated, in 2022, there will be an estimated generation of rice husk waste of 20 million tons.

Based on (Nugraha et al., 2018; Putri et al., 2019), the utilization of rice husks is still relatively low, usually used as a planting medium where some are made into charcoal first, and some are left intact in their original form. Other uses are as fuel for making bricks, cooking fuel, and made into briquettes, but the amount is very small. Research conducted by (Ningsih et al., 2012) stated that rice husks can be used as a mixture of cement raw materials where utilization can reach 5%. The research was carried out on a laboratory scale and needs to be scaled up and further developed. Most of the handling of rice husk waste is by burning

it. Usually carried out directly by farmers after the main harvest period. Farmers note that burning rice husks can make paddy fields fertile and ready for replanting (Goodman, 2020). However, this is not per research conducted by (Glushankova et al., 2018), stating that burning rice husks can reduce nutrients in the area used to burn the rice husks. Besides having a poor impact on the soil, burning rice husks also causes air pollution. According to (Bodor et al., 2022; Zorena et al., 2022), the combustion process will release various pollutants such as SO2, NO2, CO, O3, Pb, PM10, and PM2.5 which can be detrimental to environmental health. Air pollution affects humans, animals, including plants.

Rice husk waste is included in the class of organic waste from agricultural activities (Achinas et al., 2017). Currently, biogas technology development uses agriculture waste (biomass) as raw material, whereas initially biogas technology only uses livestock waste (Matin et al., 2020). Of course, this trend is beneficial for agraria countries like Indonesia, where the generation of organic waste from agricultural activities is very high. Biogas is a technology that utilizes microorganisms anaerobically and converts organic waste into methane gas and other gaseous elements. Biogas is also renewable energy because the production process uses simple raw materials and does not require a long time (Budiyono et al., 2022, 2021; Sumardiono et al., 2022). This research studies the impact the impact of rice husk waste on environmental health if not managed properly. Furthermore, it is utilized as renewable energy in the form of biogas, and the potential of rice husk to become biogas energy in Indonesia.

Methods

Measurement of ambient air quality was carried out in Rowosari Village, Tembalang District, Semarang City. Measurements were made twice during the main harvest, and many farmers burned rice husks. The measurement method is based on the Indonesian National Standard (SNI) under Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management. The parameters tested included: Sulfur Dioxide

(SO2) with SNI 7119-7-2017, Carbon Monoxide (CO) with SNI 7119-10-2011, Nitrogen Dioxide (NO2) with SNI 7119-2-2017, and Particulate Matter 10 (PM10) with SNI 7119-15-2016. In measuring SO2, CO, and NO2 parameters using Impinger and for PM10 parameters using High Volume Air Sampler (HVAS).

The raw material used for biogas production is rice husk from the Rice Milling House in Rowosari Village, Tembalang District, Semarang City. Another ingredient used is cow rumen liquid taken from the Penggaron Animal Slaughterhouse. Cow rumen liquid is used as a starter. 3% NaOH was used for chemical pretreatment for 24 hours. The C/N Ratio parameter was determined to be 25 and adjusted by adding technical urea. Total Solid (TS) parameters are set in two conditions, namely Liquid State Anaerobic Digestion (L-AD) and Solid State Anaerobic Digestion (SS-AD). In L-AD with 7% TS and in SS-AD with 17% TS.
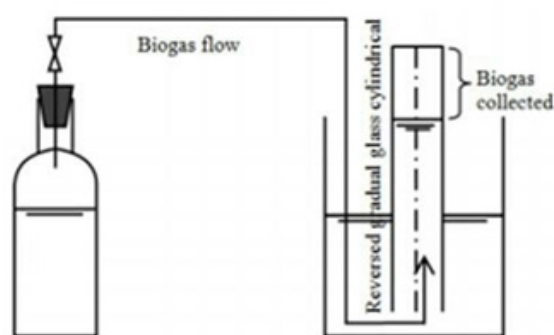

Figure 1. Series of Research Tools in the Laboratory

The research was on a laboratory scale. The biogas reactor is assembled from a polyethylene bottle with a volume of 1 liter, with a top made of rubber equipped with a valve that can be opened and closed for the process of measuring biogas production. Biogas measurements were carried out using the water displacement method (Budiyono et al., 2022; Sumardiono et al., 2022) and also carried out every other day for 60 days (biogas was no longer formed significantly). The series of biogas reactors and their measurements are in Figure 1.

Results and Discussions

Ambient air quality measurements were carried out twice to obtain accurate data and also follow the SNI method for each parameter.

The results of ambient air quality measurements can be seen in Table 1. Two parameters exceeded the quality standards, namely SO2 167 μg/m3 and PM10 132 μg/m3. Then the parameters for

CO 200 μg/m3 and NO2 178 μg/m3 are still below the quality standard. But for NO2 it is at the upper limit, so it almost reaches the quality standard.

Table 1. Ambien Air Quality Measurement

Parameters	Measurement Results ($\mu g/m^3$)	Quality Standard ($\mu g/m^3$)
Sulfur Dioxide (SO_2)	167	150
Carbon Monoxide (CO)	200	1,000
Nitrogen Dioxide (NO_2)	178	200
Particulate Matter 10 (PM_{10})	132	75

The process of burning rice husks openly and at uncontrolled temperatures included incomplete combustion resulting in significant high air pollutants. Perfect combustion only produces CO2 and H2O (Oluwoye et al., 2020). Rice husk has a high lignin content, so when placed and allowed to stand in an open space, it will retain its shape due to the difficulty of being degraded by microorganisms (Nugraha et al., 2020; Syafrudin et al., 2020). The lignin content in rice husk forms the outermost layer so that the contents, such as cellulose and hemicellulose, are difficult to decompose naturally (Matin & Hadiyanto, 2018). The utilization of rice husks, such as being used for planting media, then used as fuel for making bricks, is still very low and has not been able to reach all of the rice husks, especially during the main harvest. (Ahmed et al., 2015) states that socio-economic factors also play a role in the behavior of farmers in managing rice husk waste. Farmers who have quite a lot of livestock choose to use this waste as one of the raw materials for animal feed, but on the contrary, farmers who do not have livestock tend to burn the remaining agricultural waste directly. In addition, rice field areas that are worked directly by their owners will have different handling of rice husk waste compared to rice field areas that are worked on by land tenants, one of the indications is due to significant economic factors in the rice field cultivators.

Burning rice residue has many negative effects including local air pollution, an increase in black carbon, and a contribution to regional and global climate change (Ahmed et al., 2015). The smoke from burning rice husks is toxic to humans and animals. Air contaminated with pollutants from combustion can cause eye and nose irritation, difficulty breathing, coughing,

and headaches. People with heart disease, asthma, emphysema, or other respiratory ailments are particularly sensitive to air pollution. Other health problems exacerbated by burning waste include lung infections, pneumonia, bronchiolitis, and allergies (Budhy et al., 2021). Exposure to these SO2, CO, NO2, and PM10 substances and consuming food contaminated with ash and smoke in the long term has the risk of causing certain types of cancer, liver disorders, immune system disorders, and reproductive system disorders (Hu et al., 2020; Sunarsih et al., 2019).

Burning rice husks in paddy fields which are considered to be able to fertilize it, is another reason farmers do this. Whereas according to (Glushankova et al., 2018), rice husks burned in rice fields can cause nutrients to be lost, especially volatile nutrients. Loss of nutrients without being accompanied by the return of these elements into the soil will result in an imbalance of nutrients in it. It will reduce the level of soil fertility and lead to a decrease in crop production and productivity. (Ezyan & Hanuni, 2019) states that rice husk ash has benefits for the soil. Rice husk ash can accelerate the process of weathering and composting through the efficient absorption of nutrients. The total rice husk ash is only 7.5% and the composting process takes 48 days. In this condition, sample C achieved a ratio of N:P:K 3:8:9, 57.72% water content, and 69.86% water holding capacity. It should be noted that the total rice husk ash above 7.5% is ineffective and interferes with the composting process. As stated by (Glushankova et al., 2018), burning rice husks to ashes on agricultural land in large quantities can harm on soil nutrients.

In this section, a study on the effect of L-AD and SS-AD on the production of biogas

made from rice husk. In the L-AD variable, biogas appeared starting from the 8th day of 19 mL. This L-AD variable was recorded to produce a maximum daily biogas production of up to 56 mL on the 32nd day. Furthermore, on the SS-AD variable, biogas has appeared since the 2nd day of 25 mL. This SS-AD variable was recorded to produce a maximum daily biogas production reaching 107 mL on the 46th day. Cumulatively, biogas production at L-AD and SS-AD variables for 60 days was 433 mL and 1,278 mL. Cumulative biogas production in detail is in Figure 2.
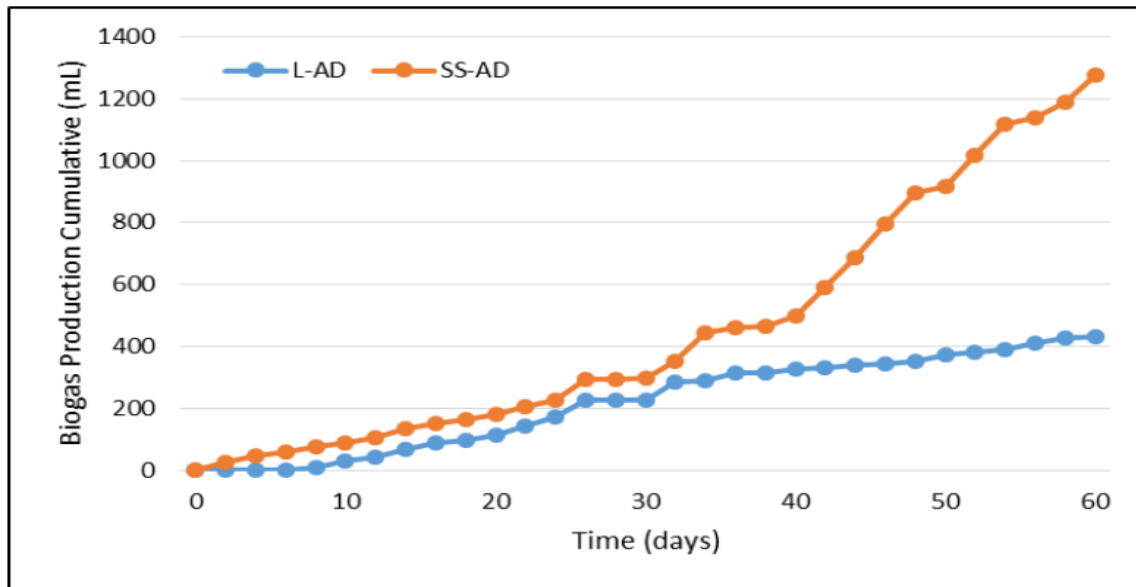

Figure 2. Biogas Production Cumulative on TS 7% (L-AD) and TS 17% (SS-AD)

When viewed cumulatively, as presented in Figure 2, the SS-AD variable shows significant biogas productivity compared to L-AD, with a biogas difference of up to 845 mL. However, if we examine deeper, the study of calculations per unit-TS, it is found that between L-AD and SS-AD, the difference in productivity is not too high. It can be seen in Figure 3, the cumulative biogas production on the L-AD variable is 61.8 mL.gTS-1 and on the SS-AD variable is 75.2 mL.gTS-1. The difference between the two is only 13.4 mL.gTS-1.
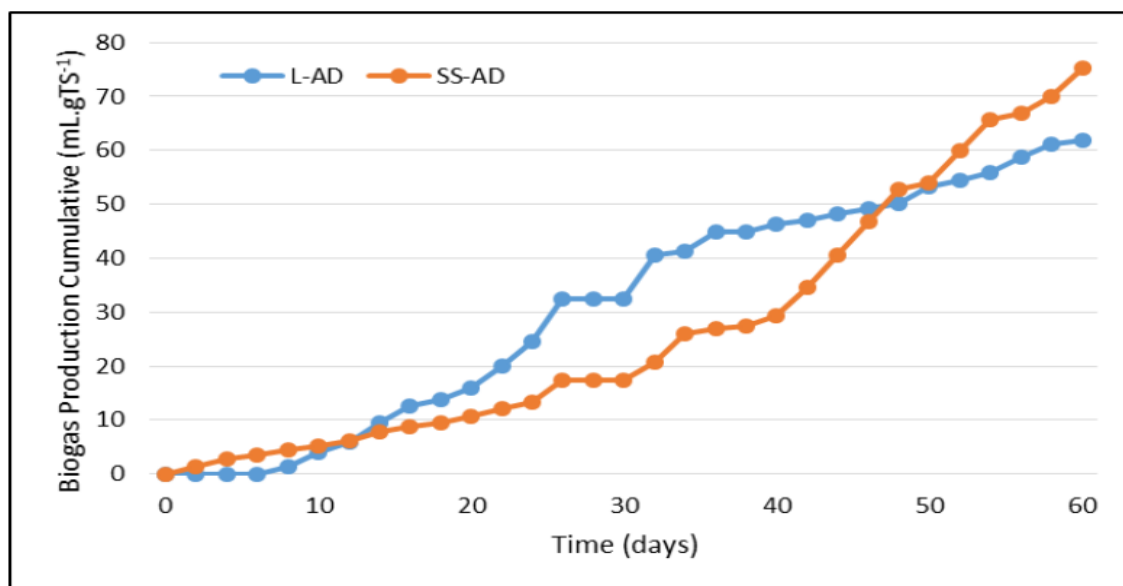

Figure 3. Biogas Production Cumulative per unit-TS on TS 7% (L-AD) and TS 17% (SS-AD)

When compared between the two, the difference in biogas production per unit-TS is not significant, but SS-AD has various advantages, so this variable is superior. Based on (Brown et al., 2012; Budiyono et al., 2021; Li et al., 2011; Matin & Hadiyanto, 2018; Yang et al., 2015), SS-AD has better biogas productivity, thus in one period of anaerobic fermentation, SS-AD can accommodate more solid waste so it can degrade more organic solid waste, and has a by-product in the form of organic fertilizer which is also more many.

The potential of rice husk waste as renewable energy in the form of biogas is very large, especially in an agricultural country like Indonesia (Nugraha et al., 2020). In Indonesia, in 2022, it will produce 55.6 million tons of dry-milled grain (GKG). From the GKG data, 64.02% goes into the rice, and the rest is rice husk waste. So the calculation is 35.98% become rice husks and its emergence in Indonesia in 2022 will reach 20 million tons. It is a big problem if not managed properly. If all of this waste is burned, what will happen is a massive degradation of health and environmental quality. However, if it is converted into renewable energy as biogas, the potential obtained is 1.5 million liters of biogas. If all generated rice husk waste can be managed properly, it can support energy security for Indonesia. On the other hand, sources of air pollution from agricultural activities, especially burning rice husks, can be significantly reduced.

Conclusion

The results of burning rice husks harm environmental health. It is indicated by the SO2 and PM10 parameters exceeding the quality standards, namely 167 and 132 µg/m3, and the NO2 parameter almost reaching the quality standard, namely 178 µg/m3. Generated rice husk can be converted into renewable energy as biogas with good productivity in SS-AD conditions, with biogas production reaching 75.2 mL.gTS-1. Rice husk to be used as biogas is very potent and can be done. Utilizing rice husk to become biogas can suppress the emergence of air pollutants from agricultural activities and can also be a source of energy security support for Indonesia.

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Complaints of Low Back Pain in Tailors

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Article Info

Abstract

Low back pain (LBP) is one of the musculoskeletal disorders as a result of incorrect ergonomics. The impact caused by low back pain is bad posture, stiffness, pinched nerve, and muscle weakness. This study aims to determine the relationship between ages, years of service, length of sitting, work posture, and the chair's ergonomics with complaints of low back pain in tailors at Pasar Petisah, Kota Medan, with 35 workers based on inclusion and exclusion criteria. The research tools are interviews, observations, and filling out questionnaires. This sampling technique is used purposive sampling methods. Data were analyzed using the STATCAL application with a 5% chi-square test. Based on the result, we concluded that there is a long relationship between ages (p=0,02), years of service (p=0,04), length of sitting (p=0,01), and work posture (p=0,03) with the occurrence of low back pain tailors. Tailors in the Petisah Market in Medan City are at risk for complaints of low back pain based on age, long years of service, a risky length of sitting, and a risky work posture. If the workers ignore low back pain, the impact is the emergence of serious problems such as stiffness in the spine, fractures, pinched nerves, and can even cause death.

Introduction

Low back pain (LBP) has been declared a burden of disease by WHO and reported as a significant cause of disability worldwide and continues to experience an increased incidence of cases. LBP ranked highest in all non-communicable disease cases (Mohideen, 2021). The prevalence in one year can reach up to 56%, and the lifetime prevalence is 84% (Arias-vázquez et al., 2020). LBP's etiology is multifactorial and classified according to the mechanism of injury, etiologic diversity, evolutionary time, and degree of radicular involvement (Schitter et al., 2022). These problems can be associated with various types of factors such as age, gender, decreased flexibility and muscle mobility, obesity, competitive sports, postural habits, non-ergonomic work, sedentary lifestyle, level of physical activity, smoking, and others (Akkarakittichoke & Janwantanakul, 2017; Quintino et al., 2017). Sitting longer than 7 hours per day can cause damage to the lumbar tissue system (Maradei García et al., 2016; Shenbagasundaram & Balasuburamaniam, 2017). The classification of LBP is divided into three types, namely: acute low back pain, which is characterized by pain that arises suddenly from daily activities in less than a week, sub-acute low back pain, which is characterized by pain that occurs continuously for 5-11 weeks, and chronic low back pain, which is characterized by serious injury from physical activity or an accident that causes spinal damage (Stevans et al., 2021; Traeger et al., 2019;

Xu et al., 2022). Based on the Riskesdas (Basic Health Research) (2018) results, the prevalence of musculoskeletal disorders in Indonesia that health workers have diagnosed is 11.9%, while based on diagnosis or symptoms is 24.7%. The number of people with LBP in Indonesia is unknown, but it is estimated that between 7.6% to 37% (Kementerian Kesehatan, 2018). In Medan City, a previous study reported the prevalence of LBP in tailors at 62,9% (Syaputra et al., 2022).

One type of work that can result in LBP complaints is tailoring. Tailors have a relatively high risk of developing LBP. In carrying out their duties, tailors will carry out sewing activities using rigid behavior. Constantly rigid behavior will be a dilemma for the tailor's health because it will suffer serious injury (Kamariah et al., 2020). Siswanti et al (2019) reported that musculoskeletal complaints in batik artisans were caused by bending and squatting activities during work (Siswiyanti et al., 2019). Stevans et al. (2021) used a descriptive study so that the characteristics of work with work attitudes at risk of LBP in France are unclear. Moreover, Munawarah & Segita (2021) study mentioned that years of service carried out by weavers have a higher risk caused by activities continuously over a period of years causing disturbances to the body. Putri et al. (2018) did not clearly state the length of time the tailor sat had no relationship with complaints of pain.

Although many studies have discussed the risk factors for LBP, few still discuss the ergonomics of the seat on the tailor, so further research needs to be done. Chair ergonomics is one of the factors that have an essential role in work. Chair ergonomics can not be separated from the choice of seat design. The criteria for selecting a chair design that is safe and comfortable when working is having a height and backrest that is in accordance with the BMI and the work table, the diameter of the seat mat, sturdy support legs, and no cracks. If workers choose ergonomic chairs, workers can avoid LBP complaints. Thus, researchers are interested in researching the complaints of LBP regarding the ergonomics of the tailor's chair. This study analyzes the effect of age, work posture, years of service, length of sitting, and chair ergonomics on complaints of low back pain in tailors.

METHOD

This study used quantitative research with a cross-sectional study design because, in this study, the dependent and independent variables were measured at the same time. This research was conducted at the tailor's location in the Petisah Market, Medan City, in February 2022. The population in this study was 35 tailors and, and all became respondents (total sampling).

Data collection in this study was by distributing questionnaires, The Pain and Distress Scale, and REBA to respondents, recording the measurement results on the research sheet form, and observing respondents at work. The Pain and Distress Scale is a measuring tool developed by William W. K. Zung M.D in October 1983. This questionnaire contains 20 statements in English and has been translated into Indonesian by the researcher. The score for the assessment of the answers in this questionnaire is divided into 3, namely: a score of 1 if the respondent answers "Never", a score of 2 if the respondent answers "Rarely", and a score of 3 if the respondent answers "often". The acute category is when the assessment score is below 20; sub-acute if the score is between 21-39; and chronic if the assessment score is above 40. In addition, the researcher also used the REBA (Rapid Entire Body Assessment) questionnaire developed by Beauty Kartika Widyasari in 2014. This questionnaire contains 16 statements with the category not at risk if the assessment score is less than 25 and risk if the score is between 26-48. The score of the answer assessment in this questionnaire is divided into 3, namely: a score of 1 if the respondent answers "Never", a score of 2 if the respondent answers "Rarely", and a score of 3 if the respondent answers "Always".

The data processing was carried out after all data has been collected from the workers. The first data processing carried out was the data editing stage to check the completeness of the data for each variable to be studied, data coding for manually coding each variable, data entry to enter data into data processing applications, and tabulating data to facilitate data processing. The results of the research analysis were

processed using the STATCAL data processing program and analyzed by univariate analysis to determine the distribution and frequency of the independent and dependent variables using the Chi-Square statistical test with a significance limit of p<a (a=0.05). The test results were presented as distribution tables and narratives to discuss the research results. This research has undergone an ethical review procedure and was declared ethical by the Universitas Prima Indonesia's Research Ethics Commission with Number: 010/KEPK/UNPRI/V/2022.

RESULT AND DISCUSSION

The characteristics of the respondents in this studyare in Table 1. Most age groups are at risk, 24 people (68.6%). The most working period is in the long working period, 25 people (71.4%). The highest length of sitting is found in the length of sitting that is not at risk, 18 people (51.43%). Most work postures are risky, 25 people (71.4%). Chair ergonomics are primarily found in ergonomic chairs, 35 people (100%). Most low back pains were in the sub-acute category, 23 people (65.7%).

TABLE 1. Characteristics of Respondents

Variables	Frequency	Percentage
Age		
≥ 35 years (at risk)	24	68,6
< 35 years (no risk)	11	31,4
Years of service		
≥ 5 years (long)	25	71,4
< 5 years (not long)	10	28,6
The Length of sitting		
≥ 8 hours (at risk)	17	48,6
< 8 hours (no risk)	18	51,4
Work Posture		
At risk	25	71,4
No risk	10	28,6
Chair ergonomics		
No	0	0
Yes	35	100
Low back pain		
Sub Acute	23	65,7
Chronic	12	34,3

Source: Primary Data, 2022

Figure 1 shows the line average and standard deviation between age and year of service with low back pain complaints. The average for people with years of service with

acute low back pain is 1 and 0. The average for people with years of service who have sub-acute low back pain is 1,222 and 0,428. The average for people with years of service who have chronic low back pain is 1,375 and 0,5. The average for people of age with acute low back pain is 1 and 0. The average for people with sub-acute low back pain is 1,389 and 0,502. The average for people with age with chronic low back pain is 1,25 and 0,447.

Figure 2 shows the average length of sitting, work posture, and chair ergonomics with low back pain complaints. The average for people with a length of sitting who have acute low back pain is 2 with 0, for people who have a sub-acute of low back pain 1,389 with 0,502 std deviations, and for people who have chronic low back pain 1,625 with 0,5. The average for people with work posture who have acute low back pain is 1 with 0, for people with sub-acute low back pain is 1,167 with 0,383, and for people with chronic low back pain is 1,438 with 0,512. The average for people with chair ergonomics who have acute low back pain is 2 with 0. So do people with sub-acute and chronic low back pain are 2 with 0.

Table 2 shows 13 people with sub-acute LBP at risk age (54.2%) and 11 with chronic pain (45.8%). Complaints of LBP at the age of no sub-acute risk were 10 people (90.9%), and chronic 1 person (9.1) with p-value = 0.03 and OR = 0.11. It means a relationship exists between age and LBP complaints on tailors at the Medan Petisah Market. Age has a risk relationship of 0.11 times, causing complaints of LBP in tailors. The values of 95% Cl lower and upper are 0.013 and 1.074. It means that age is at least 0.013 times more at risk of experiencing LBP complaints, while the highest is 1.074 times more at risk of complaining of LBP. Age has a significant relationship with low back pain complaints, which is also supported by the research of Yang et al. (2016), which noted that 23.8% of people aged 18-40 years were at risk of experiencing low back pain. Research conducted by Kanniappan & Palani (2020) stated that the age above 30 years had a 3.3 times risk of developing LBP in tailors in India. Another study reported that LBP experienced by workers aged over 45 years old can have an impact on decreasing worker ability and

productivity (Bayattork et al., 2019; Marklund et al., 2020). Everyone who has experienced LBP complaints is caused by a decrease in calcium levels in the bones. In another sense, age is a determining factor for people who experience pain in the spine (Wu et al., 2020).

The highest global incidence occurs in people who experience complaints of low back pain, including stiffness, numbness, tingling, aches, and the most chronic can experience paralysis of the body (Fatoye et al., 2019).
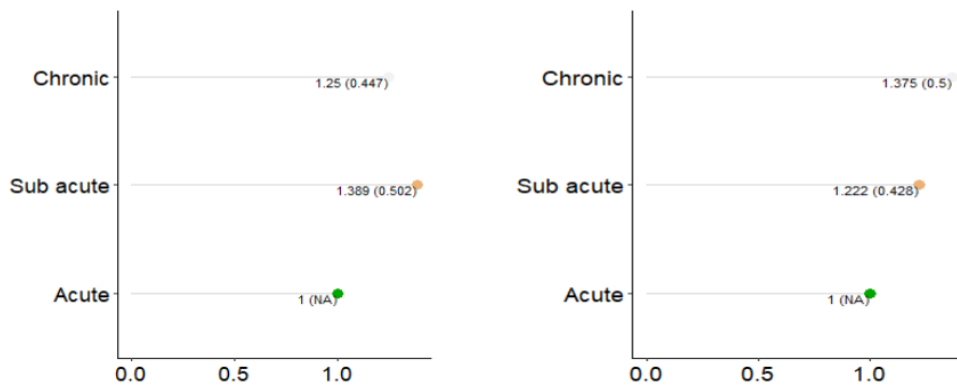

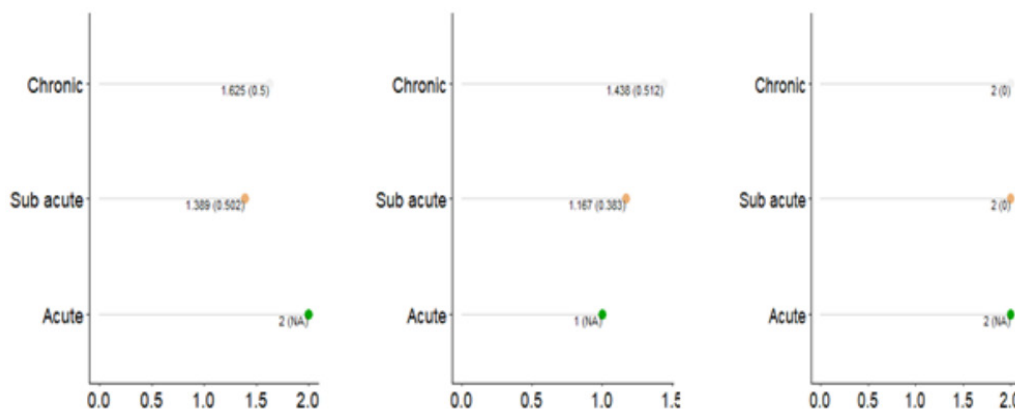FIGURE 1. The Average Between Age and Year of Service with Low Back Pain Complaints

FIGURE 2. The Average between Length of Sitting, Work Posture and Chair Ergonomics with Low Back Pain Complaints

Among people who work for long years of service, 19 have sub-acute complaints (76.0%), and 6 (24.0%) have chronic complaints. Respondents with short years of service experienced complaints of subacute LBP as many as 4 (40.0%) and chronic LBP complaints as many as 6 (60.0%) with p-value = 0.04 and OR = 4.75. Therefore, there is a relationship between years of service and LBP complaints to tailors at the Petisah market in Medan City. Years of service have a relationship of 4.75 times causing LBP complaints to tailors. The values of 95% Cl lower and upper are 0.995 and 33,673. This means that the years of service are at least 0.372 times more at risk of experiencing LBP

complaints, and the largest is 6.047 times more at risk of complaining of LBP.

Years of service are a risk factor for back pain. The study's findings align with the research of Goncharenko et al. (2020) showed that years of service are associated with low back pain. A study by Kiadaliri et al (2021) explained that years of service at the age at risk had a relationship of 2.3 times with complaints of low back pain. Then, a study by Mohamed & Amer (2019) mentioned that the years of service that are at risk for all health workers in Saudi Arabia dodoes not have a significant relationship with LBP complaints because workers are always actively moving to provide services even though

their work shifts are classified as vulnerable. According to Ali et al., (2020), the longer a person does the job, the higher the risk for LBP. Symptoms that occur if a person is exposed to chronic LBP when the individual has been working for a long time are stiffness due to

lack of movement, psychological problems, dissatisfaction with the work environment, and working with a monotonous posture (Wami et al., 2019). People with longer years of service have experienced subacute and chronic LBP due to

TABLE 2. Factors Affecting Complaints of Low Back Pain

Variable	Complaints of LBP		OR	p	95% Cl	
	Sub Acute	Chronic			Lower	Upper
	n(%)	n(%)				
Age						
≥ 35 years (at risk)	13(54,2)	11(45,8)	0,11	0,03	0,013	1,074
< 35 years (no risk)	10(90,9)	1(9,1)				
Years of service						
≥ 5 years (Long)	19(76,0)	6 (24,0)	4,75	0,04	0,995	22,673
< 5 years (Not long)	4(40,0)	6(60,0)				
The Length of sitting						
≥ 8 hours (at risk)	14(82,4)	3(17,6)	4,66	0,04	0,989	22,030
< 8 hours (no risk)	9(50,0)	9(50,0)				
Work Posture						
At risk	19(76,0)	6(24,0)	4,75	0,04	0,995	22,673
No risk	4(40,0)	6(60,0)				

Source: Primary Data, 2022

(17.6%). Length of sitting not at risk for subacute LBP is 9 people (50.0%), and chronic 9 people (50.0%) with p-value = 0.04 and OR = 4.66. It means there is a relationship between the length of sitting and LBP complaints on tailors at the Petisah market in Medan. The length of sitting has a relationship of 4.66 times, causing complaints of LBP in tailors. The values of 95% Cl lower and upper are 0.989 and 22.030. It means that the length of sitting is at least 0.989 times more at risk of experiencing LBP complaints, and the largest is more at risk of 22,030 times complaining of LBP.

The relationship between the length of sitting and LBP appears controversial, as seen in research studies by Amalia (2019) showed no significant relationship between the length of sitting and a higher risk of LBP. However, this study contradicts the research of Gupta et al. (2015) shows that workers who sit for more than 5 hours have 3 times the risk of LBP. Long sitting is at risk of experiencing subacute and chronic low back pain complaints due to static sitting for hours to pursue the target order every day. However, long sitting that is not at risk has experienced complaints of low back pain due to not stretching the muscles and the habit of

sitting for a relatively long time. Long sitting also causes muscle stiffness in the buttocks area (Wuni et al., 2021). In addition, other aspects of sitting behavior may have a critical relationship with LBP in many workers (Nourollahi et al., 2018). Chronic symptoms caused if the individual's sitting behavior begins to feel pain for a long time is a change in the shape of the spine and tail. It suggests that individual sitting length may be associated with LBP (Bontrup et al., 2019).

People with work postures at risk of subacute LBP are 19 people (76.0%) and six people with chronic (24.0%). There are 4 people at risk for subacute LBP (40.0%) and 6 (60.0%) chronic ones with p-value=0.04 and OR=4.75. It means a relationship exists between work posture and LBP complaints on tailors at the Petisah Market, Medan City. Work posture has a relationship of 4.75 times, causing complaints of LBP in tailors. The upper and lower 95%Cl values are 0.995 and 22.673, respectively. It means that the work posture is at least 0.995 times more at risk of complaining of LBP, and the highest risk is 22.673 times more complaining of LBP.

Work posture is one of the factors in

supporting one's work. It is supported by Imaekhai (2018) research which stated that the prevalence of fisherman work postures in Nigeria is 87% and has a risk of 7 times arising from complaints of low back pain. If a person's work posture is ergonomic, he will be more productive at work (Murata et al., 2021). The epidemiology of low back pain cases in China explains that work postures have a high risk of low back pain complaints. About 85% of workers in China who have poor work postures significantly affect the structure of the spine of workers. Work postures that are not ergonomic can cause complaints quickly (Hartvigsen et al., 2018). Uncomfortable work posture is related to age, gender, BMI, stress, anxiety, and depression (Mehrdad et al., 2016). Monotonous work postures carried out continuously for a long time have triggered complaints in the spine so that the flow of blood and oxygen to the muscles becomes blocked (Wan et al., 2017). Work must be more careful in this case and immediately check yourself so as not to experience serious complaints.

Ergonomics is an applied art used by workers to harmonize all facilities in the work environment. This research is inversely

proportional to the study of Firdaus (2020), which states that an ergonomic chair has a 4.4 times risk of developing low back pain complaints. An example of an application in ergonomics is the application of a worker's chair or bench. Sitting in a chair with back support has the effect of lowering the chances of LBP. Lumbar support has been widely recommended because of its well-known function of maintaining the integrity of the lower back curve, thereby reducing the risk of LBP (Diallo et al., 2019). Something is ergonomics if workers do not feel complaints while working. LBP and chair ergonomics must be harmonious with worker comfort (Vanni et al., 2022). The main principle of chair ergonomics is to adjust to the curvature of the spine, affect body biomechanics and have a backrest. In a safe seat design, the chair must be sturdy so that the user feels a comfortable sensation (Yuldashevich & Sadilloyevich, 2021). The strategy needed in emphasizing ergonomics is to provide education and intervention to individuals that can influence worker behavior in using chairs. It is done to prevent LBP and change worker behavior (Sowah et al., 2018).

TABLE 3. Multivariate Analysis Results

Low Back Pain Complaints Factors	p	95%Cl for EXP (B)	
		Lower	Upper
Age	0,034	1,097	1,421
Years of Service	0,044	1,179	1,495
Length of Sitting	0,045	1,395	1,746
Work Posture	0,044	1,179	1,495

Source: Primary Data, 2022

Table 3 shows the results of a multivariate analysis of factors for low back pain complaints. The most influential variable on the occurrence of LBP complaints is the age factor with a p-value = 0.034 with 95% Cl values are 1.097 and 1.421. It means that age is the most influential factor in LBP complaints. The risk of at least causing LBP is 1.097, and the maximum is 1.421. When the workers get aging, they begin to feel pain, such as form of tissue damage, changes in posture and reduction of fluid (Shariat et al., 2018). Age and a work posture can reduce productivity or increase productivity. The limitation of this research is that it uses a cross-sectional research design so that this study only describes the

overall types of variables to be studied. So, in future research, the researcher suggests using a case-control or cohort research design to get clear and accurate results.

CONCLUSION

Tailors in the Petisah Market in Medan City are at risk for complaints of low back pain based on age, long years of service, a risky length of sitting, and a risky work posture. If the workers ignore low back pain, the impact is the emergence of serious problems such as stiffness in the spine, fractures, pinched nerves, and can even cause death. Researchers recommend that health workers provide promotional and

preventive actions regarding low back pain problems, especially to tailors, so as not to cause severe low back pain injuries. The market party should pay more attention to the health and safety of tailors. So tailors become more productive to avoid low back pain and form collaborations with the health department to carry out health checks. Finally, tailors should be more concerned with their health condition so that they do not get low back pain by forcing activities that are too strenuous and applying practical and correct work postures.

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